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2nd International HISPA BH Congress **Comprehensive approach in heart and blood vessel protection – post-COVID-19 era**

Bijeljina, the Republic of Srpska, Bosnia and Herzegovina, 1-3 April 2022



Organised by:

Hypertension, Infarction & Stroke Prevention Association (HISPA)
International Society for Vascular Health (ISVH)
General Hospital "Sveti Vračevi" Bijeljina, RS

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Editorial office

EDITOR-IN-CHIEF

Miloš P Stojiljković

Technical Editor

Dragan Prlja

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2nd INTERNATIONAL CONGRESS

HISPA BH & ISVH

**Comprehensive approach in heart and blood vessel protection
– post-COVID-19 era -**

Organised by

Hypertension, Infarction & Stroke Prevention Association (HISPA)

International Society for Vascular Health (ISVH)

General Hospital "Sveti Vračevi" Bijeljina, RS

1 – 3 April 2022

Ethno Village Stanišići, Bijeljina, RS, B&H



Dear participants of the Second International Congress of the Hypertension, Infarction, Stroke and Prevention Association (HISPA) and the International Society for Vascular Health and Aging (ISVH), entitled "Comprehensive Approach to Cardiovascular Protection - Post-COVID-19 Era"

Dear colleagues,

With special pleasure, as the President of the Organising Committee and as your host, I welcome you to this important international scientific conference, with sincere wishes that you feel at home in our city.

The fact that our Hospital "Sveti Vračevi" and our city were chosen as the organisers of this congress is a flattering recognition for us, but also a great obligation and responsibility.

In the heart of the Semberija plain, Bijeljina is a city of special beauty, with exceptional cultural and historical values, a city of sensibility and wonderful hospitable people. Surrounded by two large rivers, the Drina and the Sava, in an attractive geographical position - on the border of Serbia, Croatia and the Republic of Srpska, ie B&H, Bijeljina is a centuries-old crossroads not only of people, religions and states, but also diverse ideas, cultural and health projects and programs. HISPA Congress will enable not only health workers, but also the population to get acquainted with the latest achievements in the fight for human health, which is especially important in these difficult conditions of the pandemic.

During the congress, in addition to active participation in the scientific part of the Congress, there will be space and time to get acquainted with important cultural and historical monuments, customs and heritage of this region.

Once again, I wish you a warm welcome to the Second International Congress of HISPA BH and ISVH with the conviction that this Congress will bring significant progress in the approach to protection of the heart and blood vessels in the post-COVID-19 era and that positive experiences from this gathering will be the biggest stimulation of our activities in the coming years.

Sincerely yours,

Zlatko Maksimović

President of the Organising Committee

Director of the General Hospital "Sveti Vračevi", Bijeljina



Dear colleagues,

On behalf of the Scientific Committee and the Association of Centers for Hypertension, Infarction and Stroke Prevention (HISPA) and the International Society for Vascular Diseases (ISVH), it is my great pleasure to wish you a warm welcome to the heart of Semberija, Bijeljina, the Republic of Srpska and Bosnia and Herzegovina, at the crossroads of the Western Balkans countries.

It is my great honour to invite you to socialise and work at the second International Congress of HISPA BH and ISVH "Comprehensive approach to the protection of heart and blood vessels - post-COVID-19 era" organised by HISPA BH and ISVH, which will be held in Bijeljina from 1-3 April 2022 in the Congress Centre of the Ethno Village Stanišići.

Today, cardiovascular diseases are the leading cause of death in women and men in Europe, while in Western Balkan almost every second inhabitant dies from heart and blood vessel diseases. What must be pointed out is that as many as 80 % of these deaths can be prevented by adequate reduction of risk factors. Faced with such problems, as well as the epidemic of SARS-CoV-2 virus which ruthlessly destroys blood vessels and heart as well as the organism as a whole, it is necessary to mobilise all segments of society in defense of public health and especially multidisciplinary approach in prevention and treatment.

Over the past 10 years, HISPA has demonstrated and proven its significant role in a personalised approach to the treatment and education of patients, as well as the education of physicians, technicians and society as a whole. Doctors and technicians will present their original scientific papers at this traditional congress, which is being held under the "dark cloud" of COVID-19 and post-COVID-19 pandemic. The International Society for Vascular Diseases (ISVH) also organises its sessions with the active participation of a large number of prominent world experts in the field of cardiovascular pathology. What we always emphasise is that the motto of our congresses is: "science applied in clinical practice". I would like to especially thank the pharmaceutical industry and other manufacturers and companies for generous help in organising this Congress. Also many thanks to HISPA members, colleagues and friends for their help.

Sincerely yours,

Nebojša Tasić
President of the Scientific Committee
President HISPA, President ISVH,
Assistance Director, Cardiovascular Institute "Dedinje", Belgrade, Serbia.



INTRODUCTORY SPEECH

Professor NEBOJŠA TASIĆ

**AT THE OPENING OF THE SECOND INTERNATIONAL CONGRESS HISPA BH & ISVH
COMPREHENSIVE APPROACH IN HEART AND BLOOD VESSELS PROTECTION- POST-COVID-19 ERA,
BIJELJINA 1 - 3 April 2022.**

Powerful and precious are motifs imparted on us by Saints Damian and Cosmas - physicians, healers, medics, through Bijeljina mentioned many times, mentioned in part as the name of the hospital that helped shape our Congress - the Holy sorcerers. Of all the linguistic endowments the people had bestowed upon the healing brothers, I cherish the SILVERLESS most. I am proud that they are part of my people's story of a centuries-long medical heritage.

As relentless followers of the path that Saints Damian and Cosmas plotted in the early days of Christianity, we are today, perhaps more than ever, obliged to approach every case with equal love and devotion, be it a beggar or a king. At last, throughout this pandemic, it wasn't just our medical and scientific readiness that were put to the test, but our very human dimension as well: solidarity, selflessness, compassion, love, professional and human honour - everything that the saintly brothers had, were loved and cherished for, even to this day. We are their descendants - doctors, physicians, healers, medics and we still walk the same path they've established, entrusting us with the vow of physician's honour: immutable and eternal regardless of era or novelty of disease.

Centuries pass, times change, man is toying with the cosmos, with artificial intelligence, information travels at inconceivable speeds, medicine advances in ever-growing synergy with other sciences. Powerful feels the man in his comfort zone, forgotten has he the value system on which the teachings of the holy sorcerers are rooted upon. And then, like a reminder of how vulnerable we truly are, the SARS-CoV-2 virus came with the intention of staying with us forever. It came to serve as a planet-wide temptation that we will deal with sometime in the future. And sometime in the future is here. At last, on this Congress, we are linking conditions of the heart and blood vessels with the conditions risen from the pandemic and we are observing associations and seeking solutions.

As an international society stemming from 85 centres out of seven countries, counting as many as 1,500 doctors and medical workers, we all have a common denominator - to prevent cardiovascular diseases. Throughout this second international HISPA Congress in Bijeljina, the already familiar diseases are considered along with the novel complications that surfaced with the virus. And the common denominator of the association, even with the additional layer of complexity, is still the same - seek solutions, seek prevention. After all, when the tests confirm that the infection has been overcome, a number of questions still remain, the most important questions remain for us, related to the devastating effect that the SARS-CoV-2 virus has on the cardiovascular organs, especially once it interacted with previously ill heart and blood vessels. The theme of our second HISPA BH & ISVH International Congress is the comprehensive protection of the heart and blood vessels, the post-COVID-19 era.

We are both puzzled and provoked by our enemy, even though we uncover its most intricate mechanistic underpinnings every day, its actions, mutations, ways in which it adapts and shapeshifts. However, the individual puzzle remains, why do some succumb and why are some spared? What does survival depend on is the question above all questions to which we tirelessly seek the answer. In our medical sphere dedicated to the heart and blood vessels, the answers are hidden in an ever-tilting causal relationship,



this often fatal encounter of chronic heart disease and SARS-CoV-2 virus, their tussle, coexistence, consequences, during active infection and in the lengthy period after it's over.

On one hand we have the answer seeking, on the other HISPA's tireless struggle to preserve health through prevention, to pharmacologically and non-pharmacologically boost the immune response, all while treating the infection and expeditiously rehabilitating the patient. The bottom line is that even without pre-existing cardiovascular conditions, after the infection has passed, the consequences persist primarily on the cardiovascular organs that are as equally challenging and often left unanswered.

Dear friends, dear co-combatants, who in honour and dedication press on with us in the footsteps of Saints Damian and Cosmas,

Thank you for acknowledging the importance of our meeting, for sharing knowledge, scientific information, for perceiving yourselves as doctors of the world and scientists that find every corner of this planet equally important and who selflessly donate their expertise to each other, to humanity. That is why we, as our famed physician ancestors whose name graces the hospital in Bijeljina, are the silverless too.

It may resonate a bit oddly to some of you the fact that we speak of the post-COVID-19 era, even though the pandemic is still quite active and ongoing. That is because HISPA always moves to intercept events, which in itself is prevention in anticipation of what is coming. Not waiting for the problem to manifest itself in the present, but always being ready to face it while it's still a distant threat, an announcement. This kind of visionary approach, of foresight, helps us as an international society to be more efficient in prevention and preservation of health. We adhere to the modern methods of prevention, moreover, we design and improve upon them, we participate in the exchange of knowledge and rehabilitation programmes, and in this case in the course of and after a COVID-19 infection. For us at HISPA every convalescent is a story on its own and that is why everyone gets a carefully designed and uniquely tailored personal recovery program.

We are locked in constant battle with our greatest enemy - ignorance. But, we have the upper hand, the holy trinity if you will: prevention, cooperation and education of our patients and our colleagues.

If our old folk saying is true that in every evil there must be some good, then during the time of the pandemic, a time that has taken on the proportions of biblical evils, prevention finally proved to be that grain of good. Indeed, prevention, often overlooked, now finally acknowledged as an aiding and indispensable link in the chain of individual health preservation and perhaps, the survival of humanity. That is why our duties are more noticeable now and even more is expected of us and that is good, because that is the purpose of HISPA.

As of today, until the end of the Congress, Bijeljina is the world capital of preventive medicine. In good faith we trust that the Congress is a major step towards a triumph of medicine over the virus. Bijeljina, to that end, is becoming a conduit of significant works, presentations and scientific contributions to the medical academic community across the world that still tirelessly battles COVID-19.



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General Hospital “Sveti Vračevi” Bijeljina, RS

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Congress topics

1. COVID-19 and post-COVID-19? Health, social and phenomenological problem.
2. Prevention of myocardial infarction and stroke in the post-COVID-19 era. Family medicine doctor as a basic pillar of protection.
3. Prevention vs intervention. What have we learned in the 21st century?
4. Rhythm disturbances in COVID-19 epidemic and post-COVID-19 syndrome - modern therapeutic approach.
5. Hypertension - from prevention to denervation. A comprehensive approach to long-term protection.
6. Diabetes mellitus - a multidisciplinary approach in the protection of all organs.
7. Dyslipidaemia - Do we have an effective solution for fatty plaques in blood vessels?
8. Stroke prevention: an imperative of post-COVID-19 time.
9. Food, stress, physical activity, smoking, sleep apnoea: five riders of the modern apocalypse.



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Leukocytes as COVID-19 Diagnostic "Messengers"

Andrea Tomić,¹ Biljana Vukojević Jelić,¹ Radoslav Nikolić,¹ Danijela Tasić,² Zorana Kovačević,² Nebojša Tasić²

Abstract

Background / Aim: In order to overview the immune system reaction to COVID-19 infection and to better understand pathophysiological processes during infection, we need to return to the very core of the immune response. The aim of this study was to determine whether leukocytes (Le) are messengers of COVID-19 infection.

Methods: The laboratory value of total Le was analysed, their current number according to the type of Le and the correlation with the level of C-reactive protein (CRP) in 240 patients positive for SARS-CoV-2 were determined. The analysis was performed in three family medicine teams for the period from December 2020 to March 2021 and the period from October 2021 to January 2022. The values of the findings in these two categories were compared and the behaviour of the Le response through these time and age categories were monitored.

Results: In the group analysed in 2020/2021 (Alpha and Delta Coronavirus Variants) out of 125 COVID-19-positive patients, leukopenia was present 28.5 %, no patient had Le 10.1 or more, lymphopenia was present in 28.5 %, neutrophilia in 23.8 %, monocytosis in 33.3 %, while CRP was elevated in 38 %. In group 2021/2022 (Omicron Variant) leukopenia was present in 29.6 % patients, leucocytosis in 11.1 %, lymphopenia in 14.8 %, lymphocytosis in 29.6 %, while elevated CRP level was present in 37 % of patients.

Conclusion: These values of laboratory findings indicated the final mutation of the virus into a milder form, although there were sporadic severe cases in which the reaction was mixed or the presence of only older strains of the virus, more often in elderly patients. Considering the monitoring of Le behaviour in the current infection, but also over a period of 3 years, Le could be characterised as messengers of COVID-19 infection with a major role in the prognosis on the course of the disease.

Key Words: COVID-19; Immune response; Leukocytes.

1. Primary Health Care Centre Doboj, Doboj, the Republic of Srpska, Bosnia and Herzegovina.
2. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
ANDREA TOMIĆ
E: tomic.andrea@gmail.com

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Introduction

In order to overview the immune system reaction to COVID-19 infection, we need to return to the very core of the immune response. Immunity can be innate and acquired. The function of the immune system is to protect the body from all factors that could damage our health. The immune system is activated every time any foreign particle or organism is found in the human body, most often microorganisms (bacteria, viruses,

fungi), as well as particles of pollution, toxins and we call such factors antigens. There are millions of antigens that can have even minor differences and which the immune system recognises and against which it starts a reaction called the immune response.¹

Innate immunity consists of several non-specific defence mechanisms and we are born with it.

It naturally forms a barrier ie, the first line of defence of the organism from harmful influences. Innate immunity consists of natural barriers such as: skin, mucous membranes, certain types of white blood cells. These barriers are ready to neutralise harmful effects on the organism at any time, but they are not “specialised” for any type of microorganism and this immunity does not have a memory function for different microorganisms, whose presence is undesirable.

Passive innate immunity is acquired based on antibodies created in the mother’s body, which are transmitted through the blood via placenta to the baby’s bloodstream. Active innate immunity is acquired during infection, when microorganisms penetrate the body and thus activate immune cells that actively neutralise them.

There are three main types of white blood cells. Granulocytes are the most abundant type of leucocyte and make up the majority of white blood cells in the peripheral circulation. They are formed in the liver in the foetus and in children and healthy people in the bone marrow. There are three types of granulocytes: neutrophils, eosinophils and basophils.

Monocytes are cells that, when they pass from the circulation to other tissues, develop into macrophages and dendritic cells. Monocytes are formed in the bone marrow. Macrophages then act as “vacuum cleaners” that, like neutrophilic granulocytes, are able to phagocytose (“eat”) the remains of dead cells from the body. Unlike neutrophils, however, macrophages can phagocytose whole cells. In addition, they participate in the presentation of parts of pathogenic organisms to lymphocytes, so that they can recognise and destroy them (T lymphocytes) or create appropriate antibodies (B lymphocytes).

And the third group, such as lymphocytes, belongs to acquired immunity. Acquired immune systems develop and respond specifically to each antigen. It remembers encounters with unwanted microorganisms and is able to apply the same immune response to infection that it applied during the previous encounter with it. B and T lymphocytes, which belong to white blood cells, are important for specific or acquired immunity. They are formed in the spleen and in smaller quantities in the bone marrow. They mainly circulate in the lymphatic system and exist in three types: B-cells, T-cells and killer cells. Their main feature

is that they become able to recognise foreign antigens. B-cells produce antibodies that bind to pathogens in order to enable their destruction, sending a signal to phagocytes to eliminate this antigen-antibody structure from the body.

T lymphocytes attack viruses more directly and eliminate them themselves, which is why they have a leading role in protecting the organism from diseases. They do not produce antibodies but secrete cytokines that destroy damaged cells. T-cells exist as: cytotoxic T-cells, helper T-cells and as suppressor T-cells. Only cytotoxic cells directly participate in the destruction of cells that are infected with the virus, while helper and suppressor T-cells have a regulatory role that modulates the behaviour of other cells of immune system.

Based on all the above, it can be concluded that the acquired immunity of the organism has four phases. In the first phase, antigen is recognised, which automatically starts the second phase – the activation of lymphocytes (B and T). In the third, effector phase, the antigen is eliminated, while in the fourth, the memory of this “meeting” of infection and the immune system is created and stored, based on which the same immune response of the organism occurs with the reappearance of the antigen.

Thus, antibodies are substances produced by B lymphocytes and they are also called immunoglobulins and antigens are substances that cause the body’s defence reactions. Their mutual connection is created the moment the organism recognises the presence of antigen and begins to produce antibodies that provide an immune response to infection. Reactants of acute inflammation are plasma proteins whose concentrations increase dramatically with tissue injury or infection. The concentration of C-reactive protein (CRP) and lectin increases the most.

The CRP serves as an inflammatory marker, which is why it is an important indicator of inflammation, tissue necrosis or trauma and is produced by the liver and fat cells (adipocytes). The concentration in the blood reaches its maximum in one to three days, after the previous increase in the concentration of interleukin.⁶ Its roles are numerous: complement activation, suppression or activation of certain types of T-lymphocytes and production of some cytokines, the possibility of binding bacterial polysaccharides and phos-

pholipids from tissues damaged by inflammation, trauma or infection.

Aim

Aim of this study was to determine whether leukocytes could be a messengers of COVID-19 infection.

Methods

Analysis of the laboratory values of total leukocytes, determination of their current number according to the type of leukocytes and determination of the correlation with the level of CRP in 240 patients positive for COVID-19 was performed. The analysis was performed in three family medicine teams for the period from December 2020 to March 2021 and the period from October 2021 to January 2022. The values of the findings in these two categories were compared and the behaviour of the leukocyte response through these time and age categories was monitored.

Results

This study included 240 patients from two family medicine teams, who had positive PCR test for SARS-CoV-2 in two periods: from 2020 to 2021 (125 patients) and from 2021 to 2022 (115 patients).

In 2020/2021 (Alpha and Delta Coronavirus variants), out of 125 patients, 64 (51.2 %) were female and 61 (48.8 %) were male. Data gathered from laboratory analysis are shown in Table 1.

Table 1: Laboratory analysis data gathered from 125 patients in period 2020/2021

Laboratory analysis	Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	62
	> 10.1	9
Lymphocytes %	< 21.0	48
	> 40.1	14
Neutrophiles %	< 50.1	33
	> 70.1	30
Monocytes %	> 10.1	34
Eosinophiles %	> 5.1	3
C-reactive protein (mg/L)	> 5.1	56

The same immune response parameters in different age groups were analysed. In age category 34 years old or younger, there were 21 patients (17 %) and the results are shown in Table 2.

Table 2: Laboratory analysis data gathered from 21 patients (17 %) that were 34 years old or younger, in period 2020/2021

Patients that were 34 years old or younger		
Laboratory analysis	Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	6
	> 10.1	0
Lymphocytes %	< 21.0	6
	> 40.1	2
Neutrophiles %	< 50.1	9
	> 70.1	5
Monocytes %	> 10.1	7
Eosinophiles %	> 5.1	0
C-reactive protein (mg/L)	> 5.1	8

Another age group, 80 patients from 35 to 64 years old, was also analysed for the same parameters, as shown in Table 3.

Table 3: Laboratory analysis data gathered from 81 patient (64.8 %) that were between 35 and 64 years old, in period 2020/2021

Patients that were between 35 and 64 years old		
Laboratory analysis	Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	39
	> 10.1	5
Lymphocytes %	< 21.0	28
	> 40.1	12
Neutrophiles %	< 50.1	20
	> 70.1	16
Monocytes %	> 10.1	24
Eosinophiles %	> 5.1	3
C-reactive protein (mg/L)	> 5.1	29

Finally, the same parameters in patients 65 or older were analysed, the 23 (18.3 %) of them and the results are shown in Table 4.

Table 4: Laboratory analysis data gathered from 23 patients (18.3 %) that were 65 or older, in period 2020/2021

Patients that were 65 or older		
Laboratory analysis	Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	8
	> 10.1	9
Lymphocytes %	< 21.0	14
	> 40.1	0
Neutrophiles %	< 50.1	1
	> 70.1	12
Monocytes %	> 10.1	3
Eosinophiles %	> 5.1	0
C-reactive protein (mg/L)	> 5.1	19



In the period 2021/2022 (Omicron Variant), out of 115 analysed COVID-19 positive patients, 77 (67 %) were female and 38 (33 %) were male. Data gathered from laboratory analysis are shown in Table 5.

Table 5: Laboratory analysis data gathered from 115 patients in period 2021/2022

Patients that were 65 or older			
Laboratory analysis		Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	31	26.9
	> 10.1	13	11.3
Lymphocytes %	< 21.0	19	16.5
	> 40.1	29	25.2
Neutrophiles %	< 50.1	49	42.6
	> 70.1	13	11.3
Monocytes %	> 10.1	22	19.1
Eosinophiles %	> 5.1	17	14.7
C-reactive protein (mg/L)	> 5.1	59	51.3

Again, patients were distributed in different age groups and then the same laboratory parameters of immune response were analysed. In age category 34 years old or younger, there were 27 patients (23.4 %), results are shown in Table 6. Another age group, 60 (52.1 %) patients from 35 to 64 years old, was also analysed in the same manner, as shown in Table 7.

Table 6: Laboratory analysis data gathered from 27 patients (23.4 %) that were 34 years old or younger, in period 2021/2022

Patients that were 34 years old or younger			
Laboratory analysis		Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	8	29.6
	> 10.1	3	11.1
Lymphocytes %	< 21.0	4	14.8
	> 40.1	8	29.6
Neutrophiles %	< 50.1	12	44.4
	> 70.1	3	11.1
Monocytes %	> 10.1	4	14.8
Eosinophiles %	> 5.1	4	14.8
C-reactive protein (mg/L)	> 5.1	10	37.0

Table 7: Laboratory analysis data gathered from 60 patient (52.1 %) that were between 35 and 64 years old, in period 2021/2022

Patients that were between 35 and 64 years old			
Laboratory analysis		Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	18	30.0
	> 10.1	4	6.6
Lymphocytes %	< 21.0	9	15.0
	> 40.1	13	21.6
Neutrophiles %	< 50.1	25	41.6
	> 70.1	4	6.6
Monocytes %	> 10.1	12	20.0
Eosinophiles %	> 5.1	11	18.3
C-reactive protein (mg/L)	> 5.1	32	53.3

Table 8: Laboratory analysis data gathered from 28 patients (24.3 %) that were 65 or older, in period 2021/2022

Patients that were 65 or older			
Laboratory analysis		Total number of patients	Percent (%)
Total leukocytes (10 ⁹ /L)	< 4.1	5	17.8
	> 10.1	6	21.4
Lymphocytes %	< 21.0	6	21.4
	> 40.1	8	28.5
Neutrophiles %	< 50.1	12	42.8
	> 70.1	6	21.4
Monocytes %	> 10.1	6	21.4
Eosinophiles %	> 5.1	2	7.1
C-reactive protein (mg/L)	> 5.1	17	60.7

Finally, the same parameters in patients 65 or older were analysed, the 28 (24.3 %) of them and the results are shown in Table 8.

Discussion

From the insight into laboratory parameters of patients who were positive to SARS-CoV-2, it can be concluded that infection induces both innate and acquired immune response. In original variant of SARS-CoV-2 it was observed a drop in total leukocyte count and a rise in neutrophil count and a drop in lymphocyte count. In a vast number of cases, raised monocyte count can be seen, which can be an explanation for symptoms such as muscle pain and fatigue. The human organism is fighting the new agent by phagocytosis or destruction of SARS-CoV-2 particle in order to present fragments of the virus as antigens. The process leads to smaller or bigger increase in CRP, depending on the severity of clinical presentation.^{1,3}

Severe clinical presentation and laboratory values are expected in elderly. Infection is almost equally distributed between genders, with slightly higher number in the female population. Infection seems to occur in significantly smaller numbers in younger population (18 years or younger). On the contrary, virus variant that occurred in the period 2021/2022, strucked females in significantly higher number.

A possible sign of the new variant of SARS-CoV-2 virus can be observed in smaller number of lymphocytes immune response. In contrast, the number of neutrophilic granulocytes increases and the higher the neutrophil-lymphocyte ratio

(NLR), the more severe the clinical picture is. Patients with a severe clinical presentation who were hospitalised had a high NLR, as well as elevated CRP. Since they were responsible for the secretion of cytokines, it is noticeable that the lymphocytes have been depleted and neutrophils are trying to eliminate the breakdown products. This may explain the difficult clinical presentation in young people whose immune systems have apparently destroyed themselves and the only cure was corticosteroids. Due to the decline in immunity and the development of opportunistic infections especially in elderly patients, antibiotics have been useful.

Over time, the virus changes its proteins and the effect of the mentioned types of leukocytes changes, mainly in ratio of neutrophils, which fall more often in latest variant of virus, compared to lymphocytes whose number is growing. (NLR ratio changes in favour to lymphocytes). Monocytosis occurs but in smaller numbers compared to 2020/2021 variant. There is an increase in eosinophils, which is correlated with milder symptoms in the form of sneezing and nasal secretions and a significantly lower number of pneumonias in the finding. A normal number of total leukocytes in the blood is often present.

Conclusion

These values of laboratory findings indicated the final mutation of the virus into a milder form, although there were sporadic severe cases in which the reaction was mixed or the presence of only older strains of the virus, more often in elderly patients. Considering the mon-

itoring of leukocyte behaviour in the current infection, but also over a period of 3 years, leukocytes could be characterised as messengers of COVID-19 infection with a major role in the prognosis on the course of the disease.

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None.

Conflict of interest

None.

References

1. Zeng F, Li L, Zeng J, Deng Y, Huang H, Chen B, et al. Can we predict the severity of coronavirus disease 2019 with a routine blood test? *Pol Arch Intern Med* 2020 May 29;130(5):400-6.
2. Dean L. Blood Groups and Red Cell Antigens [Internet]. Bethesda (MD): National Center for Biotechnology Information (US); 2005. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK2261/>. [Cited: 28-Feb-2022].
3. Dinarello CA. Anti-inflammatory agents: present and future. *Cell* 2010 Mar 19;140(6):935-50.



Improving Patients Compliance in Regular Blood Pressure Measuring by Using Smartphone Application – HISPA Approach

Zorana Kovačević,¹ Danijela Tasić,¹ Marko Filipović,¹ Milan Arsić,¹ Biljana Despotović,¹ Slađana Božović-Ogarević,¹ Zlatko Maksimović,² Nebojša Tasić¹

Abstract

Background / Aim: According to the latest 2021 ESC Guidelines for cardiovascular prevention, Serbia is considered as a country with very-high risk for cardiovascular diseases. The reason for unsuccessful risk control is multifactorial and complex, but bad compliance of patients and bad application of defined prevention guidelines stand out as most prominent. According to some studies, every third person in Serbia has prehypertension, while in adult population prevalence of hypertension (HT) goes up to 49.3 %. Aim of this study was to assess compliance in blood pressure (BP) control in patients with several cardiovascular risk factors using smartphone application as well as to evaluate whether patients with multiple risk factors had better compliance to BP measurement and control due to increased cardiovascular risk.

Methods: Patients were instructed to measure BP and heart rate (HR) at least three times a week, two times daily (in morning and in evening) and to enter resulting data into mobile app. Within the app, patients had an insight in all previous measurements in form of a table and a graph, which enabled them to track their progress and BP control.

Results: Patients were divided into two groups – those who had 50 or more measurements – a good compliance group and those with less than 50 measurements – bad compliance group. Groups were then compared according to the number of present risk factors and by successfulness of BP control. There was no statistically significant difference between groups regarding age ($p = 0.275$) or body mass index (BMI) ($p = 0.739$). There was statistically significant difference in number of risk factors between the groups. Spearman test for correlation has shown positive correlation between number of cardiovascular risk factors and number of patient measurements during 4-month period.

Conclusion: Using smartphone app for BP measurement and control is easy to apply and well accepted by patients, especially those with more than one risk factors for cardiovascular diseases. Further research is needed for assessing its usefulness in clinical practice.

Key words: Blood pressure; HISPA; Smartphone; Compliance.

1. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.
2. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
ZORANA KOVAČEVIĆ
E:zoca005@gmail.com

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Introduction

According to the latest 2021 ESC Guidelines for cardiovascular prevention, Serbia is considered

as a country with very-high risk for cardiovascular diseases.¹ Although cardiovascular risk fac-

tors are very well known and guidelines for prevention were established long time ago, doctors in Serbia are still struggling with great number of myocardial infarctions, strokes and other atherosclerotic complications. The reason for unsuccessful risk control is multifactorial and complex, but bad compliance of patients and bad application of defined prevention guidelines stand out as most prominent.

Hypertension (HT) is one of the most common and most important cardiovascular risk factors. According to some studies, every third person in Serbia has prehypertension, while in adult population prevalence of HT goes up to 49.3 %.² Mostly asymptomatic, long-term HT causes myocardial hypertrophy with various consequences, increases vascular stiffness, speeds up the process of atherosclerosis and cerebral and kidney damage. Therefore, good blood pressure (BP) control is essential for cardiovascular risk reduction.³

Good BP control can be established and maintained with regular BP measurements and compliance in pharmacological and non-pharmacological treatment. In order to achieve that, it is becoming a common practice to use digital solutions such as mobile phone applications, smart watches etc. with different kinds of reminders and graphs that are proven to improve compliance of patients.⁴ Also, it is of great importance to develop patients' awareness that combination of different risk factors such as diabetes, dyslipidaemia, smoking and stress, multiplies chances for development of cardiovascular diseases.

Hypertension, Infarction and Stroke Prevention Association (HISPA) has a goal to treat cardiovascular risk as a disease itself, developing new ways to successfully implement prevention measures in clinical practice.

Aim

The aim of this study was to assess compliance in BP control in patients with several cardiovascular risk factors using original smartphone application. Another goal was to evaluate whether patients with multiple risk factors had better compliance to BP measurement and control due to increased cardiovascular risk.

Methods

In this study, 210 patients with poorly regulated HT and other cardiovascular risk factors were included. Patients were selected by 20 doctors from HISPA centres in different cities in Serbia, from July 2019 to December 2019. Demographic and medical history data were obtained, physical examination including weight, height, body mass index (BMI) calculation, BP and heart rate (HR) measurement was performed to each patient. After signing informed consent, each patient received instructions for installation of mobile application.

Study protocol

Patients were instructed to measure BP and HR at least three times a week, two times daily (in morning and in evening) and to enter resulting data into mobile app. Instructions for BP measurements were given according to European Society of Hypertension protocol.⁵

Within the app, patients had an insight in all previous measurements in form of a table and a graph, which enabled them to track their progress and BP control. Moreover, patients' doctors had an insight in each patient's profile, which gave them possibility to monitor the patients and to advise them when BP isn't controlled properly. After installing smartphone application, patients were given written manual for the app, as well as brochure for cardiovascular risk reduction.

Data were collected after 4 months from inclusion. Patients who had more than 50 measurements within 4 months were considered as those who had achieved good compliance to BP control. Therefore, patients were divided into two groups – those who had 50 or more measurements – a good compliance group (GCG) and those with less than 50 measurements – bad compliance group (BCG). Groups were then compared according to the number of present risk factors.

Statistical analysis was done by SPSS version 26.0 programme. Statistical significance was set at $p < 0.05$.

Results

From included 212 patients, 44.33 % were women and average age was 56.18 ± 12.10 year (youngest patient was 20 and the oldest 80 years old). Each patient had HT and one or more of the following risk factors: dyslipidaemia, diabetes, smoking and/or obesity. Average number of additional risk factors per patient was 1.74 ± 1.04 . Average BMI was 27.67 ± 4.25 (lowest 18.3, highest 42.6).

Patients varied in absolute number of measurements during 4-month period, from lowest number of 2 to the highest number of 278 measurements. Average number of measurements was

61.24 ± 47.5 measurements per patient. In GCG there were 112 (52.8 %) patients, while BCG counted 100 patients. There was no statistically significant difference between groups regarding age ($p = 0.275$) and BMI ($p = 0.739$).

There was statistically significant difference in number of risk factors between the groups (Table 1, 2). Spearman's test for correlation has shown positive but not very strong correlation between number of cardiovascular risk factors and number of patients' measurements during 4-month period (Table 3).

Table 1: Number of risk factors Good compliance group (GCG) and Bad compliance group (BCG)

Compliance Groups	Number of risk factors			
	N	Mean	Std. Deviation	Std. Error Mean
Bad Compliance Group	100	1.570	1.112	.111
Good Compliance Group	112	1.893	.990	.093

Table 2: Comparison of the Good compliance group (GCG) and Bad compliance group (BCG) regarding number of risk factors - analysis of means (GCG) and Bad compliance group (BCG) – analysis of means

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95 % Confidence Interval of the Difference	
								Lower	Upper	
Number of risk factors	Equal variances assumed	5.280	.023	-2.236	210	.026	-.3229	.1444	-.6075	-.0383
	Equal variances not assumed			-2.222	199.501	.027	-.3229	.1453	-.6094	-.0363

Table 3: Spearman's test of correlation between number of cardiovascular risk factors and compliance of patients

		Correlations		
			Number of factors	Number of measurements
Number of factors	Correlation coefficient	1.000	.180**	
	Sig. (2-tailed)		.009	
	N	212	212	
Spearman's rho	Correlation coefficient	.180**	1.000	
	Sig. (2-tailed)	.009		
	N	212	212	

** Correlation is significant at the 0.01 level (2-tailed)

Discussion

Adherence to chronic therapy is not an easy task and if a patient has more than one comorbidity it becomes even harder to stick strictly to the suggested therapy and to change unhealthy lifestyle to start with. According to some studies, as many as 50-80 % of patients with prescribed antihypertensive therapy have low adherence to the treatment regimen.¹⁵ Different approaches are used to improve BP control. One of them is introducing novel single-pill combination therapies, which lead to improved adherence and persistence compared with equivalent multi pill combinations as shown in systematic literature review and meta-analysis.⁶

Another method for compliance improvement is education and behavioural changes⁷ which should be incorporated in clinical routine. Patients in this study received brochures with tips and recommendations for cardiovascular risk factor reduction, which helps in raising patients' awareness of cardiovascular diseases. These brochures are incorporated in HISPA program for risk factor reduction and are introduced to patients as a common practice.

Fast approaching method for BP control is implementation of novel digital technologies. Large randomised controlled trial TASHMIN4 showed better BP reduction, self-titration and long-term control in group of patients using BP telemonitoring versus usual care.⁸ Positive results from McManus and al continued through the cost-effectiveness study which economically justified self-monitoring and self-titration in HT, with or without telemonitoring, confirming its potential usefulness in primary care, as it could also reduce a workload of physicians.⁹ Recent meta-analyses have shown similar results, supporting telemonitoring and other tools that help in self-measurement of BP.¹⁰

Telemonitoring is not effective only in BP control, thus it has a widespread use in other chronic diseases, such as diabetes mellitus, heart failure and asthma.¹¹ It has also shown extreme benefits during COVID-19 pandemic, for monitoring COVID-19 and non-COVID-19 patients, who had limited access to primary health care.^{12, 13} Study conducted by Fletcher et al has proved statistically significant increase in adherence and a decrease in BP values after introducing BP monitoring to hypertensive patients.¹⁴

Another benefit of BP monitoring using digital technologies is better applicability to the population of younger adults, who have the biggest benefit from starting risk factor reduction on time. Some studies show that younger adults usually have later diagnoses of HT, compared to elderly.¹⁶ This emphasises even more how much is important to adjust preventive methods to new generations.¹⁷

As shown in our results, patients who had more risk factors had also measured their BP more often. These data are very promising, because using smartphone app helped patients stay on track with their BP control. However, the limitation of this research is a small patient sample and short period of patient follow-up, which prevents analysis of long-term benefits of using smartphone app for BP control.

Conclusion

Using smartphone app for BP measurement and control is easy to apply and well accepted by patients, especially those with more than one risk factor for cardiovascular diseases. Further research is needed for assessing its usefulness in clinical practice.

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Conflict of interest

None.

References

1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Böck M, et al; ESC National Cardiac Societies; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J* 2021 Sep 7;42(34):3227-337.
2. Miljuš D. [Assessment of the prevalence of hypertension and risk factors for arterial hypertension in adults in the Republic of Serbia][Dissertation]. University of Belgrade, Faculty of Medicine; 2018. Serbian.

3. Tasic D, Topouchian J, Dragisic D, Tasic N, Hakobyan Z, Vatinyan S, et al. Reproducibility of the European Society of Hypertension - International Protocol for validation of blood pressure measuring devices in obese patients. *J Hypertens* 2019 Sep;37(9):1832-37.
4. Kitt J, Fox R, Tucker KL, McManus RJ. New approaches in hypertension management: a review of current and developing technologies and their potential impact on hypertension care. *Curr Hypertens Rep* 2019 Apr 25;21(6):44. doi: 10.1007/s11906-019-0949-4.
5. Palmer MJ, Barnard S, Perel P, Free C. Mobile phone-based interventions for improving adherence to medication prescribed for the primary prevention of cardiovascular disease in adults. *Cochrane Database Syst Rev* 2018 Jun 22;6(6):CD012675. doi: 10.1002/14651858.CD012675.pub2.
6. Parati G, Kjeldsen S, Coca A, Cushman WC, Wang J. Adherence to single-pill versus free-equivalent combination therapy in hypertension: a systematic review and meta-analysis. *Hypertension* 2021 Feb;77(2):692-705.
7. Gorina M, Limonero JT, Álvarez M. Educational diagnosis of self-management behaviours in patients with diabetes mellitus, hypertension and hypercholesterolaemia based on the PRECEDE model: Qualitative study. *J Clin Nurs* 2019 May;28(9-10):1745-59.
8. McManus RJ, Mant J, Franssen M, Nickless A, Schwartz C, Hodgkinson J, et al; TASMINH4 investigators. Efficacy of self-monitored blood pressure, with or without telemonitoring, for titration of antihypertensive medication (TASMINH4): an unmasked randomised controlled trial. *Lancet*. 2018 Mar 10;391(10124):949-59.
9. Monahan M, Jowett S, Nickless A, Franssen M, Grant S, Greenfield S, et al. Cost-effectiveness of telemonitoring and self-monitoring of blood pressure for antihypertensive titration in primary care (TASMINH4). *Hypertension* 2019 Jun;73(6):1231-9.
10. Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP, et al. Self-monitoring of blood pressure in hypertension: A systematic review and individual patient data meta-analysis. *PLoS Med* 2017 Sep 19;14(9):e1002389. doi: 10.1371/journal.pmed.1002389.
11. Paré G, Moqadem K, Pineau G, St-Hilaire C. Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: a systematic review. *J Med Internet Res* 2010 Jun 16;12(2):e21. doi: 10.2196/jmir.1357.
12. Silven AV, Petrus AHJ, Villalobos-Quesada M, Dirikgil E, Oerlemans CR, Landstra CP, et al. Telemonitoring for patients with COVID-19: recommendations for design and implementation. *J Med Internet Res* 2020 Sep 2;22(9):e20953. doi: 10.2196/20953.
13. Luzi L, Carruba M, Crialesi R, Da Empoli S, Dagani R, Lovati E, et al. Telemedicine and urban diabetes during COVID-19 pandemic in Milano, Italy during lock-down: epidemiological and sociodemographic picture. *Acta Diabetol* 2021 Jul;58(7):919-27.
14. Fletcher BR, Hartmann-Boyce J, Hinton L, McManus RJ. The effect of self-monitoring of blood pressure on medication adherence and lifestyle factors: a systematic review and meta-analysis. *Am J Hypertens* 2015 Oct;28(10):1209-21.
15. Durand H, Hayes P, Morrissey EC, Newell J, Casey M, Murphy AW, et al. Medication adherence among patients with apparent treatment-resistant hypertension: systematic review and meta-analysis. *J Hypertens* 2017 Dec;35(12):2346-57.
16. Johnson HM, Thorpe CT, Bartels CM, Schumacher JR, Palta M, Pandhi N, et al. Undiagnosed hypertension among young adults with regular primary care use. *J Hypertens* 2014 Jan;32(1):65-74.
17. Glynn L, Casey M, Walsh J, Hayes PS, Harte RP, Heaney D. Patients' views and experiences of technology based self-management tools for the treatment of hypertension in the community: A qualitative study. *BMC Fam Pract* 2015 Sep 9;16:119. doi: 10.1186/s12875-015-0333-7.



The Importance of Vaccination in the Prevention of Post-COVID-19 Complications

Biljana Mijović,^{1,2} Zlatko Maksimović²

Abstract

Background / Aim: During the COVID-19 pandemic, millions of people became infected worldwide. Manifestations of COVID-19 were clinically variable, ranging from asymptomatic infections to multiple organ failure and death. The aim of this study was to point out the importance of vaccination in the prevention of post-COVID-19 complications.

Methods: A systematic review of the literature was conducted. A combination of search terms in the PubMed database was used. All original scientific papers in English were reviewed, which contained the given keywords. Cohort studies, case studies and control and analytical cross-sectional studies were included.

Results: 1917 papers were identified, 82 were subject to a full text review, of which 40 were included in the analysis after a detailed review, of which 32 were cohort, 6 case studies and controls and 2 analytical cross-sectional studies. The studies were heterogeneous, but all analysed the differences between vaccinated and unvaccinated in terms of real-life outcomes.

Conclusion: There were significant differences in SARS-CoV-2 infection, hospitalisation, severe clinical forms and deaths compared to real-life vaccination. Vaccines are effective in preventing post-COVID-19 complications. In the coming period, it is necessary to conduct more long-term prospective studies in relation to the specific complications of COVID-19.

Key words: COVID-19; Vaccine effectiveness; Hospitalised; Complications after COVID-19.

1. Faculty of Medicine Foča, University of East Sarajevo, Foča, the Republic of Srpska, Bosnia and Herzegovina.
2. General hospital "Sveti Vračevi", Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
BILJANA MIJOVIĆ
E: biljana.mijovic@gmail.com

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Introduction

In late 2019, the world encountered a new type of coronavirus, called SARS-CoV-2. Millions of people became infected during the pandemic around the world. Thus, as on the 6 of March 2022, the infection was confirmed in more than 433 million people, including over 5.9 million deaths globally.¹ Manifestations of COVID-19 were clinically variable, ranging from asymptomatic infections to multiple organ failure and death. The fight against the new virus was initially focused on the prevention and suppression of respiratory insufficiency, considering the observation of acute pulmonary insufficiency and loss of pulmonary capacity.^{2,3}

However, it was quickly established that SARS-CoV-2 infection is more than a respiratory syndrome and that endogenous chemicals that respond to inflammation have the ability to generate changes in more tissues.⁴ Infection with this virus has affected various human systems, including the immune, haematological, pulmonary, cardiovascular, gastrointestinal, urinary, skeletal, muscular and nervous systems, as well as mental health.⁵ The genetic code of the virus was discovered within a few weeks after its discovery, which was the basis for the work on the discovery of vaccines and drugs against this disease.⁶

Knowing that vaccines are the best and most effective measure in the fight against infectious diseases, the world was desperately waiting for vaccines to be produced against COVID-19. Two mRNA vaccines against COVID-19 approved by the US Food and Drug Administration (FDA) BNT16262 (Pfizer / BioNTech) and mRNA-1273 (Moderna) have shown high efficacy in large randomised phase 3 clinical trials. It is important to evaluate their effectiveness in real life.⁷

As of 12 January 2022, the WHO estimated that nine vaccines met the necessary safety and efficacy criteria (AstraZeneca / Oxford vaccine, Johnson and Johnson, Moderna, Pfizer / BioNTech, Sinopharm, Sinovac, COVAXIN, Covovax, Nuvaxovid). Although no vaccine is 100 % effective, all approved vaccines provide a high degree of protection against serious illness and death from disease.⁸

However, there are insufficient data on the effect of time after vaccination on SARS-CoV-2 infection and its severe form.⁹ This study aims to systematise the evidence on the effectiveness of vaccines in preventing post-COVID-19 complications in real life.

Results

1917 papers were identified, 82 were subject to reading the full text, of which 40 were included in the analysis after a detailed review, of which 32 were cohort, 6 case studies and controls and 2 analytical cross-sectional studies. The studies were heterogeneous, but all analysed the differences between vaccinated and unvaccinated in terms of real-life outcomes (Table 1).

Methods

A systematic review of the literature was conducted. A combination of search terms was used in the PubMed database, such as vaccine effectiveness, COVID-19, hospitalisation, complications after COVID-19. The study was conducted according to PRISMA guidelines. All original scientific papers in English were reviewed, which contained the given keywords and which were published in the period from May 2021 to February 2022. Cohort studies, case and control studies and analytical cross-sectional studies were included.

Two independent reviewers extracted data from the selected studies. The following data were obtained from each article: first author, year of publication, name of vaccine, company, type of study, country of study and data related to effectiveness (infection, hospitalisation, death, type of complication, etc). Discrepancies between independent reviewers were resolved by consensus.

Studies examining the effectiveness of vaccines in real life have been very heterogeneous. Effectiveness measures ranged from comparing the incidence rates of COVID-19 between vaccinated and unvaccinated, symptomatic or asymptomatic infection, hospitalisation, severe / critical forms of illness, length of hospital stay, use of mechanical ventilation, mortality rates.

Table 1: Characteristics of examined studies

Author	Country	Year	Respondents	Type of study	Ref
Haas	Israel	2021 May	232, 268	Prospective cohort	10
Thompson	SAD	2021 July	3,975 health workers	Prospective cohort	11
Tenforde	SAD	2021 Nov	4,513 patients	Case-control	12
Wainstock	Israel	2021 Oct	4,399 gave birth	Retrospective cohort	13
Accorsi	SAD	2022 Feb	23,391 cases 46,764 controls	Case-control study	14
Nordstrom	Sweden	2021 Dec	705,385 individuals	Retrospective cohort	15
Angel	Israel	2021 June	6,710 health workers	Retrospective cohort	16
Theiler	SAD	2021 Nov	2002 gave birth	Retrospective cohort	17
Young-Xu	SAD	2021 Oct	6,647,733 veterans	Case-control study	18
Papagoras	Greece	2021 Nov	195 patients	Retrospective cohort	19
Lipkind	SAD	2022 Jan	46,079 pregnant women	Retrospective cohort	20

Author	Country	Year	Respondents	Type of study	Ref
Twohig	England	2022 Jan	43,338 patients	Prospective cohort	21
Pawlowski	SAD	2021 Aug	68,266 individuals	Retrospective cohort	22
Andreews	England	2022 Jan	893,845 individuals	Case-control study	23
John	SAD	2021 Oct	20,037 patients	Retrospective cohort	24
Singh	India	2021 Oct	577 cases and 1,144 controls	Case-control study	25
Citu M	Romania	2022 Feb	906 pregnant women	Prospective cohort	26
Marincu	Romania	2022 Feb	2,041 patients	Case-control study	27
Verma	India	2022 Jan	826 patients	Retrospective cohort	28
Taherian	Iran	2022 Jan	3,134,624 individuals	Retrospective cohort	29
Cocchio	Italy	2022 Jan	2,233,399 individuals	Retrospective cohort	30
Taylor	SAD	2021 Oct	7,615 patients	Prospective cohort	31
Baum	Finland	2021 Nov	901,092 individuals	Prospective cohort	32
Aslam	SAD	2021 Oct	2,151 patients	Retrospective cohort	33
Kalligeros	SAD	2021 Sept	915 patients	Prospective cohort	34
Fall	SAD	2022 Jan	2,031 patients	Retrospective cohort	35
Muthukrishnan	India	2021 July	1,168 patients	Cross-sectional	36
Agrawa	Scotland	2021 Sept	General population	Prospective cohort	37
Vimercati	Italy	2022 Jan	122 pregnant women	Cross-sectional	38
Glampson	England	2021 Sept	2,183,939 persons	Retrospective cohort	39
Leon M	SAD	2022 Jan	General population	Prospective cohort	40
Bollineni	SAD	2021 Dec	70 patients	Retrospective cohort	41
Kang	China	2022 Feb	10,805 persons	Retrospective cohort	42
Bruxvort	SAD	2022 Feb	342 patients	Prospective cohort	43
Gonzales	Argentina	2021 Oct	415,995 individuals	Retrospective cohort	44
John V	SAD	2022 Jan	3,496 veterans	Retrospective cohort	45
Gomes	Germany	2021 Nov	708,187 individuals	Prospective cohort	46
Dick	Israel	2022 Feb	5,618 gave birth	Retrospective cohort	47
Busic	Croatia	2022 Feb	2,990 patients	Retrospective cohort	48
Lutrick	SAD	2021 Dec	243 adolescents	Prospective cohort	49

Table 2: Measures of vaccine effectiveness

Autor	Effectiveness measures	Ref
Haas	Two doses of BNT162b2 are highly effective across all age groups (≥ 16 years, including older adults aged ≥ 85 years) in preventing symptomatic and asymptomatic SARS-CoV-2 infections and COVID-19-related hospitalisations, severe disease and death, including those caused by the B.1.1.7 SARS-CoV-2 variant.	10
Thompson	Authorised mRNA vaccines were highly effective among working-age adults in preventing SARS-CoV-2 infection when administered in real-world conditions and the vaccines attenuated the viral RNA load, risk of febrile symptoms and duration of illness among those who had breakthrough infection despite vaccination.	11
Tenforde	Vaccination with an mRNA COVID-19 vaccine was significantly less likely among patients with COVID-19 hospitalisation and disease progression to death or mechanical ventilation.	12
Wainstock	Prenatal maternal COVID-19 vaccine has no adverse effects on pregnancy course and outcomes.	13
Accorsi	These findings suggest that receipt of 3 doses of mRNA vaccine, relative to being unvaccinated and to receipt of 2 doses, was associated with protection against both the Omicron and Delta variants, although the higher odds ratios for Omicron suggest less protection for Omicron than for Delta.	14
Nordstrom	Use of heterologous ChAdOx1 nCoV-19 and mRNA prime-boost vaccination is an effective alternative to increase population immunity against COVID-19, including against the Delta variant which dominated the confirmed cases during the study period.	15
Angel	Among health care workers at a single center in Tel Aviv, Israel, receipt of the BNT162b2 vaccine compared with no vaccine was associated with a significantly lower incidence of symptomatic and asymptomatic SARS-CoV-2 infection more than 7 days after the second dose.	16
Theiler	Vaccinated pregnant women were less likely than unvaccinated pregnant patients to experience COVID-19 infection and COVID-19 vaccination during pregnancy was not associated with increased pregnancy or delivery complications.	17

Autor	Effectiveness measures	Ref
Young-Xu	mRNA vaccination was associated with substantially decreased risk of COVID-19 infection and hospitalisation, with no deaths among fully vaccinated veterans.	18
Papagoras	Vaccinated patients with SRD with breakthrough COVID-19 have better outcomes compared with unvaccinated counterparts with similar disease/treatment characteristics.	19
Lipkind	Results consistently showed no increased risk when stratified by mRNA COVID-19 vaccine dose, or by second or third trimester vaccination, compared with risk among unvaccinated pregnant women.	20
Twohig A	Outbreaks of the delta variant in unvaccinated populations might lead to a greater burden on health-care services than the alpha variant.	21
Pawlowski	BNT162b2 and mRNA-1273 are effective in a real-world setting and are associated with reduced rates of SARS-CoV-2 infection and decreased burden of COVID-19 on the healthcare system.	22
Andreews	Against hospitalisation or death, absolute effectiveness of a BNT162b2 booster ranged from around 97 % to 99 % in all age groups irrespective of the primary course, with no evidence of waning up to 10 weeks.	23
John V	This cohort study of US veterans found that mRNA vaccine administration was associated with a delayed but modest reduction in COVID-19 infection but an excellent reduction in COVID-19-related hospitalisation or death in patients with cirrhosis.	24
Singh	Four out of every five fully vaccinated individuals are estimated to be protected from contracting SARS CoV-2 infection.	25
Citu Mihaela	The BNT162b2 and Ad26.COVS.S vaccines are safe to administer during the third trimester of pregnancy, while their safety, efficacy and immunogenicity remain similar to those of the general population.	26
Marincu	Although our findings are consistent with natural immunity offering similar short-term protection to a second dose of mRNA vaccine, all eligible individuals should be provided with immunisation to lower their risk of infection, even if they have already been infected with SARS-CoV-2.	27
Verma	CT severity scores in individuals receiving both doses of SARS-CoV-2 vaccination were less severe in comparison to those receiving a single dose of vaccine or no vaccine at all.	28
Taherian	The highest and lowest reduction in relative risk was for those who received AstraZeneca and Sputnik, respectively.	29
Cocchio	Vaccination is significantly correlated with a shorter period of positivity and shorter hospital stays, with each step toward completion of the vaccination cycle coinciding with a reduction of 3.3 days in the persistence of positivity and 2.3 days in the length of hospital stay.	30
Taylor	COVID-19 vaccination is critical for all eligible adults, including those aged < 50 years who have relatively low vaccination rates compared with older adults.	31
Baum	COVID-19 vaccines protect against SARS-CoV-2 infection and COVID-19 hospitalisation. A single dose provides moderate protection in elderly and chronically ill, although two doses are clearly superior.	32
Aslam	Real world clinical effectiveness of COVID-19 vaccination in SOTRs with an almost 80 % reduction in the incidence of symptomatic COVID-19 versus unvaccinated SOTRs during the same time.	33
Kalligeros	COVID-19 related hospitalisation after vaccination may occur to a small percentage of patients, mainly those who are partially vaccinated.	34
Fall	Omicron infections of vaccinated individuals are expected, yet admissions are less frequent. Admitted patients might develop severe disease comparable to Delta. Efforts for reducing the Omicron transmission are required as even though the admission risk is lower, the numbers of infections continue to be high.	35
Muthukrishnan	Vaccination with two doses of COVISHIELD® was associated with lower odds of mortality among hospitalised patients with moderate to severe COVID-19.	36
Agrawa	COVID-19 hospitalisations and deaths were uncommon 14 days or more after the first vaccine dose in this national analysis in the context of a high background incidence of SARS-CoV-2 infection and with extensive social distancing measures in place.	37
Vimercati	The presence of a severe COVID-19 infection worsened the obstetrical and neonatal outcomes, with higher rates of urgent or emergent cesarean section, preterm births and neonatal respiratory distress syndrome.	38
Glampson	This study provides further evidence that a single dose of either the Pfizer/BioNTech vaccine or the Oxford/Astra-Zeneca vaccine is effective at reducing the risk of testing positive for COVID-19 up to 60 days across all age groups, ethnic groups and risk categories in an urban UK population.	39

Autor	Effectiveness measures	Ref
Leon M	Additional recommendations for vaccine doses might be warranted in the future as the virus and immunity levels change.	40
Bollineni	In this cohort of vaccinated LT patients who developed breakthrough COVID-19, the clinical course, risk of complications and outcomes trended better than unvaccinated patients. However, universal involvement of the allograft demonstrates the continued vulnerability of these patients to significant sequelae from COVID-19.	41
Kang	Full vaccination with inactivated vaccines is effective against the B.1.617.2 variant. Effort should be made to ensure full vaccination of target populations.	42
Bruxvort	Vaccination against SARS-CoV-2 appears to result in favourable outcomes as attested by the absence of mechanical ventilation, ICU, or death among fully vaccinated patients.	43
Gonzales	A single dose of Gam-COVID-Vac was effective for a wide range of outcomes associated with COVID-19	44
John V	Though patients with cirrhosis can develop breakthrough COVID-19 after full or partial vaccination, these infections are associated with reduced mortality.	45
Gomes	Two doses of BioNTech-Pfizer's BNT162b2 vaccine is highly effective against COVID-19 outcomes in elderly persons.	46
Dick	SARS-CoV-2 vaccine appears to be safe during pregnancy with no increase in incidence of preterm labor and small for gestational age compared to unvaccinated women. However, in women vaccinated during the second trimester there may be an increase in the rate of preterm birth.	47
Basic	Vaccinees had a lower risk of dying, less often oxygen therapy and mechanical ventilation.	48
Lutrick	Two doses of mRNA BNT BNT162b2 vaccine are very effective in preventing infection among adolescents.	49

A total of four studies looked at complications during pregnancy, childbirth and complications in new-borns. Measures of the effectiveness of vaccines against COVID-19 are shown in Table 2.

Discussion

The COVID-19 pandemic, in addition to its acute burden and care for the prevention and treatment of this disease, also brought with it worries about long-term complications. As the world struggled to make vaccines and drugs, COVID-19 left complications.

Two of the most common respiratory manifestations of COVID-19 are significant decreases in diffuse lung capacity and associated damage to the pulmonary interstitium. One year after moderate COVID-19, the incidence rate of impaired lung capacity and persistent lung damage still exceeds 30 % and one-third of patients have severe lung capacity impairment and fibrous lung damage.

Persistent respiratory complications can cause significant morbidity of the population, long-term disability and even death due to the progression of pulmonary fibrosis. Based on experience with complications after SARS virus

infection, it can be estimated that the incidence rate of post-COVID-19 lung fibrosis will be 2-6 %. It is believed that fibrosis can become one of the main long-term complications of COVID-19, even in asymptomatic individuals. Currently, despite the best efforts of the global medical community, there is no treatment for COVID-19-induced pulmonary fibrosis.⁵⁰

The whole chain of immune reactions leads to the development of Guillain-Barré syndrome (GBS) which is associated with COVID-19. This disease is characterised by rapid evolution, with an inflammatory cascade of peripheral nerves and loss of myelin sheath.⁵ Among the common complications of COVID-19 have been reported rheumatoid arthritis, Kawasaki disease, myocarditis. Although these diseases occurred after COVID-19 infection, it is necessary to provide more evidence for this presumed association.⁵

The ACE2 receptor plays a key role in the mechanism of COVID-19 infection. However, it is not only a SARS-CoV-2 receptor, but also has an important homeostatic function that regulates the renin-angiotensin (RAS) system, which is crucial for both the cardiovascular and the immune system. Therefore, ACE2 is a key link between SARS-CoV-2 infection, cardiovascular disease (CVD) and the immune response.⁵¹ Millions of people around the world who survived COVID-19 have cardiovascular consequences. By elucidating the mechanism of cardiovascular complications, implications for the treatment of patients after recovery from acute COVID-19 infection are born.⁵²

COVID-19 is extremely heterogeneous in terms of severity, clinical phenotype and most importantly, global distribution. Although most patients recover from an acute infection, many still suffer from late effects affecting various organs, including the lungs. The role of the pulmonary vascular system during the acute and chronic stages of COVID-19 has not been adequately studied. A thorough understanding of the origin and dynamic behaviour of SARS-CoV-2 virus and potential causes of heterogeneity in COVID-19 is crucial for the prediction and treatment of disease, both acute and chronic, including the development of chronic pulmonary hypertension.

Vaccine research, as the best prevention measures for COVID-19, was accompanied by clinical trials and a high level of vaccine efficacy in terms of infection, hospitalisation and severe / critical forms of the disease. However, there has been a need to investigate the effectiveness of COVID-19 vaccines in real life. By measuring the effectiveness of vaccines against infection, hospitalisation, severe disease or death, we indirectly indicate the effectiveness of vaccines in the prevention of post- COVID-19 complications.

Research similar to this was conducted by Xing et al. They included thirteen randomised trials, which included the safety and efficacy of 11 COVID-19 vaccines. In ten studies, the 28-day seroconversion rate of subjects exceeded 80 %. In two clinical trials, the vaccines were effective from 70.4 % to 95 %. The seroconversion rate was lower than 60 % in one study alone. The immune response to vaccines was worse in the elderly than in the younger population. In six studies comparing single- and double-dose vaccination, four studies showed that double-dose vaccination produced a stronger immune response than

single-dose vaccination.⁵³ The mentioned study was published in March 2021, that is, a year before this study and it referred to the effectiveness of the vaccine, which does not diminish its importance. This study summarises real-life results. Although very heterogeneous, each of the included studies supports the importance of vaccination in the prevention of COVID-19 and thus the complications it entails.

Vaccines protect against infection ranging from 51.8 % in the case of inactivated vaccines⁴² to 95 % in the case of mRNA vaccines and complete vaccination, or from 64 %¹⁸ to 81 % in the case of incomplete vaccination.¹¹ Inactivated vaccines in 60.4 % protect against symptomatic infection, in 78.4 % against pneumonia and 100 % against severe forms of the disease.⁴² Unvaccinated people are 40 times more likely to get an infection, 30 times more likely to get a symptomatic infection, 15 times more likely to be hospitalised and 13.5 times more likely to get severe COVID-19.¹⁰ Similarly, in a study by Angela et al, the risk of symptomatic infection is about 31 times higher in the unvaccinated.¹⁶ The authors also pointed to the reduced effectiveness of vaccines against Omicron strain compared to Delta strain.¹⁴ They also pointed to a significant increase in effectiveness with the use of heterologous vaccines.¹⁵

Vaccines significantly prevent hospitalisation, ranging from 86 %²² to 94 %³⁰ depending on the type of vaccine. All the included studies, which followed severe forms of the disease as an outcome, indicated that vaccines 100 % protect against severe forms of the disease and the fatal outcome. Prevention of COVID-19 is especially important in people with comorbidities, as they are at greater risk of complications and death. In a cohort study, John and co-workers followed American veterans suffering from cirrhosis and found that within 60 days of COVID-19, unvaccinated people were statistically significantly more likely to develop severe forms of the disease and die than those vaccinated.⁴⁵ Included studies indicate that vaccines do not cause adverse effects on pregnancy, childbirth and the new-born¹³ and that the rate of preterm birth is higher in unvaccinated (6.2 %) compared to vaccinated (5.5 %).

However, this systematic review also has some limitations: (1) Only observational studies (Cohort, case-control and cross-sectional analytical studies) were included. (2) There were differences in the design of different clinical trials, which

made it impossible to compare the advantages and disadvantages of different types of vaccines. (3) In this systematic review, only English documents were searched and only in the PubMed database and documents published in other languages such as Japanese and French were excluded. (4) A great heterogeneity of the included studies, but also of the outcomes, was observed.

Conclusion

There were significant differences in terms of SARS-CoV-2 infection, hospitalisation, severe clinical forms, deaths in relation to vaccination, complications during pregnancy and childbirth. Vaccines are effective in preventing post-COVID-19 complications. In the coming period, it is necessary to conduct more long-term prospective studies in relation to the specific complications of COVID-19.

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Conflict of interest

None.

References

1. WHO. Weekly epidemiological update on COVID-19 - 8 March 2022. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (accessed on 9 Mart 2022). [Cited: 8-Mar_2022].
2. Guo T, Fan Y, Chen M, Wu X, Zhang L, et al. Cardiovascular implications of fatal outcomes of patients with coronavirus disease 2019 (Covid-19). *JAMA Cardiol* 2020;5:811–8.
3. Meiler S, Hamer OW, Schaible J, Zeman F, Zorger N, Kleine H, et al. Computed tomography characterization and outcome evaluation of COVID-19 pneumonia complicated by venous thromboembolism. *PLoS One* 2020 Nov 19;15(11):e0242475. doi: 10.1371/journal.pone.0242475.
4. Leung TYM, Chan AYL, Chan EW, Chan VKY, Chui CSL, Cowling BJ, et al. Short- and potential long-term adverse health outcomes of COVID-19: a rapid review. *Emerg Microbes Infect* 2020 Dec;9(1):2190-9.
5. Silva Andrade B, Siqueira S, de Assis Soares WR, de Souza Rangel F, Santos NO, Dos Santos Freitas A, et al. Long-COVID and Post-COVID health complications: an up-to-date review on clinical conditions and their possible molecular mechanisms. *Viruses* 2021 Apr 18;13(4):700. doi: 10.3390/v13040700.
6. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature* 2020 Mar;579(7798):270-3.
7. Pawlowski C, Lenehan P, Puranik A, Agarwal V, Venkatakrisnan AJ, Niesen MJM, et al. FDA-authorized mRNA COVID-19 vaccines are effective per real-world evidence synthesized across a multi-state health system. *Med (N Y)* 2021 Aug 13;2(8):979-92.e8.
8. WHO. COVID-19 vaccines. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines/advice>. [Cited: 8-Mar_2022].
9. Corrao G, Franchi M, Cereda D, Bortolan F, Zoli A, Leoni O, et al. Persistence of protection against SARS-CoV-2 clinical outcomes up to 9 months since vaccine completion: a retrospective observational analysis in Lombardy, Italy. *Lancet Infect Dis* 2022 Jan 27:S1473-3099(21)00813-6. doi: 10.1016/S1473-3099(21)00813-6.
10. Haas EJ, Angulo FJ, McLaughlin JM, Anis E, Singer SR, Khan F, et al. Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. *Lancet* 2021 May 15;397(10287):1819-29.
11. Thompson MG, Burgess JL, Naleway AL, Tyner H, Yoon SK, Meece J, et al. Prevention and attenuation of Covid-19 with the BNT162b2 and mRNA-1273 vaccines. *N Engl J Med* 2021 Jul 22;385(4):320-9.
12. Tenforde MW, Self WH, Adams K, Gaglani M, Ginde AA, McNeal T, et al; Influenza and Other Viruses in the Acutely Ill (IVY) Network. Association between mRNA vaccination and COVID-19 hospitalisation and disease severity. *JAMA* 2021 Nov 23;326(20):2043-54.
13. Wainstock T, Yoles I, Sergienko R, Sheiner E. Prenatal maternal COVID-19 vaccination and pregnancy outcomes. *Vaccine* 2021 Oct 1;39(41):6037-40.
14. Accorsi EK, Britton A, Fleming-Dutra KE, Smith ZR, Shang N, Derado G, et al. Association between 3 doses of mRNA COVID-19 vaccine and symptomatic infection caused by the SARS-CoV-2 Omicron and Delta variants. *JAMA* 2022 Feb 15;327(7):639-51.
15. Nordström P, Ballin M, Nordström A. Effectiveness of heterologous ChAdOx1 nCoV-19 and mRNA prime-boost vaccination against symptomatic Covid-19 infection in Sweden: A nationwide cohort study. *Lancet Reg Health Eur* 2021 Dec;11:100249. doi: 10.1016/j.lanepe.2021.100249.
16. Angel Y, Spitzer A, Henig O, Saiag E, Sprecher E, et al. Association between vaccination with BNT162b2 and incidence of symptomatic and asymptomatic SARS-CoV-2 infections among health care workers. *JAMA* 2021 Jun 22;325(24):2457-65.
17. Theiler RN, Wick M, Mehta R, Weaver AL, Virk A, Swift M.

- Pregnancy and birth outcomes after SARS-CoV-2 vaccination in pregnancy. *Am J Obstet Gynecol MFM* 2021 Nov;3(6):100467. doi: 10.1016/j.ajogmf.2021.100467.
18. Young-Xu Y, Korves C, Roberts J, Powell I E, Zwain M G, et al. Coverage and estimated effectiveness of mRNA COVID-19 vaccines among US veterans. *JAMA Netw Open* 2021 Oct 1;4(10):e2128391. doi: 10.1001/jama-networkopen.2021.28391
 19. Papagoras C, Fragoulis GE, Zioga N, Simopoulou T, Deftereou K, Kalavri E, et al. Better outcomes of COVID-19 in vaccinated compared to unvaccinated patients with systemic rheumatic diseases. *Ann Rheum Dis* 2021 Nov 10;annrheumdis-2021-221539. doi: 10.1136/annrheumdis-2021-221539.
 20. Lipkind HS, Vazquez-Benitez G, DeSilva M, Vesco KK, Ackerman-Banks C, Zhu J, et al. Receipt of COVID-19 vaccine during pregnancy and preterm or small-for-gestational-age at birth - eight integrated health care organizations, United States, December 15, 2020-July 22, 2021. *MMWR Morb Mortal Wkly Rep* 2022 Jan 7;71(1):26-30.
 21. Twohig KA, Nyberg T, Zaidi A, Thelwall S, Sinnathamby MA, Aliabadi S, et al; COVID-19 Genomics UK (COG-UK) consortium. Hospital admission and emergency care attendance risk for SARS-CoV-2 delta (B.1.617.2) compared with alpha (B.1.1.7) variants of concern: a cohort study. *Lancet Infect Dis* 2022 Jan;22(1):35-42.
 22. Pawlowski C, Lenehan P, Puranik A, Agarwal V, Venkatakrishnan AJ. FDA-authorized mRNA COVID-19 vaccines are effective per real-world evidence synthesized across a multi-state health system. *Med (N Y)* 2021 Aug 13;2(8):979-92.e8.
 23. Andrews N, Stowe J, Kirsebom F, Toffa S, Sachdeva R, Gower C, et al. Effectiveness of COVID-19 booster vaccines against COVID-19-related symptoms, hospitalisation and death in England. *Nat Med* 2022 Jan 14. doi: 10.1038/s41591-022-01699-1.
 24. John BV, Deng Y, Scheinberg A, Mahmud N, Taddei TH, Kaplan D, et al. Association of BNT162b2 mRNA and mRNA-1273 vaccines with COVID-19 infection and hospitalisation among patients with cirrhosis. *JAMA Intern Med* 2021 Oct 1;181(10):1306-14.
 25. Singh C, Naik BN, Pandey S, Biswas B, Pati BK, Verma M, et al. Effectiveness of COVID-19 vaccine in preventing infection and disease severity: a case-control study from an Eastern State of India. *Epidemiol Infect* 2021 Oct 11;149:e224. doi: 10.1017/S0950268821002247.
 26. Citu IM, Citu C, Gorun F, Sas I, Tomescu L, Neamtu R, et al. Immunogenicity following administration of BNT162b2 and Ad26.COV2.S COVID-19 vaccines in the pregnant population during the third trimester. *Viruses* 2022 Feb 2;14(2):307. doi: 10.3390/v14020307.
 27. Marincu I, Citu C, Bratosin F, Bogdan I, Timircan M, Gurban CV, et al. Clinical characteristics and outcomes of COVID-19 Hospitalized patients: a comparison between complete mRNA vaccination profile and natural immunity. *J Pers Med* 2022 Feb 10;12(2):259. doi: 10.3390/jpm12020259.
 28. Verma A, Kumar I, Singh PK, Ansari MS, Singh HA, Sonkar S, et al. Initial comparative analysis of pulmonary involvement on HRCT between vaccinated and non-vaccinated subjects of COVID-19. *Eur Radiol* 2022 Jan 12:1-9.
 29. Taherian Z, Rezaei M, Haddadpour A, Amini Z. The effect of COVID-19 vaccination on reducing the risk of infection, hospitalisation and death in Isfahan province, Iran. *Iran J Public Health* 2022 Jan;51(1):188-95.
 30. Cocchio S, Zabeo F, Facchin G, Piva N, Furlan P, Nicoletti M, et al. The effectiveness of a diverse COVID-19 vaccine portfolio and its impact on the persistence of positivity and length of hospital stays: the Veneto region's experience. *Vaccines (Basel)* 2022 Jan 11;10(1):107. doi: 10.3390/vaccines10010107.
 31. Taylor CA, Patel K, Pham H, Whitaker M, Anglin O, Kambhampati AK, et al; COVID-NET Surveillance Team. Severity of disease among adults hospitalized with laboratory-confirmed COVID-19 before and during the period of SARS-CoV-2 B.1.617.2 (Delta) predominance - COVID-NET, 14 States, January-August 2021. *MMWR Morb Mortal Wkly Rep* 2021 Oct 29;70(43):1513-9.
 32. Baum U, Poukka E, Palmu AA, Salo H, Lehtonen TO, Leino T. Effectiveness of vaccination against SARS-CoV-2 infection and Covid-19 hospitalisation among Finnish elderly and chronically ill-An interim analysis of a nationwide cohort study. *PLoS One* 2021 Nov 18;16(11):e0258704. doi: 10.1371/journal.pone.0258704.
 33. Aslam S, Adler E, Mekeel K, Little J S. Clinical effectiveness of COVID-19 vaccination in solid organ transplant recipients. *Transpl Infect Dis* 2021 Oct;23(5):e13705. doi: 10.1111/tid.13705.
 34. Kalligeros M, Shehadeh F, Mylona EK, Kaczynski M, Kalagara S, Atalla E, et al. Clinical outcomes of adult patients hospitalized with COVID-19 after vaccination. *Trop Med Infect Dis* 2021 Sep 26;6(4):175. doi: 10.3390/tropicalmed6040175.
 35. Fall A, Eldesouki ER, Sachithanandham J, Morris CP, Norton MJ, et al. A quick displacement of the SARS-CoV-2 variant Delta with Omicron: unprecedented Spike in COVID-19 cases associated with fewer admissions and comparable upper respiratory viral loads. *MedRxiv* 2022 Jan 28;2022.01.26.22269927. doi: 10.1101/2022.01.26.22269927.
 36. Muthukrishnan J, Vardhan V, Mangalesh S, Koley M, Shankar S, Yadav AK, et al. Vaccination status and COVID-19 related mortality: A hospital based cross sectional study. *Med J Armed Forces India* 2021 Jul;77(-Suppl 2):S278-S282.
 37. Agrawal U, Katikireddi SV, McCowan C, Mulholland RH, Azcoaga-Lorenzo A, Amele S, et al. COVID-19 hospital admissions and deaths after BNT162b2 and ChAdOx1 nCoV-19 vaccinations in 2-57 million people in Scotland (EAVE II): a prospective cohort study. *Lancet Respir Med* 2021 Dec;9(12):1439-49.
 38. Vimercati A, De Nola R, Trerotoli P, Metta ME, Cazzato G, Resta L, et al. COVID-19 infection in pregnancy: obstetrical risk factors and neonatal outcomes-a monocentric, single-cohort study. *Vaccines (Basel)* 2022 Jan 21;10(2):166. doi: 10.3390/vaccines10020166.
 39. Glamson B, Brittain J, Kaura A, Mulla A, Mercuri L, Brett SJ, et al. Assessing COVID-19 vaccine uptake and effectiveness through the North West London vaccination program: retrospective cohort study. *JMIR Public Health Surveill* 2021 Sep 17;7(9):e30010. doi: 10.2196/30010.
 40. León TM, Dorabawila V, Nelson L, Lutterloh E, Bauer UE, Backenson B, et al. COVID-19 cases and hospitalisations by COVID-19 vaccination status and previ-

- ous COVID-19 diagnosis - California and New York, May-November 2021. *MMWR Morb Mortal Wkly Rep* 2022 Jan 28;71(4):125-31.
41. Bollineni S, Mahan LD, Duncan P, Mohanka MR, Lawrence A, Joerns J, et al. Characteristics and outcomes among vaccinated lung transplant patients with breakthrough COVID-19. *Transpl Infect Dis* 2021 Dec 30;e13784. doi:10.1111/tid.13784.
 42. Kang M, Yi Y, Li Y, Sun L, Deng A, Hu T, et al. Effectiveness of inactivated COVID-19 vaccines against illness caused by the B.1.617.2 (Delta) variant during an outbreak in Guangdong, China: A cohort study. *Ann Intern Med* 2022 Feb 1;M21-3509. doi: 10.7326/M21-3509.
 43. Bruxvoort KJ, Sy LS, Qian L, Ackerson BK, Luo Y, Lee GS, et al. Real-world effectiveness of the mRNA-1273 vaccine against COVID-19: Interim results from a prospective observational cohort study. *Lancet Reg Health Am* 2022 Feb;6:100134. doi: 10.1016/j.lana.2021.100134.
 44. González S, Olszewicki S, Salazar M, Calabria A, Regairaz L, Marín L, et al. Effectiveness of the first component of Gam-COVID-Vac (Sputnik V) on reduction of SARS-CoV-2 confirmed infections, hospitalisations and mortality in patients aged 60-79: a retrospective cohort study in Argentina. *EClinicalMedicine* 2021 Oct;40:101126. doi: 10.1016/j.eclinm.2021.101126.
 45. John BV, Deng Y, Schwartz KB, Taddei TH, Kaplan DE, Martin P, et al. Postvaccination COVID-19 infection is associated with reduced mortality in patients with cirrhosis. *Hepatology* 2022 Jan 12. doi: 10.1002/hep.32337.
 46. Gomes D, Beyerlein A, Katz K, Hoelscher G, Nennstiel U, Liebl B, et al. Is the BNT162b2 COVID-19 vaccine effective in elderly populations? Results from population data from Bavaria, Germany. *PLoS One* 2021 Nov 5;16(11):e0259370. doi: 10.1371/journal.pone.0259370.
 47. Dick A, Rosenbloom JI, Gutman-Ido E, Lessans N, Cahen-Peretz A, Chill HH. Safety of SARS-CoV-2 vaccination during pregnancy- obstetric outcomes from a large cohort study. *BMC Pregnancy Childbirth* 2022 Feb 28;22(1):166. doi: 10.1186/s12884-022-04505-5.
 48. Basic N, Lucijanic T, Barsic B, Luksic I, Basic I, Kurdija G, et al. Vaccination provides protection from respiratory deterioration and death among hospitalized COVID-19 patients: Differences between vector and mRNA vaccines. *J Med Virol* 2022 Feb 20. doi: 10.1002/jmv.27666.
 49. Lutrick K, Rivers P, Yoo YM, Grant L, Hollister J, Jovel K, et al. Interim estimate of vaccine effectiveness of BNT162b2 (Pfizer-BioNTech) vaccine in preventing SARS-CoV-2 infection among adolescents aged 12-17 years - Arizona, July-December 2021. *MMWR Morb Mortal Wkly Rep* 2021 Dec 31;70(5152):1761-5.
 50. Bazdyrev E, Rusina P, Panova M, Novikov F, Grishagin I, Nebolsin V. Lung fibrosis after COVID-19: treatment prospects. *Pharmaceuticals (Basel)* 2021 Aug 17;14(8):807. doi: 10.3390/ph14080807.
 51. Aleksova A, Gagno G, Sinagra G, Beltrami AP, Janjusevic M, Ippolito G, et al. Effects of SARS-CoV-2 on cardiovascular system: the dual role of angiotensin-converting enzyme 2 (ACE2) as the virus receptor and homeostasis regulator-review. *Int J Mol Sci* 2021 Apr 26;22(9):4526. doi: 10.3390/ijms22094526.
 52. Halawa S, Pullamsetti SS, Bangham CRM, Stenmark KR, Dorfmueller P, Frid MG, et al. Potential long-term effects of SARS-CoV-2 infection on the pulmonary vasculature: a global perspective. *Nat Rev Cardiol* 2021 Dec 6:1-18.
 53. Xing K, Tu XY, Liu M, Liang ZW, Chen JN, Li JJ, et al. Efficacy and safety of COVID-19 vaccines: a systematic review. *Zhongguo Dang Dai Er Ke Za Zhi* 2021 Mar;23(3):221-8.



The Role and Importance of Extracranial Ultrasound of the Carotid and Vertebral Arteries in the Prevention of Stroke

Miladin B Pantić¹

Abstract

Cardiovascular diseases are the most common cause of death and disability in the world. Stroke is statistically the second leading cause of illness and the first leading cause of disability. Therefore, it is important to identify asymptomatic persons with risk factors for the development of cerebrovascular diseases in time, in order to prevent serious consequences. Colour Doppler sonography (CDS) is an available and inexpensive, non-invasive method of showing the blood vessels through which the brain is fed. In addition to that, CDS provides a good understanding of the morphology of blood vessels — with a good knowledge of anatomy and hemodynamic characteristics through the basic physical principles of the Doppler effect.

Key words: Extracranial ultrasound; Stroke; Prevention.

References: 1. Vasić D. [Vascular ultrasonography]. Belgrade: Naša knjiga; 2014. Serbian. 2. White MA, Chakraborty S. Common carotid artery occlusion with retrograde flow in the internal carotid artery: a case report. *J Diagn Med Sonogr* 2013;29(6):269–74. 3. Lee W. General principles of carotid Doppler ultrasonography. *Ultrasonography* 2014 Jan;33(1):11-7.

1. Health Centre Doboj, Doboj, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
MILADIN B PANTIĆ
E: miladin.pantic@domzdravljadoboj.ba

ABSTRACT INFO

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Incidence of Antibiotic Treatment in Patients With Respiratory Symptoms Previously Well Advised

Daniel Atias,¹ Suzana Savić,² Draško Kuprešak³

Abstract

Background: There is constant talk of overuse of antibiotics, bacterial resistance to them. In an analysis of 28,000 medical examinations, more than 50 % of patients diagnosed with a cold or upper respiratory tract infection received an antibiotic.

Aim: To determine the frequency of antibiotic prescribing in patients in whom we have previously taken a good history and to look at current symptoms of the disease, and in whom we did not prescribe antibiotics at the first visit to our outpatient clinic. A key symptom for which we did not prescribe an antibiotic is a good appetite.

Methods: Prospective - retrospective study. Between October 2019 and February 2020, 50 patients of both sexes were examined and recorded, and of different ages complaining of some symptoms such as fever, sneezing, coughing, runny nose and the like. We asked each patient about their appetite and when the condition started and with these symptoms we were guided whether or not to administer the antibiotic. For various symptoms we administered antipyretics, expectorants and β 2 short-acting agonists.

Conclusion: 1. A negligible number of patients will receive an antibiotic if a history is taken and a clinical examination is performed. 2. Good appetite is a very important factor for not including antibiotics in a patient with initial respiratory symptoms. 3. Administration of antipyretics and expectorants and bronchodilators prevents significant secondary infection and consequent antibiotic use.

Key words: History and clinical examination; Good appetite; Antibiotic; Resistance.

References: 1. European Antimicrobial Resistance Surveillance System [Internet database]. RIVM 2009. [cited 30.03.2010.]. Available at: <http://www.rivm.nl/earss/database/>. 2. Davey P, Brown E, Fenelon L, Finch R, Gould I, Hartman G, et al. Interventions to improve antibiotic prescribing practices for hospital inpatients. *Cochrane Database Syst Rev* 2005(4):CD003543. 3. Bartlett JG, Onderdonk AB, Cisneros RL, Kasper DL. Clindamycin-associated colitis due to a toxin-producing species of *Clostridium* in hamsters. *J Infect Dis* 1977 Nov;136(5):701-5. 4. Cosgrove SE, Carmeli Y. The impact of antimicrobial resistance on health and economic outcomes. *Clin Infect Dis* 2003 Jun 1;36(11):1433-7. 5. Roberts RR, Hota B, Ahmad I, Scott RD, 2nd, Foster SD, Abbasi F, et al. Hospital and societal costs of antimicrobial-resistant infections in a Chicago teaching hospital: implications for antibiotic stewardship. *Clin Infect Dis* 2009 Oct 15;49(8):1175-84. 6. Kollef MH, Sherman G, Ward S, Fraser VJ. Inadequate antimicrobial treatment of infections: a risk factor for hospital mortality among critically ill patients. *Chest* 1999 Feb;115(2):462-74. 7. Ibrahim EH, Sherman G, Ward S, Fraser VJ, Kollef MH. The influence of inadequate antimicrobial treatment of bloodstream infections on patient outcomes in the ICU setting. *Chest* 2000 Jul;118(1):146-55.

1. Health Centre Dobož, Dobož, the Republic of Srpska, Bosnia and Herzegovina.
2. Health Centre Banja Luka, Faculty of Medicine, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
3. Health Centre Čelinac, Čelinac, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:

DANIEL ATIAS
E: daniel.atijas@domzdravljadoboj.ba

ABSTRACT INFO

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Significance of Point-of-Care Ultrasound (POCUS) Diagnostics in the Family Doctor's Office - Case Report

Željka Popović¹

Abstract

Background: Point-of-Care Ultrasound (POCUS) diagnostics is a 21st century stethoscope for every clinician regardless of specialty. Advances in technology have led to the availability of ultrasonic devices whose dimensions have been reduced to pocket editions.

Aim of this study was to show the practical importance of basic knowledge of ultrasound work, which in record time leads to diagnosis and timely treatment.

Methods: Electronic patient card, laboratory findings, ultrasound device Samsung ACUSON 300.

Case I: A 72-year-old patient complained of nosebleeds that occurred that morning when she measured high blood pressure. Other ailments included heartburn and belching that have been present for several months. At the physical examination, the hard liver was palpated and a lab was performed and ultrasound examination showed multiple metastatic changes in the liver. CT examination showed ovarian cancer.

Case II: A 44-year-old patient complained of dizziness that has been present for several days. Of the previous illnesses he had cerebral infarction 7 years ago and well controlled arterial hypertension. Ultrasound colour doppler of the carotid arteries was performed and a critical stenosis of 77 % was found and the patient was urgently referred to a vascular surgeon who performed endarterectomy.

Results: Basic knowledge of ultrasound diagnostics led to rapid diagnosis.

Conclusion: Knowing POCUS diagnostics shortens the path from diagnosis to treatment.

Key words: Ultrasound; Primary care; Case report.

References: 1. Zdravković I. Ultrasound diagnostics for general practitioners and family medicine; 2. Zdravković I. Handbook for general practitioners.

1. Health Centre Doboje, Doboje, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
ŽELJKA POPOVIĆ
E: zeljkapopovic982@gmail.com

ABSTRACT INFO

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Training Technologies, Need for Dosed Physical Activity and Risk Factor Prevention

Malin Drašković,¹ Vesko Drašković¹

Abstract

The time we live in is conditioned by a sedentary lifestyle that is measured by increasingly frequent health problems through diagnoses. Man is a kinetically dependent being and as such, he received his functional and physiological benefit only through movement. Training technologies are the only accurate, precise method of applying dosed physical load that exclusively gives results and prevents any potential consequences of improvised exercise. Exercise is precisely defined by precise, dosed movements in accordance with the possibilities and physiological norms of the individual. The market is oversaturated with various contents that have not been tested, which leaves a huge space for the consequences of risks and contraindications. Science and profession through direct practice provide an answer to the question, which methodology to use in the pursuit of results. That answer is in training technologies. There is almost no pathological process in the human body where dosed and controlled physical activity is not recommended after therapy. Also, dosed exercise is recommended in the prevention of diseases, as well as in the prevention of worsening of already diagnosed diseases. The consequences of risk factors are statistically more frequent, so that the profession is facing increasing challenges in practice. The human organism does not listen, but is listened to and when the pathological process comes to the level of therapy, the doctors are the ones who are listened to. Doctors often suggest light exercise during the recovery period. The problem arises in the fact that the patient does not know how to dose the physical load, but superficially remembers the outdated motor abilities that inspired him. This recollection often leads to improvisation, and improvisation to an incident, injury and restraint of a further plan of rehabilitation and therapy.

Key words: Prevention; Training technologies; Physical activity; Exercise, Risk factors.

References: 1. Fiuza-Luces C, Santos-Lozano A, Joyner M, Carrera-Bastos P, Picazo O, Zugaza JL, Izquierdo M, Ruilope LM, Lucia A. Exercise benefits in cardiovascular disease: beyond attenuation of traditional risk factors. *Nat Rev Cardiol* 2018 Dec;15(12):731-743. 2. Li G, Li J, Gao F. Exercise and Cardiovascular Protection. *Adv Exp Med Biol* 2020;1228:205-216.

1. Centre for Cardiovascular Prevention, Cardiovascular Institute „Dedinje“, Belgrade, Serbia.

Correspondence:
VESKO DRAŠKOVIĆ
E: vezbanjeizdravlje3md@gmail.com

ABSTRACT INFO

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Return-to-Play After COVID-19

Jasmina Živković,¹ Miodrag Marjanović,² Jasmina Stanković¹

Abstract

Background: Uncertainty regarding the prevalence and clinical implication of myocarditis in athletes after SARS-CoV-2 infection prompted sports medicine and sports cardiology physicians to develop new return-to-play protocol in the pandemic. Concern that exercise may exacerbate the severity of cardiac injury and increase the risk of arrhythmic death in those with viral-related myocarditis led to recommendation, in the USA, with some combination of a resting 12-lead ECG, troponin and transthoracic echocardiogram (triad testing). Early case series documenting experiences with cardiac MRI in asymptomatic and mildly symptomatic athletes reported high frequencies of cardiac injury.

Methods: Return-to-sport recommendations are based on cardiopulmonary evaluation and divided in 5 groups on COVID-19 exposure. (1) Asymptomatic athletes, who tested negative for COVID-19 (358 subjects) return to sport allowed without extra examination. (2) Asymptomatic athletes who tested positive for COVID-19 (63 subjects) take a break from training for at list two weeks from the date of the positive test and followed strict isolation guidelines. Of the recommended tests, a neat 12-lead ECG is sufficient for a gradual return to sport. (3) For athletes who were positive and had moderately severe symptoms (51 subjects), 4 weeks of abstinence from training is recommended, followed by cardiovascular evaluation (12-lead ECG, cardiac biomarkers and cardiac stress test). (4) For athletes who had severe symptoms and / or myocarditis (0 subjects), in addition to 12-lead ECG and blood test, ergospirometry and ultrasound of the heart should be performed. Their return to sport should be allowed after 6 months from the onset of the disease. (5) For athletes treated in intensive care due to severe pneumonia (0 participants) training should be banned for six months from the positive test and then a complete evaluation as in point 4 should be performed including MRI of the heart and lungs. Gradual return to sport means monitoring the intensity and duration of training, where the heart rate, intensity of load, fatigue, muscle pain, stress reactions and sleep quality should be monitored daily. In the first two days, aerobic activities lasting 15 minutes at 70 % maximum heart rate (HRmax) should be conducted. On the third day, the intensity should be increased to 80 % HRmax. From the end of the first week increase the training length to 60 minutes, and by the end of the second week, the load should achieve 100 % HRmax.

Results: After six months, sports medicine examination was performed by the protocol in all participants and the consequences of COVID-19 were not found.

Conclusion: Return-to-sport recommendations are the safe way to avoid consequences of COVID-19 in asymptomatic to mildly symptomatic form of the disease.

Key words: Sport medicine; Exercise, Post-COVID.

References: 1. Wilson MG, Hull JH, Rogers J, Pollock N, Dodd M, Haines J, et al. Cardiorespiratory considerations for return-to-play in elite athletes after COVID-19 infection: a practical guide for sport and exercise medicine physicians. *Br J Sports Med* 2020 Oct;54(19):1157-61. 2. Martinez MW, Tucker AM, Bloom OJ, Green G, DiFiori JP, Solomon G, et al. Prevalence of inflammatory heart disease among professional athletes with prior COVID-19 infection who received systematic return-to-play cardiac screening. *JAMA Cardiol* 2021 Jul 1;6(7):745-52.

1. Health Centre Šabac, Šabac, Serbia.
2. Health Centre Prnjavor, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
JASMINA ŽIVKOVIĆ
E: malamo@ptt.rs

ABSTRACT INFO

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MRI Diagnosis of Post-COVID-19 Myocardial Changes

Jelena Marić,¹ Siniša Ristić,^{1,2} Zlatko Maksimović,^{1,2} Vladimir Đurić,¹ Biljana Mijović,^{1,2} Lazar Angelkov¹

Abstract

In this paper, it will be presented the possibilities of visualisation and detection of myocardial changes using magnetic resonance imaging as a radiological modality that allows tissue characterisation *in vivo* conditions. The importance of this visualisation diagnostics is reflected in the monitoring of the dynamics of myocardial fibrosis in various pathological conditions, especially myocardopathies and myocardial sequelae. A special attention to changes in the myocardium that can be detected by magnetic resonance imaging and are related to conditions related to post-COVID-19 syndrome will be described.

Key words: Post-COVID-19; Myocardial changes; Magnetic resonance imaging.

References: 1. Viskin D, Topilsky Y, Aviram G, Mann T, Sadon S, Hadad Y, et al. Myocarditis associated with COVID-19 vaccination: echocardiography, cardiac tomography, and magnetic resonance imaging findings. *Circ Cardiovasc Imaging* 2021 Sep;14(9):e013236. doi: 10.1161/CIRCIMAGING.121.013236.

1. Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

2. Faculty of Medicine Foča, University of East Sarajevo, Foča, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:

SINIŠA RISTIĆ

E: ristic.m.sinisa@gmail.com

ABSTRACT INFO

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Organisation of Nursing Care in the University Clinical Centre of the Republic of Srpska During the COVID-19 Pandemic

Sladana Vranješ,¹ Spomenka Hotilovac,¹ Vlado Đajić,¹ Zvezdana Rajkovača,¹
Slobodan Hajder¹

Abstract

The University Clinical Centre of the Republic of Srpska (UCC RS) is the largest healthcare institution in the Republic of Srpska and a reference healthcare institution at the level of the Republic of Srpska, as well as a scientific base for the Faculty of Medicine of the University of Banja Luka and the Medical High School. This paper deals with the organisation of nursing care in the UCC RS during the COVID-19 pandemic from March 2020 to January 2022. Before the COVID-19 pandemic outbreak (the first case of the new coronavirus was registered in March 2020), this institution had 1,200 beds at its disposal and employed 1,454 medical technicians of all profiles. In January 2022, the number of medical technicians in the UCC RS was 1511. According to the data available to the UCC RS, since the first case registered in the Republic of Srpska until January 2022, the number of treated and hospitalised patients was 11786, of whom 6908 were males and 4878 were females. An average length of stay for patients in hospital was nine days. The outbreak of the COVID-19 pandemic raised a number of challenges, many of which related to a completely modified and new organisation of work as well as to the activities of medical organisational units. Besides providing the space capacities, it was necessary to provide additional medical staff and equipment. Additional space for the treatment of patients during the pandemic was provided by equipping and adapting the old locations. The necessary equipment was provided with the assistance of competent institutions, from donations and from our own resources. The existing hospital capacities were expanded by adding 350 new beds. However, the biggest challenge was the medical staff. In a very short period of time, it was necessary to provide the newly formed COVID wards with a sufficient number of trained medical technicians and to organise education of new employees. At the very beginning of the COVID-19 pandemic, a further aggravation was lack of knowledge about the disease that caused the pandemic, as well as the lack of relevant sources of information about the disease itself, its course and consequences. Therefore, in accordance with the new findings in relation to the disease, it was necessary to educate the staff about the use of protective equipment and at the same time to free them from the fear of the unknown. Besides basic education, it was necessary to train a certain number of medical technicians for a very short period of time to work in intensive care units. These data suggest that work in a pandemic conditions was a kind of struggle which after two years resulted in numerous organisational and spatial changes that were accompanied by education and admission of an additional number of medical technicians. With regard to the above, organisation and timely education of employees in the UCC RS resulted in treatment of COVID-19 patients in accordance with all regulations and principles of nursing care.

Key words: COVID-19; Management; Nursing care; Education; Organisation.

References: 1. Springhouse. Nursing procedures, Springhouse. 4th edition, Belgrade: Data Status; 2010. 2. Kalauz S. Organization and management in the field of health care. Zagreb: Medicinska naklada; 2015.

1. University Clinical Centre of the Republic of Srpska, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
SLADANA VRANJEŠ
E: sladjana.vranjes@kc-bl.com

ABSTRACT INFO

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Contemporary Role of Team Doctor in Elite Sport

Dejan Aleksandrić¹

Abstract

Team doctor have the leadership role in the organisation, management and provision of care of athletes in individual, team and mass participation sporting events. To accomplish this goal, the team doctor should possess and understand, medical qualifications and education, medical and administrative duties and responsibilities, ethical issues and medicolegal issues, but in contemporary elite sport media training is also becoming an essential skill. The team doctor's education, training and experience uniquely qualifies him/her to provide the best medical care for the athlete.¹ The team doctor integrates medical expertise with medical consultants, athletic trainers, and other allied health care professionals. The team doctor is ultimately responsible for the clearance to participate and the return to play (RTP) decision.² Doctor leadership of the interdisciplinary sports medicine team depends on fundamental leadership skills that often are overlooked in medical school. These leadership skills include effective communication, emotional intelligence, teamwork, selfless service, integrity and critical thinking while utilising an athlete-centered approach.³

Key words: Sport medicine; Elite sport; Return to play decision; Leadership skills.

References: 1. Herring SA, Kibler WB, Putukian M. Team physician consensus statement: 2013 update. *Med Sci Sports Exerc* 2013;45:1618–22. 2. Herring SA, Kibler WB, Putukian M. The team physician and the return-to-play decision: a consensus statement-2012 update. *Med Sci Sports Exerc* 2012;44:2446–8. 3. Tayne S, Hutchinson MR, O'Connor FG, Taylor DC, Musahl V, Indelicato P. Leadership for the team physician. *Curr Sports Med Rep* 2020 Mar;19(3):119–23.

1. Orthopedic Hospital "Banjica", Belgrade, Serbia.

Correspondence:
DEJAN ALEKSANDRIĆ
E: dejan.aleksandric@fss.rs

ABSTRACT INFO

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Effect of Trimetazidine, an Anti-Ischaemic Drug, on Microcirculation in Patients With Stable Coronary Heart Disease Treated With Percutaneous Coronary Intervention

Ana Matović,¹ Stefan Timčić,¹ Anja Radunović,¹ Petar Otašević,¹ Ivan Ilić¹

Abstract

Background/Aim: Myocardial ischaemia, in addition to a significant stenosis of the epicardial coronary arteries, can be caused by disorders of small blood vessels (less than 500 microns), coronary microcirculation. To assess microcirculation, index of microcirculatory resistance (IMR) has been developed. Many drugs have an effect on microcirculation, including trimetazidine (TMZ), a drug used in the treatment of stable angina pectoris. Aim of this study was to demonstrate that TMZ given before elective percutaneous coronary intervention (PCI), has a beneficial effect on microcirculation by reducing the IMR value.

Methods: Patients with stable coronary artery disease and indications for PCI, who were TMZ naïve, were randomly assigned to receive either TMZ plus previous medications (TMZ group - TMZ+) or just previous medications (Control group - TMZ-). Invasive indices were measured for all patients before and after PCI: fractional flow reserve (FFR), coronary flow reserve (CFR) and IMR, using coronary pressure - / thermistor - tipped wire (PressureWire, AbbottVascular).

Results: The study included 32 patients. Initial values of all invasive indices were similar between study groups, except for FFR value which was lower in patients not treated with TMZ (TMZ+ 0.76 ± 0.03 vs TMZ- 0.66 ± 0.05 ; $p = 0.002$). There was a noteworthy difference in change in IMR values in patients treated with TMZ (TMZ+ 13.6 ± 12.0 ; TMZ- 7.2 ± 11.1), which did not reach statistical significance (ANOVA, $p = 0.456$).

Conclusion: Trimetazidine, given before elective percutaneous coronary intervention, has a cytoprotective effect on cardiomyocytes and can decrease IMR values.

Key words: Trimetazidine; Coronary flow reserve; Microvascular resistance index.

References: 1. Qian G, A X, Jiang X, Jiang Z, Li T, Dong W, Guo J, Chen Y. Early trimetazidine therapy in patients undergoing primary percutaneous coronary intervention for ST segment elevation myocardial infarction reduces myocardial infarction size. *Cardiovasc Drugs Ther* 2021 Nov 12. doi: 10.1007/s10557-021-07259-y. 2. Selthofer-Relatić K, Stupin M, Drenjančević I, Bošnjak I. from myocardial infarction with non-obstructive coronary arteries (MINOCA) to chronic coronary syndrome: clinical diagnostic use of laser doppler flowmetry in coronary microvascular dysfunction. *Am J Case Rep* 2020 Aug 9;21:e924984. doi: 10.12659/AJCR.924984.

1. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
IVAN ILIĆ
E: ivan1ilic@yahoo.com

ABSTRACT INFO

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Is Plaque Characterisation in "True" Coronary Artery Bifurcations by Multislice Computerised Tomography Useful for Planning Percutaneous Coronary Interventions?

Miljana Ostojić,¹ Stefan Timčić,¹ Anja Radunović,¹ Petar Otašević,¹ Ivan Ilić¹

Abstract

Background: Coronary bifurcations are an excellent example of the effect of endothelial shear stress (ESS) on the distribution and progression of atherosclerotic lesions, because of their complex three-dimensional structure and haemodynamic conditions. Treatment of "true" bifurcation lesions, having more than 50 % stenosis of both the main branch (MB) and side branch (SB), remains challenging. Bifurcations' characteristics can play an important role in the outcome and occurrence of complications of percutaneous coronary interventions (PCI), and their assessment is possible using multislice computerised tomography coronary angiography (MSCTCA).

Aim: Was to investigate whether atherosclerotic plaque characteristics in MB and SB in "true" non-left main bifurcation lesions determined by MSCTCA can influence the occurrence of SB compromise after "provisional" stenting of the MB.

Methods: Patients with stable coronary artery disease having "true" bifurcations, not located in left main left coronary artery, underwent MSCTCA before and after PCI. Quantitative and qualitative parameters of the bifurcations (angles between bifurcations branches, localisation and plaque density) in longitudinal and cross sections at three levels (carina, 5 mm proximal and distal) were analysed.

Results: The study included 70 patients with 72 "true" bifurcations. The most of the bifurcations were located in left anterior descending (LAD) – diagonal (D) territory. SB compromise occurred in 17/72 bifurcations (23.6 %). In longitudinal cross-section plaques on carina side of MB and SB occurred less frequently and had lower density compared to plaques on lateral side of both branches ($p < 0.001$). In multivariable regression analysis that included known predictors of SB compromise on CTCA analysis, only circumferential plaque in MB proximal segment was an independent predictor of SB compromise.

Conclusion: CT diagnostics can be useful in planning interventions in complex coronary bifurcations. SB compromise during PCI was associated with circumferential distribution of atherosclerotic plaques in the proximal segment of MB.

Key words: Coronary bifurcation; CT coronary angiography; Provisional stenting; Side branch compromise.

References: 1. Qian G, A X, Jiang X, Jiang Z, Li T, Dong W, Guo J, Chen Y. Early trimetazidine therapy in patients undergoing primary percutaneous coronary intervention for ST segment elevation myocardial infarction reduces myocardial infarction size. *Cardiovasc Drugs Ther* 2021 Nov 12. doi: 10.1007/s10557-021-07259-y. 2. Selthofer-Relatić K, Stupin M, Drenjančević I, Bošnjak I. From myocardial infarction with non-obstructive coronary arteries (MINOCA) to chronic coronary syndrome: clinical diagnostic use of laser doppler flowmetry in coronary microvascular dysfunction. *Am J Case Rep* 2020 Aug 9;21:e924984. doi: 10.12659/AJCR.924984.

1. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
IVAN ILIĆ
E: ivanilic@yahoo.com

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The Relation Between Functional Capacity and Left Ventricular Function in Patients With Resistant Hypertension: Three-Dimensional Echocardiographic Study

Vera Celić,^{1, 2} Jelena Suzić-Lazić,^{1, 2} Dalibor Dragišić,² Nebojša Tasić,^{1, 3} Danijela Tasić,^{1, 3} Anka Majstorović,² Aleksandra Šljivić,² Marko Cvrkotić²

Abstract

Background/Aim: Resistant hypertension (RH) is associated with a high risk of hypertension-mediated organ damage and increases all-cause mortality. The purpose of this study was to investigate functional capacity and left ventricular (LV) function by 3-dimensional echocardiography (3DE) in patients with RH.

Methods: This study included 40 patients with RH, and 30 well-controlled hypertensive patients (controls), adjusted by gender and age. Office blood pressure (BP) > 140/90 mmHg is used to identify patients with RH according to the definition. All the subjects underwent 3DE examination and cardiopulmonary exercise testing (CPET).

Results: 3D LV ejection fraction (EF) in RH group was lower than LV EF in controls (62 ± 6 % vs 54 ± 3 %, $p < 0.05$). Similar findings were obtained for 3D LV mass index (37.3 ± 3.1 g/m² vs $43, 2 \pm 2.1$ g/m², $p < 0.05$). 3D global circumferential, radial and area strains were similar between the groups, but global longitudinal strain (GLS) significantly decreased in RH group (-16.8 ± 2.1 % vs -20 ± 3.7 %, $p < 0.001$). Peak oxygen uptake (mL/kg/min) was significantly lower in RH patients than controls (24.9 ± 4 vs 29.5 ± 4.8 , $p < 0.001$). Peak oxygen uptake was independently associated with 3D LV ejection fraction ($\beta = 0.32$, $p = 0.031$), and 3D GLS ($\beta = 0.30$, $p = 0.024$).

Conclusion: Functional capacity was significantly lower in patients with RH comparing with well controlled hypertensive patients. 3D LV EF and 3D GLS were independent predictors of LV functional capacity in both groups of patients.

Key words: Resistant hypertension, 3-dimensional echocardiography, cardiopulmonary exercise testing.

References: 1. Smolarek D, Gruchała M, Sobiczewski W. Echocardiographic evaluation of right ventricular systolic function: The traditional and innovative approach. *Cardiol J* 2017;24(5):563-72. 2. Kurklsinsky A, Mankad S. Three-dimensional echocardiography in valvular heart disease. *Cardiol Rev* 2012 Mar-Apr;20(2):66-71.

1. Faculty of Medicine, University of Belgrade, Belgrade, Serbia.
2. Cardiology Department, University Clinical Hospital Centre "Dr Dragiša Misović," Belgrade, Serbia.
3. Centre for Cardiovascular Research, Institute for Cardiovascular Disease Dedinje, Belgrade, Serbia.

Correspondence:
VERA CELIC
E: veracelic@yahoo.com

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3-Dimensional Echocardiographic Assessment of Morphological and Functional Changes of the Left Ventricle in Asymptomatic Patients With Non-Alcoholic Fatty Liver Disease and Hypertension

Vera Celić,^{1, 2} Dalibor Dragišić,² Nebojša Tasić,^{1, 3} Danijela Tasić,^{1, 3} Jelena Suzić-Lazić,^{1, 2} Branka Filipović,^{1, 4} Vladan Vukomanović,² Aleksandra Šljivić,² Marko Cvrkotić,² Stanimir Kiurski⁴

Abstract

Background/Aim: Arterial hypertension (HT) and non-alcoholic fatty liver disease (NAFLD) are interrelated independent of other components of the metabolic syndrome. The aim of the present study was to establish whether NAFLD is associated with morphological and functional changes of the left ventricle (LV) using three-dimensional echocardiography (3DE) including Speckle Tracking Echocardiography (3D-STE).

Methods: This cross-sectional study included asymptomatic subjects with HT, 20 with NAFLD (group A) and 44 without NAFLD (group B), adjusted by age and sex. All patients underwent a physical examination, laboratory testing, conventional 2-dimensional echocardiography (2DE) and 3DE. LV mass (LVM) was indexed to height to avoid the effect of obesity. The diagnosis of NAFLD was made by the technique of abdominal ultrasonography.

Results: There was no differences between groups in LV 2DE parameters: ejection fraction (EF), end-systolic volumes (ESV), end-diastolic volumes (EDV), LVM index (LVMI) and parameters of diastolic function. 3D LV ESV, EDV and EF were similar in both group. 3D LVMI (g/m^2) was significantly higher in group A comparing with B (94 ± 8 vs 69 ± 12 ; $p < 0.05$). In the group A, LV 3D-STE parameters, global radial strain (GRS), global longitudinal strain (GLS), global area strain (GAS) and global circumferential strain (GCS) were reduced compare to group B ($p < 0.05$). Multiple linear regression analysis showed that NAFLD is independently associated with GLS and GCS.

Conclusions: 3DE analysis can evaluate LV function powerfully than 2DE in patients with NAFLD and hypertension. NAFLD had negative impacts on LVMI and 3D strains in patients with hypertension.

Key words: Hypertension; Non-alcoholic fatty liver disease; Three-dimensional echocardiography.

References: 1. Guta AC, Badano LP, Ochoa-Jimenez RC, Genovese D, Previtero M, Civera S, et al. Three-dimensional echocardiography to assess left ventricular geometry and function. *Expert Rev Cardiovasc Ther* 2019 Nov;17(11):801-15. 2. Ujvári A, Lakatos BK, Tokodi M, Fábrián A, Merkely B, Kovács A. Evaluation of left ventricular structure and function using 3D echocardiography. *J Vis Exp* 2020 Oct 28;(164). doi:10.3791/61212.

1. Faculty of Medicine, University of Belgrade, Belgrade, Serbia.
2. Cardiology Department, University Clinical Hospital Centre "Dr Mišović Misović", Belgrade, Serbia.
3. Centre for Cardiovascular Research, Institute for Cardiovascular Disease Dedinje, Belgrade, Serbia.
4. Gastroenterology Department, University Clinical Hospital Centre "Dr Dragiša Mišović", Belgrade, Serbia.

Correspondence:
VERA CELIĆ
E: veracelic@yahoo.com

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Prevalence of Heart Attack, Stroke and Risk Factors for Cardiovascular Disease in Patients With Diabetes

Kosana Stanetić,^{1,2} Vesna Kević,¹ Mirko Stanetić,³ Verica Petrović,^{1,2} Bojan Stanetić³

Abstract

Background: Diabetes mellitus (DM) is a well known risk factor for cardiovascular (CV) and cerebrovascular diseases. Patients with diabetes have about four times the risk of developing atherosclerosis and the risk of heart attack is twice as high as in the general population.

Aim: The aim of this study was to examine the prevalence of heart attack, stroke and other risk factors for cardiovascular and cerebrovascular diseases in patients with diabetes and compare the obtained results on heart attack and stroke with patients who don't have diabetes.

Methods: The research is a cross-sectional study, conducted by reviewing electronic health records and registers of patients with chronic diseases older than 18 years registered in four family medicine teams in the Educational Center of Family Medicine at the Health Centre Banja Luka in the period from 01.07.-31.08.2019. Patients treated for DM were given data on age, sex, body mass index (BMI), smoking status, fasting glycemic values, HbA1c, lipid status parameters. Data on heart attack and stroke were taken from all subjects.

Results: The study included 6739 patients older than 18 years, of whom 404 patients were treated for DM and their risk factors were analysed. Out of a total of 404 patients with DM, 214 (53 %) were male and 210 (52.0 %) patients were > 65 years of age. The obtained results showed that in a total of 404 patients with DM 79 (19.6 %) had a heart attack, 29 (7.2 %) had a stroke. Most of the respondents, 324 (80.25 %) had achieved target values of blood pressure \leq 140/90 mmHg. The largest number of patients with DM was in the group of overweight patients with a BMI of 25.0-29.9 kg/m² (170 patients; 42.1 %); obese with a BMI of 30.0-34.9 kg/m² were 126 or 31.2 %; with BMI 35.0-39.9 kg/m² 32 patients (7.9 %) and with BMI \geq 40.0 kg/m² 8 patients (2.0 %). There were 77 (19.1 %) smokers; 282 (69.8 %) had total cholesterol values > 5.0 mmol/L; 287 (71.0 %) patients had LDL-cholesterol values > 2.5 mmol/L; target values of HbA1c (< 7.0 %) were not reached by 230 (56.9 %) patients, 370 (91.6 %) patients had elevated fasting glycemia > 6.1 mmol/L. In the group of other registered patients who do not suffer from diabetes, it was found that 48 (0.76 %) patients had a heart attack, 113 (1.78 %) had a stroke.

Conclusion: The prevalence of heart attack and stroke was significantly higher in the patients with DM compared to patients who don't have this disease. This research indicates the need to improve secondary prevention by family physicians and specialists in order to improve glycoregulation and reduce other risk factors (weight loss, smoking cessation, regulation of lipid status, achieving blood pressure targets). Family doctors have a significant role in reducing the risk of acute cardiovascular events in patients with DM because they monitor their patients, have insight into all other risk factors, give recommendations for non-pharmacological and pharmacological therapy.

Key words: Diabetes; Heart attack; Stroke; Risk factors.

References: 1. Visseren FJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Böck M, et al. European Guidelines on CVD Prevention. Committee for Practice Guidelines to improve the quality of clinical practice and patient care in Europe; Eur Heart J 2021 Sep;42(34):3227-37. 2. Li W, Li M, Gao C, Wang X, Qi D, Liu J, et al. Impact of type 2 diabetes mellitus on recurrent myocardial infarction in China. *Diab Vasc Dis Res* 2016 Nov;13(6):395-404. 3. Turner RC, Millns H, Neil HA, Stratton IM, Monley SE, Matthews DR, et al. United Kingdom Prospective Diabetes Study Group: Risk factors for coronary artery disease in non-insulin dependens diabetes mellitus. *United Kingdom Prospective Diabetes Study Group (UKPDS:23) Br Med J* 1998;316:823-8.

1. Primary Health Centre Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
2. Department of Family Medicine, Faculty of Medicine, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
3. Department of Internal Medicine, Faculty of Medicine, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
KOSANA STANETIĆ
E: kosana.stanetic@med.unibl.org

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COVID-19 and Heart Rhythm Disturbances – Our Approach

Vladimir Đurić,¹ Lazar Angelkov,¹ Zlatko Maksimović¹

Abstract

Since the first reports from China on the symptoms of SARS CoV-2 positive patients, it became obvious that, in addition to affecting the respiratory tract, COVID-19 is a multisystem disease and that almost all organs can be affected. Later studies confirmed that the heart is one of the most commonly affected organs – directly or indirectly. One of the most common manifestations of cardiovascular involvement are arrhythmias - both in COVID-19 itself and in the post-COVID-19 period. Although tachyarrhythmias are more commonly described, here we present 2 patients with slowed heart rate and one patient with tachycardia. While in one of the patients the symptoms arose during the COVID-19 infection itself, in the other two the development of symptoms occurred in the post-COVID-19 period.

Case I: The first patient was in home isolation due to symptoms of COVID-19 infection and a positive PCR test, when he fell after getting out of the bed and lost consciousness. Examined by paramedics, the ECG was performed and grade III AV block with a wide QRS escape rhythm of around 35 beats per minute was verified. Temporary pacemaker was urgently implanted. Anamnesticly patient has been treated for diabetes and renal failure. Due to the elevated temperature, he took NSAIDs in a higher dose. In laboratory findings: BUN was 32 mmol/l, creatinine 482 mmol/l; K⁺ 6.9, CRP 140, troponin 41 (ref: 19 -39 ng/L). The patient was abundantly rehydrated and therapy for hyperkalemia was prescribed. A satisfactory diuretic response was obtained, with a decrease in potassium values, recovery of conduction through the AV node and cessation of the need for a temporary pacemaker. Sinus rhythm was maintained until discharge.

Case II: Second patient, aged 30, came for an examination due to dizziness and heart palpitations, which occurred 2-3 months after overcoming a moderately severe COVID-19 infection. The dizziness was repeated several times, without loss of consciousness ("if I had not sat down, I would have fainted"). A high-grade AV block was registered on the 24-hour holter, which is why decision was made to implant a permanent pacemaker. An investigation into the potential existence of secondary causes is underway.

Case III: A third patient, aged 35, called paramedics because of epigastric pain, nausea, vomiting and a feeling of rapid heartbeat. He felt such problems for the first time and 2 months ago he overcame a milder form of COVID-19 infection. Wide QRS complex tachycardia was verified on the performed ECG and the patient was transported to hospital. After reviewing the ECG, atrial fibrillation with pre-excitation was suspected and it was decided to perform electrocardioversion. Sinus rhythm was seen after conversion, with some signs of pre-excitation. In order to prove the accessory pathway in technically limited conditions, decision was made to do a complete blockade of the AV node with 24 mg of Adenosine. After complete blockade in this patient, the sinus P waves were followed by wide QRS complexes with a pronounced delta wave. The patient is scheduled for accessory pathway ablation.

Key words: Heart rhythm disturbances; COVID-19; Post-COVID symptoms.

References: 1. Varney JA, Dong VS, Tsao T, Sabir MS, Rivera AT, Ghula S, et al. COVID-19 and arrhythmia: An overview. *J Cardiol* 2022 Apr;79(4):468-75. 2. Bhatla A, Mayer MM, Adusumalli S, Hyman MC, Oh E, Tierney A, Moss J, et al. COVID-19 and cardiac arrhythmias. *Heart Rhythm* 2020 Sep;17(9):1439-44.

1. Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
VLADIMIR ĐURIĆ
E: vladimir.djuric87@gmail.com

ABSTRACT INFO

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What Does Guidelines State on the Role of Nutrients in Cardiovascular Prevention?

Sonja Smiljić¹

Abstract

Nutraceuticals are all those ingredients present in foods or non-food products that have been found to have an effect on preventing the onset of certain diseases or having therapeutic properties. Cardiovascular disease is a leading cause of mortality in most countries of the world. Atherosclerosis is a chronic inflammatory disease of the arterial walls and is the primary cause of cardiovascular disease. Changes in diet and lifestyle in the prevention of cardiovascular disease and atherosclerosis have received greater attention in recent years. Various mechanisms have been proposed to explain the cardioprotective effect of nutraceuticals such as stabilisation of vulnerable atherosclerotic plaques or reduction of inflammatory biomarkers. The effect of omega-3 polyunsaturated fatty acids, hydroxytyrosols, lycopene, polyphenols from cereals, fruits and vegetables is described. Nutraceuticals are natural compounds which come from food sources and can have a positive effect on the blood vessel wall. Numerous nutraceuticals have been shown to have potential anti-inflammatory effects, making them promising compounds for exploring novel anti-atherogenic therapies. Although studies indicate significant effects of nutraceuticals, large, serious clinical trials are needed to determine their full effectiveness in the prevention of atherosclerosis and cardiovascular disease therapy.

Key words: Nutraceuticals; Atherosclerosis; Polyunsaturated fatty acids; Fiber; Polyphenols.

References: 1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J* 2021 Sep 7;42(34):3227–337. 2. Smiljić S. The clinical significance of endocardial endothelial dysfunction. *Medicina (Kaunas)* 2017;53(5):295-302.

1. Department of Physiology, Faculty of Medicine, University of Pristina, Kosovska Mitrovica, Serbia.

Correspondence:
SONJA SMILJIĆ
E: sonja.smiljic@med.pr.ac.rs

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Childbirth in COVID-19 Positive Pregnant Women - Our Experiences

Miomira Brkić,¹ Milica Pajić¹

Abstract

Background/Aim: After declaring a pandemic caused by a new type of the SARS-CoV-2 virus, we treat COVID-19 positive pregnant women daily. In order to complete baby deliveries in infected pregnant women, within the Hospital "Sveti Vračevi" Bijeljina, respecting all recommended measures to combat the spread of infectious diseases, COVID-19 maternity hospital was established in a separate building. Aim of this study was to present our experiences during childbirth of positive pregnant women.

Results: During 2020, out of 1004 births, 14 deliveries were in COVID-19 positive pregnant women and in 2021, out of 1051 births, that number was 18. Obstetrics indications were the only criteria for choosing manner of childbirth. In 2020, out of 14 births, 8 were vaginal and 6 were operative. All deliveries were in term. In 2021, out of 18 births, 14 were vaginal and 4 were Caesarean sections. One birth was premature. Beside gynaecologist and the midwife, the paediatrician and the paediatric nurse were present during the childbirth and the anaesthesiologist if necessary. All infants had a normal Apgar score and were tested for the presence of SARS-CoV-2 virus. During these two years presented, only two new-borns were PCR COVID-19 positive. Most of the pregnant women, although non-vaccinated, were asymptomatic at the time of delivery or had some mild clinical symptoms and were discharged home on time. In 2020, two new-borns were detained for further treatment. In 2021, 5 mothers were discharged with their babies, 11 babies were retained for further treatment and in two cases the babies were discharged and the mothers were retained for necessary treatment. During 2020, there was one high-febrile pregnant woman with bilateral pneumonia, an increased D-dimer and dependent on oxygen therapy. She was treated for fifteen days and after discharge was on anticoagulant therapy for two months. Analysing year 2021, in a pregnant woman who had a premature birth due to high fever, cough and was dependant on oxygen therapy, an increased D-dimer was found and she also used anticoagulant therapy after discharge.

Conclusion: Pregnant women are and always will be a vulnerable category of patients, especially during a pandemic of infectious diseases. Our experience shows that most pregnant women were asymptomatic or had mild symptoms of the disease. Two of them had more severe symptoms of infection. One premature birth occurred. The prognosis of most COVID-19 positive pregnant women and women who gave birth in COVID-19 maternity hospital was good and they had a similar progression of the disease as in the general population. The delivery itself was the same as for other pregnant women.

Key words: COVID-19; Pregnant women; Childbirth.

References: 1. Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R. COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *J Adv Res* 2020 Mar 16;24:91-8. 2. Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, Gurol-Urganci I, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. *Lancet Glob Health* 2021 Jun;9(6):e759-e772. 3. Lin C, Chu SM, Hsu JF, Hsu CC, Chang YL, Lien R, et al. Delivery management of suspected or confirmed COVID-19 positive mothers. *Pediatr Neonatol* 2021 Sep;62(5):476-82.

1. General Hospital "Sveti Vračevi"
Bijeljina, Bijeljina, the Republic of
Srpska, Bosnia and Herzegovina.

Correspondence:
BRKIĆ MIOMIRA
E: miomirabrkić@gmail.com

ABSTRACT INFO

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COVID-19 and Cardiac Arrhythmias, new Dilemmas in Electrophysiology

Lazar G Angelkov¹

Abstract

Early studies suggest that coronavirus disease 2019 is associated with a high incidence of cardiac arrhythmias - in 17 % of patients hospitalised for COVID-19 and in 44 % admitted to the intensive care unit.¹ The potential mechanisms that could result in arrhythmogenesis among COVID-19 patients include hypoxia caused by direct viral tissue involvement of lungs, myocarditis,² abnormal host immune response, myocardial ischaemia, myocardial strain, electrolyte derangements, intravascular volume imbalances³ and drug side effects.⁴ Cardiac arrhythmias such as atrial fibrillation, supraventricular tachycardia, complete heart block and ventricular tachycardia occur in patients infected, recovering and recovered from COVID-19.⁵ Atrial fibrillation has been noted as the most common pathologic arrhythmia and has been shown to be a poor prognostic marker in multiple cohorts.⁶ Sinus bradycardia reported in multiple observational studies in the acute infectious period stands out as an unexpected inflammatory response.⁷ In the convalescent period, long-term complications such as postural orthostatic tachycardia syndrome and inappropriate sinus tachycardia have been described.⁸ In this presentation the current data on incidence and outcomes of arrhythmias in the acute and convalescent period, possible pathophysiologic mechanisms and medical management is summarised. Special attention is placed on the management and treatment of myocarditis in athletes. Personalised therapy while balancing the risk/benefit of medical or invasive therapy is necessary to improve the care of patients with arrhythmias and acute or "long" COVID-19.⁹

Key words: Cardiac arrhythmias; COVID-19; Post-COVID; Electrophysiology.

References: 1. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 2020 Mar 17;323(11):1061-9. 2. Chilazi M, Duffy EY, Thakkar A, Michos ED. COVID and cardiovascular disease: What we know in 2021. *Curr Atheroscler Rep* 2021 May 13;23(7):37. doi: 10.1007/s11883-021-00935-2. 3. Topol EJ. COVID-19 can affect the heart. *Science* 2020 Oct 23;370(6515):408-9. 4. Kuck KH. Arrhythmias and sudden cardiac death in the COVID-19 pandemic. *Herz* 2020 Jun;45(4):325-6. 5. Desai AD, Boursiquot BC, Melki L, Wan EY. Management of arrhythmias associated with COVID-19. *Curr Cardiol Rep* 2020 Nov 24;23(11):2. doi: 10.1007/s11886-020-01434-7. 6. Mountantonakis SE, Saleh M, Fishbein J, Gandomi A, Lesser M, Chelico J, et al; Northwell COVID-19 Research Consortium. Atrial fibrillation is an independent predictor for in-hospital mortality in patients admitted with SARS-CoV-2 infection. *Heart Rhythm* 2021 Apr;18(4):501-7. 7. Babapoor-Farrokhran S, Batnyam U, Wiener PC, Kanjanahattakij N, Khraisha O, Amanullah A, et al. Atrioventricular and sinus node dysfunction in stable COVID-19 patients. *SN Compr Clin Med* 2020;2(11):1955-8. 8. Ståhlberg M, Reistam U, Fedorowski A, Villacorta H, Horiuchi Y, Bax J, et al. Post-COVID-19 tachycardia syndrome: a distinct phenotype of post-acute COVID-19 syndrome. *Am J Med* 2021 Dec;134(12):1451-6. 9. Ahmad MS, Shaik RA, Ahmad RK, Yusuf M, Khan M, Almutairi AB, et al. "LONG COVID": an insight. *Eur Rev Med Pharmacol Sci* 2021 Sep;25(17):5561-77.

1. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
LAZAR ANGELKOV
E: langelkov@yahoo.com

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Thyroiditis and Disorders of the Thyroid Gland as a Manifestation of Post-COVID-19 Syndrome

Danijel Đekić¹

Abstract

The aim of the study was to determine the frequency and association between thyroid dysfunction and previous COVID-19 infections. The study involved 112 people, 87 women and 25 men. Patients who had COVID-19 infection for a period of at least 4 months and at most one year before the examination were included. All patients had routinely performed findings within one year before infection that did not show thyroid dysfunction, did not have a genetic burden of thyroid disease. All 112 patients had a certain form of thyroid disorders with thyroid gland during the specified period after COVID-19 infection: 61 patients had Hashimoto's thyroiditis without hormone level disorders, 20 patients had Hashimoto's thyroiditis with hypothyroidism, 8 patients had Graves' disease, 8 patients had De Quervain's thyroiditis, 7 patients had hyperthyroidism and 8 had hypothyroidism without elevated levels of thyroid antibodies. By excluding other etiological factors, with knowledge of the mechanisms of COVID-19 infection, there is a strong association of the resulting disorders with the previous infection in these subjects.

Key words: Post-COVID syndrome; Hashimoto's thyroiditis; Graves' disease; De Quervain's thyroiditis.

References: 1. Nagayama Y. Continuous versus discontinuous B-cell epitopes on thyroid-specific autoantigens-thyrotropin receptor and thyroid peroxidase. *Eur J Endocrinol* 1995 Jan;132(1):9-11. 2. Mackenzie WA, Davies TF. An intrathyroidal T-cell clone specifically cytotoxic for human thyroid cells. *Immunology* 1987 May;61(1):101-3.

1. University Clinical Centre of the Republic of Srpska, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
SLADANA VRANJEŠ
E: danijeljf@gmail.com

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Hawthorne Effect in Hypertension Treatment

Ivica Zdravković¹

Abstract

In the first half of the 20th century, the social sciences noticed a phenomenon in which the behaviour of individual or group changes as a consequence of their awareness that they have been observed. This behavioural change was named the "Hawthorne effect", after the name of the factory and the town where an experiment was performed, which followed the change in workers' productivity with the change of labour environment. The Hawthorne effect may overlap with the placebo and nocebo effects and has been observed in various studies that researched behaviour of healthcare professionals and the occurrence of drug side effects. This paper is an attempt to evaluate the impact of Hawthorne effect on the treatment of arterial hypertension. Two groups of patients were selected and one group was exposed to intense control over the few weeks after the first exam. Then therapeutic results were compared among the two groups 6 months later. The conclusion suggest that the Hawthorne effect is present during intensified monitoring of treatment results and can be used to increase compliance and improve therapeutic outcome.

Key words: Hawthorne; Effect; Hypertension; Placebo; Nocebo.

References: 1. De Amici D, Klersy C, Ramajoli F, Brustia L, Politi P. Impact of the Hawthorne effect in a longitudinal clinical study: the case of anesthesia. *Control Clin Trials* 2000 Apr;21(2):103-14. 2. Brody T. Placebo arm as part of clinical study design. In: Brody T. *Clinical trials*. Amsterdam: Elsevier, 2021.

1. Specialist Clinic "ID MEDICA",
Požarevac, Serbia.

Correspondence:
IVICA ZDRAVKOVIĆ
E: ivicaserbia@yahoo.com

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Lung Ultrasound (LUS) Compared With Lungs X-ray in COVID-19 Patients

Ivica Zdravković¹

Abstract

Lung ultrasound (LUS) is well established tool for diagnosing "interstitial syndrome" in patients with pneumonia, ARDS or pulmonary oedema. With the ultrasound probe placed between ribs distinctive "B-lines" can be seen in a lung tissue, as a result of interstitial accumulation of fluid (lymphocytes during exudation in inflammatory process, or transudate during pulmonary oedema). These lines are visible much before any changes on standard posteroanterior (PA) lungs radiography. This paper is written with the intention of re-checking the sensitivity of lung ultrasound compared to lung X-ray in a group of patients having a SARS-CoV-2 infection. On a small exemplary group of specially selected patients, it is demonstrated high specificity of LUS diagnostics, which speeds up the treatment process and makes it more successful.

Key words: Lungs; Ultrasound; LUS; COVID-19, X-ray; Radiography.

References: 1. Nikravan S [Internet]. Philips point-of-care ultrasound education tools. Available at: www.usa.philips.com. [Cited: 2022-March-01]. 2. Milenković M, Stanisavljević J, Hadžibegović A, Prosen G, Mašulović D, Stojadinović M. Lung ultrasound: Part two (Lung ultrasound Part 2). *SJAIT* 40(7-8):183-91. 3. Zdravković I [Internet]. Family Medicine POCUS Curriculum, International POCUS Organization, 2021. Available at: www.pocus.rs. [Cited: 2022-March-01].

1. Specialist Practice "ID MEDICA",
Požarevac, Serbia.

Correspondence:
IVICA ZDRAVKOVIĆ
E: ivicaserbia@yahoo.com

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The Importance of Vaccination in the Prevention of Post-COVID-19 Complications

Biljana Mijović,^{1,2} Zlatko Maksimović²

Abstract

Background/Aim: During the COVID-19 pandemic, millions of people became infected worldwide. Manifestations of COVID-19 were clinically variable, ranging from asymptomatic infections to multiple organ failure and death. The aim of this study was to point out the importance of vaccination in the prevention of post-COVID-19 complications.

Methods: A systematic review of the literature was conducted. A combination of search terms in the PubMed database was used. All original scientific papers in English, which contained the given keywords were reviewed. Cohort studies, case studies and control and analytical cross-sectional studies were included.

Results: 182 papers were identified, of which 49 were included in the analysis after a detailed review, of which 40 were cohort, 5 case studies and controls and 4 analytical cross-sectional studies. The studies were heterogeneous, but all analysed the differences between vaccinated and unvaccinated in terms of real-life outcomes.

Conclusion: There were significant differences in SARS-CoV-2 infection, hospitalisation, severe clinical forms and deaths compared to real-life vaccination. Vaccines are effective in preventing post-COVID-19 complications. In the coming period, it is necessary to conduct more long-term prospective studies in relation to the specific complications of COVID-19.

Key words: COVID-19; Vaccine effectiveness; Hospitalised; Complications after COVID-19.

References: 1. Antonelli M, Penfold RS, Merino J, Sudre CH, Molteni E, Berry S, et al. Risk factors and disease profile of post-vaccination SARS-CoV-2 infection in UK users of the COVID Symptom Study app: a prospective, community-based, nested, case-control study. *Lancet Infect Dis* 2022 Jan;22(1):43-55.

1. Faculty of Medicine Foča, University of East Sarajevo, Foča, the Republic of Srpska, Bosnia and Herzegovina.
2. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
ZLATKO MAKSIMOVIĆ
E: zlatko.maksimovic@gmail.com

ABSTRACT INFO

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Effects of the Mediterranean Diet on the Prevention and Treatment of Metabolic Syndrome and Associated Disorders

Vesna Dimitrijević Srećković¹

Abstract

Abdominal adipose tissue is a hormonally active organ involved in insulin activity, as well as glucose and lipid metabolism. Various molecules originated from fat cells have been discovered to be biologically active and contribute to metabolic disorders related to obesity. Studies show that inflammatory factors related to abdominal adipose tissue indicate, not only the development of cardiovascular events, but also diabetes. All obese people are at major risk, especially those with stomach obesity. Reduced physical activity, lack of exercise, as well as dietary mistakes - diets rich in simple carbohydrates (sweets and sugary drinks), saturated fats of animal origin with insufficient intake of fruits, vegetables, cereals are the key reasons for the growing epidemic of obesity, metabolic syndrome, diabetes 2 and associated disorders in the world, both in adults and young people. The metabolic syndrome diagnose requires the presence of abdominal obesity (increased waist circumference for men greater than 94 cm, for women greater than 80 cm) and two other factors: elevated triglycerides above 1.7 mmol/L, low HDL cholesterol less than 1.0 mmol/L for men and less than 1.3 mmol/L for women, blood glucose greater than 5.6 mmol/L and high blood pressure greater than 130/85 mmHg. Metabolic syndrome is defined by abdominal obesity, accompanied by elevated blood insulin levels, insulin resistance leading to glycoregulatory disorders, high blood pressure, high blood fats and later atherosclerosis and vascular complications. Elevated blood insulin levels (hyperinsulinism) and insulin resistance are present in children with metabolic syndrome as well as in those with pre-metabolic syndrome. The association of the metabolic syndrome with atherosclerosis, tumours, sterility has been proven and it is also associated with depression. Our results showed the presence of metabolic syndrome in 37 % of obese children and adolescents, while the remaining 63 % had pre-metabolic syndrome (presence of only abdominal obesity or abdominal obesity with another factor) - usually increased waist circumference and low HDL - cholesterol. Hyperinsulinism, elevated inflammatory factors and thrombosis, the appearance of albumin in the urine and reduced antioxidant protection occur already in the phase of the pre-metabolic syndrome. Three decades ago, the Unit for Nutrition and Diabetes Prevention, Institute of Endocrinology, Diabetes and Metabolic Diseases assembled Mediterranean menus rich in complex carbohydrates, dietary fibre, monounsaturated fats and omega-3 polyunsaturated fats and low in saturated fat. The menus have shown to be of great success in obese individuals and patients with metabolic syndrome, pre-diabetes, diabetes and other chronic complications. The effects of the Mediterranean diet are manifested through the beneficial effects of monounsaturated fatty acids of olive oil, omega 3 fatty acids, increased intake of dietary fibre from fruits, vegetables and legumes and reduced intake of saturated fats of animal origin. Olive oil has beneficial effects on regulating blood pressure and lowering cholesterol levels. Omega-3-polyunsaturated fatty acids have anti-inflammatory and antithrombotic effects, lower triglycerides and increase insulin sensitivity. Reducing saturated fatty acids lowers serum lipids and reduces the risk of thrombosis. Fruits, vegetables and legumes are a source of antioxidants, potassium, which regulates blood pressure, folic acid, which has a beneficial effect on homocysteine, soluble fibre, which reduces reduced fat absorption, lowers cholesterol and increases HDL-cholesterol. Our results show that the Mediterranean diet has a statistically significant effect on body mass index, reduction of obesity, insulin resistance, glycoregulation, lipid status, blood pressure, prevention and treatment of vascular complications, non-alcoholic fatty liver, sexual dysfunction, polycystic ovary syndrome, infertility, depression and cancer.

Key words: Mediterranean diet; Metabolic syndrome; Abdominal adipose tissue.

References: 1. Wali JA, Jarzebska N, Raubenheimer D, Simpson SJ, Rodionov RN, O'Sullivan JF. Cardio-metabolic effects of high-fat diets and their underlying mechanisms-a narrative review. *Nutrients* 2020 May 21;12(5):1505.

1. Clinic for Endocrinology, Diabetes and Metabolic Diseases, University Clinical Centre of Serbia, Faculty of Medicine, University of Belgrade, Belgrade, Serbia.

Correspondence:
VESNA DIMITRIJEVIĆ
SREĆKOVIĆ
E: vesnadsendo@gmail.com

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Tobacco Control in the Republic of Srpska

Marin Kvaternik,¹ Darko Marković²

Abstract

The tobacco control in the Republic of Srpska, with an overall and long-term planned approach to solution of this important public health issue, practically started with the accepting of Strategy of Tobacco Control Policy in the Republic of Srpska (Strategy) by the Republic of Srpska Government in February 2004. The main aim of the Strategy was to decrease the prevalence of smoking by at least 2 % per year, increasing the number of people who either do not start smoking or stop smoking and at the same time enabling the residents to have tobacco-smoke free environment. Strategy was trying to achieve goals by preventing people to start a smoking habit, supporting smokers to stop smoking and protecting the non-smokers from the tobacco smoke. The Republic of Srpska National Parliament in 2004 adopted the set of laws regulating the smoking on the public places, tobacco and tobacco products marketing as well as availability of tobacco and tobacco products to minors. With purpose of professional support to smoke cessation in 2005, 35 doctors of medicine were educated and certified as educators in the field of smoking behaviour termination. In the following two years 505 doctors of medicine and 601 nurses/medical technicians from the primary health protection were educated as well as certified for work on the smoking habit cessation within the Chronic Non-contagious Diseases Prevention and Control Program (Program) which started its implementation in June 2003, namely through family medicine teams work. As a result of this work a Guide for Helping to Reduce or Eliminate Tobacco Consumption was published. The results of these activities were presented on the Fourth European Conference on Tobacco held in Basel in 2007. The work rose an interest among the Conference participants as well as a positive surprise that such an organised activity was going on in Bosnia and Herzegovina. Unfortunately, the years following that year practically ceased this Program, causing also the termination of work in the field of reduction and elimination of smoking habit, as well as continuation of professional education of health care workers in this field. During 2010 two informative campaigns were held. The first one was concerning the 31 January – A Day without Cigarettes and it was directed towards the affirmation of non-smoking as a lifestyle, as well as raising awareness on negative consequences of passive smoking. The continuation of campaign was held in the period from 15 May to 15 June, whereas this time major messages were directed towards the rights of non-smokers to tobacco-free environment and preventing the youth from starting a smoking behaviour. The results of two studies conducted using the same methodology, on the representative sample of grown-up population living in the Republic of Srpska, showed the decrease of frequency of daily smokers from 33.6 % in 2002 to 28.7 % in 2010. In recent years, there is a work worthy of mentioning, a work done by a multi-disciplinary team on creating a new strategy and a new, contemporary, overall law. Working drafts are over and most probably are waiting for the end of COVID-19 pandemic in order to be presented to the members of Parliament in the Republic of Srpska National Parliament.

Key words: Tobacco control; the Republic of Srpska; Strategy; National programme.

References: 1. Kvaternik M. Impact of Education on the work of doctor of medicine with smokers on smoking cessation. *Mater Sociomed* 2009;21(4):229-30. 2. Kvaternik M. [Factors influencing the involvement of family health workers in smoking cessation. *Proceedings of the First International Congress of Hygiene and Preventive Medicine*]. Belgrade 22-24 maj 2013. Serbian. 3. Kvaternik M. [Smoking cessation in the family medicine practice]. Banja Luka: Panevropski univerzitet „Apeiron“ Banja Luka, 2019.

1. Public Health Institute of the Republic of Srpska, Doboj, the Republic of Srpska, Bosnia and Herzegovina.
2. Health Centre "House of Health" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
MARIN KVATERNIK
E: marin.kvaternik@phi.rs.ba

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Manner of Standardisation of Nursing Procedures at the Secondary and Tertiary Level of Health Care During the COVID-19 Pandemic

Mirjana Janković,¹ Milan Latinović¹

Abstract

The challenges posed by the COVID-19 pandemic to health systems worldwide are unprecedented in recent history. In addition to the health system, the pandemic has caused severe problems to all other social systems. Since the first day of the pandemic, and for two years now, all levels of health care have suffered an unprecedented increase in the needs of the population to provide health services. This is especially true at the secondary and tertiary levels of health care. The general health and social context in which the COVID-19 pandemic is taking place is extremely unfavourable for health systems. The high share of the elderly population in the general population, the constant decades-long growth in the number of people suffering from chronic non-communicable diseases, the low standard of living of the population and poor health literacy, additionally complicated the problems caused by the pandemic. Nurses-technicians, as the most numerous group of workers employed in health care, were inevitably affected by the new situation, which at times meant a completely new organisation of work, use of new equipment and mastery of new procedures. The knowledge about COVID-19, patient treatment, needs and ways of providing health care was gained sometimes „randomly“, often based on their own observations and experience. The key issue in this seemingly chaotic process for nurse-technicians was how to provide the patient with adequate health care, which will be safe, high quality and accessible to the user, while safe from the point of view of service providers (nurses and technicians). The experience we have today clearly points to the fact that one of the strongest pillars of the sustainability of the health system, even in completely unforeseen circumstances and crisis situations, is the standardisation of procedures. Through the processes of mandatory certification and the process of accreditation of health care institutions, many processes related to the field of nursing have been standardised, which has contributed to achieving the goal of providing safe and quality care. Through standard operating procedures (SOPs) that are the result of the work of the Ministry of Health and Social Welfare of the Republic of Srpska and the Strengthening Nursing Project, nurses-technicians had a powerful tool in their hands. The published manual described in a clear, concise and systematic way all nursing procedures, which the nurse-technician performs independently, by explicit order of the doctor or as part of a team. The standardisation of nursing procedures has proven to be a guarantee of further improvement of the quality of health care, while providing strong support to nurses-technicians in terms of their competence and sense of security in daily work. The application of standardised procedures has provided high flexibility in the work of nurses-technicians in terms of adapting to work in teams subject to changes in team composition, as well as specific needs for general and special care for patients with COVID-19.

Key words: COVID-19; Nurse-technician; Health care; Standardisation; Operating.

References: 1. Egeljić-Mihailović N, Janković M, Vranješ S, Marinković S, Antonić D, Štrbac S. [Manual of standard operating procedures in nursing for secondary and tertiary level of health care in the Republic of Srpska]. Sarajevo : Fondacija Fami, 2020. Serbian.

1. Ministry of Health and Social Welfare, Government of the Republic of Srpska, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
MIRJANA JANKOVIĆ
E: mirjana.jankovic@live.com

ABSTRACT INFO

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Cardiovascular Complications of COVID-19 Infections in Children

Ružica Borović¹

Abstract

Background: COVID-19 in children is usually presented with a mild clinical picture. However, in a number of children, infection with this virus can be complicated by the development of multisystem inflammatory syndrome (MIS-C). It occurs as a result of an adaptive immune response, which is characterised as a cytokine storm.¹ Diagnostic criteria for MIS-C according to the recommendations of the Centres for Disease Control and Prevention (CDC) are: age of patient < 21 years, fever and laboratory evidence of inflammation, clinically severe disease requiring hospitalisation, multisystem character (≥ 2) of affected organs (cardiovascular, renal, respiratory, haematological, gastrointestinal, dermatological or neurological manifestations), SARS-CoV-2 positivity (acute or past infection) demonstrated by RT-PCR, serological or rapid antigen test; or exposure to a suspected or confirmed case of COVID-19 four weeks before the onset of symptoms. MIS-C has multisystem involvement, but cardiovascular manifestations are the most important. In its clinical presentation, this syndrome imitates Kawasaki disease and it's called Kawasaki-like syndrome, atypical or incomplete Kawasaki.² MIS-C and Kawasaki differ in clinical characteristics, age of onset and type of cardiovascular complications.³ Cardiovascular complications are more pronounced in patients with MIS-C.⁴ The most common cardiovascular complications are: myocarditis, pericarditis, coronary artery abnormalities and valvular dysfunction. Coronary artery abnormalities in MIS-C are ectasias, or minor dilatations of the coronary arteries and giant aneurysms are also found in Kawasaki disease.⁵

Case Reports: Patient 1: 5-year-old girl was admitted to the Paediatrics department of the Bijeljina Hospital due to fever and abdominal pain. The trouble started 5 days before admission. Physical findings: bilateral conjunctivitis, macular exanthema on the skin. Other findings were normal. In laboratory analyses, she had elevated laboratory parameters of inflammation. Rapid antigen test and PCR on COVID-19 was negative, with elevated titre of IgG At on COVID-19, IgM At was negative. A mild, initial dilatation of the coronary arteries, without aneurysmal changes, was observed in the echocardiographic finding. The rest of the findings were normal. During hospitalisation at the Institute for Mother and Child, the diagnosis was confirmed, treated with intravenous immunoglobulins, without a clinical response. Three pulses of Methylprednisolone and Acetylsalicylic acid were applied, after that, she was afebrile, laboratory analyses were normalised and the clinical findings were normal.

Patient 2: 6.5-year-old girl was admitted due to fever that lasted for 5 days. The physical findings: mucositis, polymorphic rash, mildly impaired left basal breathing, difficulty walking. Analyses performed showed: CRP: 285 mg/L, leucocyte count: $15.6 \cdot 10^9/L$, troponin 223 pg/mL. Rapid antigen test, PCR, IgM, IgG of COVID-19 negative. Echocardiographic examination: myocardial contractility normal, minor pericardial effusion. Finding on the coronary arteries was normal. Due to suspicion of the development of MIS-C, she was referred to the Children's Clinic in Banja Luka. In this Clinic the diagnosis of MIS-C was confirmed. She was treated with intravenous immunoglobulins and Acetylsalicylic acid, until complete clinical recovery and remediation of all inflammatory processes (lungs, heart, gastrointestinal system, joints).

Conclusion: Severe COVID-19 infection in children requires examination by a paediatric cardiologist.

Key words: COVID-19; Multisystem inflammatory syndrome; Kawasaki disease; Children.

References: 1. Kabeerdoss J, Pilia RK, Karkhele R, Kumar TS, Danda D, Singh S. Severe COVID-19, multisystem inflammatory syndrome in children, and Kawasaki disease: immunological mechanisms, clinical manifestations and management. *Rheumatol Int* 2021;41:19–32. 2. Cavalcanti A, Islabão A, Magalhães C, Veloso S, Lopes M, do Prado R, et al. Paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS): a Brazilian cohort. *Adv Rheumatol* 2022 Feb 21;62(1):6. doi: 10.1186/s42358-022-00237-4. 3. Dionne A, Dahdah N. Myocarditis and Kawasaki disease. *Int J Rheum Dis* 2018 Jan;21(1):45-9. 4. Vukomanovic VA, Krasic S, Prijic S, Ninic S, Minic P, Petrovic G, et al. Differences between pediatric acute myocarditis related and unrelated to SARS-CoV-2. *Pediatr Infect Dis J* 2021 May 1;40(5):e173-e178. 5. Pilia RK, Bhattacharj D, Singh S. Controversies in diagnosis and management of Kawasaki disease. *World J Clin Pediatr* 2018 Feb 8;7(1):27-35.

1. Paediatrics Department, Hospital "Sveti Vračevi", Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
RUŽICA BOROVIĆ
E: borovicruzica@gmail.com

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Are We Considering Sleep Apnoea as a Risk Factor for Cardiovascular Diseases?

Brankica Galić Miljanović¹

Abstract

Background / Aim: People with sleep apnoea stop breathing more or less during a sleep and most often they are not even aware of it. Sleep breathing disorders are divided into: obstructive sleep apnoea syndrome (OSA), the most common, central sleep apnoea syndrome (CAS) and hypoventilation syndrome in obese people. Sleep apnoea, OSA as the most common, actually tries to suffocate in sleep, recurrent hypopnea and apnoea is resulting in chronic hypoxemia, hypercapnia, oxidative stress, apoptosis, endothelial dysfunction, decreased intrathoracic pressure and sympathetic activation. OSA as an independent risk factor is found in people with cardiovascular diseases and conditions (hypertension, resistant hypertension, heart failure, myocardial infarction, cardiac ischaemia, sudden cardiac death, cardiac conduction disorders - AV block type 2 and 3, malignant arrhythmias – ventricular tachycardia and ventricular fibrillation, stroke). Loud snoring, cessation of breathing and short awakening from sleep, daytime sleepiness and frequent accidents are the main features of OSA, especially in obese people. All of the above can arouse suspicion of OSA in a dream. Validated questionnaires and tests (Berlin Questionnaire, Epworth Sleepiness Scale, STOP-BANG Questionnaire, etc.) can be used to identify people with this disorder in primary health care (PHC). The final diagnosis is made by polysomnography. Objective of this study was to examine and assess the awareness of doctors about this disorder as a risk factor for cardiovascular disease in PHC.

Methods: The study included 112 doctors from the Family Medicine Service from several Health Centres in the Republic of Srpska who were interviewed with a self-created questionnaire containing questions about information about OSA, knowledge of methods for identifying people with OSA, frequency and finding consultants about this disorder.

Results: Most doctors were aware of this risk factor, 82.8 %, 58 % were familiar with the methods of identification, 19.3 % answered that people with problems appear, 7.3 % noticed the findings of the consultant marked this disorder.

Conclusion: This research could improve thinking about sleep apnoea as a risk factor for cardiovascular disease among doctors.

Key words: Sleep apnoea; Obstructive sleep apnoea; Risk factors; Cardiovascular diseases; Primary health care.

References: 1. Prolić S. [Cardiovascular diseases and obstructive sleep apnoea]. *Kardio List* 2009;4(3):14-7. Serbian. 2. Caples SM, Gami AS, Somers VK. Obstructive sleep apnea and cardiovascular disease. *Ann Intern Med* 2005;142:187-97. 3. Včeva A, Đanić D, Đanić Hadžibegović A, Šimunjak B. [Guidelines for obstructive sleep apnoea]. *Med Jad* 2020;50(3):249-56. Bosnian. 4. Zemunek V, Pavlinac Dodig I, Vulić M. [Risk assessment for obstructive sleep apnoea in patients with type 2 diabetes]. *Med Jad* 2013;43(3):179-87. Serbian. 5. Tan A, Yin JD, Tan LW, van Dam RM, Cheung YY, Lee CH. Using the Berlin questionnaire to predict obstructive sleep apnea in the general population. *J Clin Sleep Med* 2017;13(3):427-32.

1. Primary Health Centre Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
BRANKICA GALIĆ MILJANOVIĆ
E: brankicagalic32@gmail.com

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Incidence of Inflammatory Heart Disease of Professional Athletes as Part of COVID-19 Infection and Their Safe Return to Training and Competition

Aleksandar Davidović,^{1,2} Dane Cvijanović¹

Abstract

The COVID-19 pandemic has suspended or disrupted training and competitions in a number of sports to minimise the risk of viral spread. Growing knowledge about this disease shows that a large number of athletes have prolonged symptoms for weeks and months after infection, the most common include cough, tachycardia and extreme fatigue. The gradual easing of epidemiological measures, as well as a significant number of sick athletes, raise the question of a safe return to sports activities after a COVID-19 infection. For athletes struggling with flu-like symptoms, myocarditis has always been a potential complication of viral syndromes. Asymptomatic, viral myocarditis in general population is a common cause of sudden cardiac death, especially in those > 35 years old. Cohort study from USA, which included 1,597 competitive collegiate athletes shows that symptom-based screening detects only 0.31 % prevalence of myocarditis. Screening with cardiovascular magnetic resonance imaging increased the prevalence of clinical and subclinical myocarditis to 2.3 %. The potential for cardiorespiratory complications from COVID-19 requires a heedful evaluation based on the clinical and symptom direction and severity of disease. We recommend a pragmatic approach must be taken and suggest our decisions on an individual basis. Clinical assessment, return planning and review (progress) are circular in nature. In patients with mild forms of the disease, without lung involvement, initial examination includes electrocardiography (ECG) and echocardiography, if cardiac results are abnormal – 24 h ECG Holter and cardiac magnetic resonance. In patients with pneumonia, chest X-ray and thoracic computed tomography are repeated, as it is necessary, same as biochemical tests: C-reactive protein (CRP), D-dimer and high-sensitive cardiac troponin T (hs-cTnT). Myocarditis and any other (eventually) disorder is treated per current guidelines. This considers the dynamic nature of returning process with continual focus on the athlete's progress and assessment for new symptoms.

Key words: Inflammatory heart disease; COVID-19 infection; Return-to-play decision.

References: 1. Daniels CJ, Rajpal S, Greenshields JT, Rosenthal GL, Chung EH, Terrin M, et al; Big Ten COVID-19 Cardiac Registry Investigators. Prevalence of clinical and subclinical myocarditis in competitive athletes with recent SARS-CoV-2 Infection: results from the Big Ten COVID-19 Cardiac Registry. *JAMA Cardiol* 2021 Sep 1;6(9):1078-87. 2. Martinez MW, Tucker AM, Bloom OJ, Green G, DiFiori JP, Solomon G, et al. Prevalence of inflammatory heart disease among professional athletes with prior COVID-19 infection who received systematic return-to-play cardiac screening. *JAMA Cardiol* 2021 Jul 1;6(7):745-52. 3. Corrado D, Zorzi A. Sudden death in athletes. *Int J Cardiol* 2017;237:67-70. 4. Santos-Ferreira D, Tomás R, Dores H. Return-to-Play Guidelines for Athletes after COVID-19 infection. *JAMA Cardiol* 2021 Apr 1;6(4):478-9.

1. University Clinical Centre "Zvezdara", Belgrade, Serbia.
2. Faculty of Dentistry, University in Belgrade, Belgrade, Serbia.

Correspondence:
ALEKSANDAR DAVIDOVIĆ
E: davidovicalex@hotmail.com

ABSTRACT INFO

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Acute Coronary Syndrome in COVID-19 Era

Aleksandar Janjičić¹

Abstract

The Coronavirus Disease 2019 (COVID-19) pandemic has brought unprecedented changes to our world and healthcare system. Treatment of medically emergent conditions like acute coronary syndrome (ACS) are particularly vulnerable and worldwide there were reports of reduction in ACS admissions with worsened in-hospital outcome. A meta-analysis that included 40 studies showed a reduction of 28.1 % in rates of admission in patients with ACS during the COVID-19 pandemic period compared with the same period in 2019 with a 21.9 % reduction in ST segment elevation myocardial infarction (STEMI) cases, 27 % reduction in non-ST segment elevation myocardial infarction (NSTEMI) and 48.1 % reduction in the number of patients admitted with unstable angina, reduction greater than 50 % of coronary angiography and percutaneous coronary angioplasty and a higher time delay of STEMI. Although primarily causing respiratory distress, there is growing evidence that COVID-19 increases the risk of ACS. Data from a nationwide Danish registry suggested that COVID-19 was associated with a five-fold increase in ACS events in the 14-day period following COVID-19 infection. Myocardial injury in patients with COVID-19 could be due to plaque rupture, cytokine storm, hypoxic injury, coronary spasm, microthrombi or direct endothelial or vascular injury. SARS-CoV-2 predisposes patients to thrombotic complications, due to excessive inflammation, endothelial dysfunction, platelet activation, and coagulation/fibrinolysis disturbances. Among STEMI patients, SARS-CoV-2 positivity is associated with larger thrombus burden, with larger use of GP IIb/IIIa inhibitors and thrombectomy during primary percutaneous coronary intervention and remarkably higher mortality but also higher rates of in-stent thrombosis and heart failure.

Key words: COVID-19; Acute coronary syndrome; Myocardial injury.

References: 1. Mafham MM, Spata E, Goldacre R, Gair D, Curnow P, Bray M, et al. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. *Lancet* 2020;396:381-9. 2. Kite TA, Ludman PF, Gale CP, Wu J, Caixeta A, Mansourati J, et al. International prospective registry of acute coronary syndromes in patients with COVID-19. *J Am Coll Cardiol* 2021;77(20):2466-76. 3. De Luca G, Verdoia M, Cercek M, Jensen LO, Vavliukis M, Calmac L, et al. Impact of COVID-19 pandemic on mechanical reperfusion for patients with STEMI. *J Am Coll Cardiol* 2020;76(20):2321-30. 4. Modin D, Claggett B, Sindet-Pedersen C, Lassen MCH, Skaarup KG, Jensen JUS, et al. Acute COVID-19 and the incidence of ischemic stroke and acute myocardial infarction. *Circulation* 2020;142(21):2080-2. 5. M. Madjid, D. Vela, H. Khalili-Tabrizi, S.W. Casscells, S. Litovsky, Systemic infections cause exaggerated local inflammation in atherosclerotic coronary arteries: clues to the triggering effect of acute infections on acute coronary syndromes. *Tex Heart Inst J* 2007;34(1):11-8. 6. Metzler B, Siostrzonek P, Binder RK, Bauer A, Reinstadler SJ. Decline of acute coronary syndrome admissions in Austria since the outbreak of COVID-19: the pandemic response causes cardiac collateral damage. *Eur Heart J* 2020 May 14;41(19):1852-3. 7. Toner L, Koshy AN, Hamilton GW, Clark D, Farouque O, Yudi MB. Acute coronary syndromes undergoing percutaneous coronary intervention in the COVID-19 era: comparable case volumes but delayed symptom onset to hospital presentation. *Eur Heart J Qual Care Clin Outcomes* 2020 Jul 1;6(3):225-6.

1. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
ALEKSANDAR JANJIČIĆ
E: drjanjic@gmail.com

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Maintaining Quality During Pandemic in Public Health Institution Hospital "Sveti Vračevi" Bijeljina

Zlatko Maksimović,^{1,2} Sanja Milovanović,¹ Aleksandar Janjičić,¹ Biljana Mijović,²
Nela Mitrović,¹ Mikajlo Lazić,¹ Nemanja Janković¹

Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for the disease COVID-19 that has decimated the health and economy of our planet. Since the first description of a coronavirus-related pneumonia outbreak in December 2019, the virus COVID-19 has evolved into a pandemic and as of today over 400 million people globally in over 210 countries have been confirmed to have been infected and almost six million people have died of COVID-19. The virus causes the disease not only in people but also in pets and wild animals. Lack of a voice on how to handle the pandemic impacted the management of the disease globally. The COVID-19 pandemic has had a significant impact on the health-care delivery system worldwide. Many pre-pandemic norms, standards and methods of providing medical services in most medical facilities had to be changed and re-evaluated. Many of them will likely stay changed and will probably never be provided in the same way in post-pandemic reality. The COVID-19 crisis is still ongoing and some sources say that we should be prepared for many more waves of pandemic in the future. The explosion of COVID-19 pandemic found many health organisations unprepared to respond to such a threat and has required health systems to change much faster than normal. Many staff have experienced training in quality improvement and patient safety methods which can be used to support the design of new systems and to accelerate learning about new and adapted practices. After a year's experience of working in a state of permanent emergency, it became clear that events are appropriately managed only in organisations, which make use of such instruments as systems approach, risk analysis, planning and performance monitoring. All this is supported by professionalism and the sacrifice of medical workers. In order to plan the response to future challenges, it is necessary to record and duly analyse the lessons learned. This paper provides guidance on how the experience from the fight against the COVID-19 pandemic can be used in planning responses to future emergencies.

Key words: Emergency; Pandemic; Epidemic; COVID-19; Continuity of operation; Risk management; Government strategies; Quality management; Bijeljina hospital.

References: 1. Fleming S, Hankir M, Ernestus RI, Seyfried F, Germer CT, Meybohm P, et al. Surgery in times of COVID-19-recommendations for hospital and patient management. *Langenbecks Arch Surg* 2020 May;405(3):359-64.

1. Public Health Institution Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.
2. Faculty of Medicine Foča, University of East Sarajevo, Foča, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
ZLATKO MAKSIMOVIĆ
E: zlatko.maksimovic@gmail.com

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Hypertension and Diabetes Mellitus

Maja Šipić¹

Abstract

Hypertension and diabetes are two of leading risk factors for atherosclerosis and the leading causes of death. The frequency of both diseases increases constantly and it is estimated that in 2030, the number of diabetics will increase to 366 million and the number of hypertensives to one and a half billion. Hypertension often accompanies diabetes, but additionally, diabetes is more common in hypertensives than in the general population. The incidence of hypertension in type 2 diabetes, which makes up 90 % of diabetics, is 50-80 %, and in type 1 diabetics about 30 %. When hypertension and diabetes are associated, the risk of death is increased by as much as 44 % and cardiovascular events (CV) by 41 %. The 2019 ESC / EASD Guidelines for the Treatment of Diabetes, Prediabetes and Cardiovascular Diseases are clear that the treatment of hypertension begins with non-pharmacological measures: weight regulation, reduction of dietary salt, limiting fat and total caloric intake, cessation of alcohol and smoking and regular exercising. Changing life habits is rarely enough for optimal regulation of blood pressure (BP). Several randomised prospective studies have shown that good regulation of BP reduces the risk of microvascular and macrovascular complications. In the UKPDS study, lowering systolic BP by 10 mmHg reduced the risk of all diabetic complications (24 %), retinopathy (34 %), stroke (44 %), heart failure (56 %) and death from diabetes (32 %). The results of the HOT study in the group of patients with diabetes showed that the risk of CV events with a diastolic pressure (DP) of 80 mmHg was reduced by 50 % compared to patients where the target DP was 90 mmHg. Target BP values in patients with diabetes are < 130/80 mmHg but should be individualised based on the estimated cardiovascular risk, considering the potential adverse effects of the drug and the patient's preference for a particular drug. Therapy should be initiated with drugs that are proven to reduce cardiovascular events in patients with diabetes, such as angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs), followed by calcium channel blockers (CCB) and diuretics. Optimal regulation of BP often requires combination of renin-angiotensin-aldosterone (RAAS) blockers and CCB or diuretics (fixed doses in one tablet are preferred), but the combination of ACE-I with ARBs is not recommended. In patients with prediabetes, the risk of developing diabetes is lower with the use of ACE inhibitors than beta blockers or diuretics. Many patients with diabetes and hypertension have resistant hypertension that requires additional MR-mineralocorticoid receptor blockers (spironolactone, eplerenone or newer finerenone). New drugs for glycoregulation of glucagon-like peptide-1 receptor agonist (GLP1-RA) showed a mild antihypertensive effect during the study, while SGLT2 inhibitors caused a greater reduction in BP, so their effect should be considered. Randomised clinical trials have shown that the relationship between BP levels and CV risk is continuous and that the treatment of hypertension is more beneficial in people with diabetes than in people of the same age with hypertension without diabetes. As cardiovascular diseases are the most common cause of death in people with diabetes, BP control is the most important measure.

Key words: Hypertension; Diabetes mellitus; Treatment; Guidelines.

References: 1. Cosentino F, Grant PJ, Aboyans V, Bailey CJ, Ceriello A, Delgado V, et al; ESC Scientific Document Group. 2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD. *Eur Heart J* 2020 Jan 7;41(2):255-323. 2. Jia G, Sowers JR. Hypertension in diabetes: an update of basic mechanisms and clinical disease. *Hypertension* 2021 Nov;78(5):1197-205. 3. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet* 2021 Sep 11;398(10304):957-80. 4. Ivers NM, Jiang M, Alloo J, Singer A, Ngui D, Casey CG, et al. Diabetes Canada 2018 clinical practice guidelines: Key messages for family physicians caring for patients living with type 2 diabetes. *Can Fam Physician* 2019 Jan;65(1):14-24. 5. UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *UK Prospective Diabetes Study Group BMJ*. 1998 Sep 12;317(7160):703-13.

1. Faculty of Medicine, University of Pristina, Kosovska Mitrovica, Serbia.

Correspondence:
MAJA ŠIPIĆ
E: maja.sipic66@gmail.com

ABSTRACT INFO

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Heart Failure and Diabetes Mellitus

Kristina Bulatović¹

Abstract

Diabetes mellitus is a serious global health problem. By 2035, the number of people with diabetes worldwide is expected to be over 592 million, a dramatic increase from 382 million people with diabetes in 2013. Studies have shown that patients with diabetes mellitus have more than twice the risk of developing heart failure (HF) than patients without diabetes. A Framingham study suggests that diabetes mellitus independently increases the risk of HF by up to 2 times in men and 5 times in women. A recent study showed that as many as 44 % of patients hospitalised for HF have diabetes mellitus, while that number in the general population is about 10 %. Many significant clinical trials have addressed the relationship between strict glycaemic control and cardiovascular outcomes. Although HF was not the primary endpoint of these studies, subsequent analyses also suggested that intensive glucose lowering did not reduce and in some cases even increased the risk of hospitalisation for HF. To be diagnosed with HF, patients must have typical symptoms and signs of HF and objective evidence of functional and structural abnormalities leading to decreased cardiac output and increased intracardiac filling pressure. Currently, the classification of HF according to ESC classification recommendations is HFrEF- heart failure with reduced ejection fraction (EF) (EF < 40 %), HFmrEF- heart failure with moderately reduced EF (EF 40-49 %), HFpEF- heart failure with preserved EF (EF > 50 %). Among patients with diabetes, 64 % have HFrEF, while 21.6 % have HFpEF. Drugs used to treat diabetes may have a beneficial effect on cardiovascular outcome including the development of HF, such as metformin and SGLT2 inhibitors and certain GLP1RA. However, others such as sulfonylureas, thiazolidinediones, insulin, some GLP1RA and some DPP4i may worsen or increase the risk of HF. Population studies have reported an independent association between diabetes mellitus and cardiac hypertrophy and systolic dysfunction with the consequent development of HF. The ARIC study provided evidence that subclinical myocardial damage increased linearly across the glycaemic spectrum from no diabetes mellitus to prediabetes and diabetes mellitus. This correlates with an increased risk of developing HF, which is highest in those with type-2 diabetes mellitus (T2DM). Many studies have examined the association between the use of drugs to treat diabetes and the occurrence of HF in these patients. New analyses have supported the case that metformin is beneficial for the survival of diabetic patients with HF compared to alternative glucose-lowering regimens. Population cohorts and observational studies have consistently found that metformin treatment is associated with a reduction in the prevalence of HF in diabetics. SGLT2 inhibitors are the first class of glucose-lowering drugs that have definitely reduced the risk of HF in T2DM. While the use of insulin in T2DM leads to an increased prevalence of HF. When it comes to drugs used to treat the symptoms and signs of HF, ACE inhibitors and mortality have been shown to reduce cardiovascular disease (CVD) rates of all causes in patients with diabetes mellitus. As far as the treatment of HFpEF is concerned, so far no drug has improved the survival of patients, although they can reduce the prevalence of HF. Despite the different response to medical therapy, it is interesting that HFrEF and HFpEF have a similar prognosis. It can be concluded that diabetes is an important risk factor for the development of HF. Patients with HF with diabetes have a worse prognosis than those without diabetes. The classification, diagnosis and treatment of HF remain the same for patients with and without diabetes.

Key words: Heart failure; Diabetes mellitus; Ejection fraction.

References: 1. Park JJ. Epidemiology, pathophysiology, diagnosis and treatment of heart failure in diabetes. *Diabetes Metab J* 2021 Sep;45(5):796. doi: 10.4093/dmj.2021.0239. 2. Action to Control Cardiovascular Risk in Diabetes Study Group, Gerstein HC, Miller ME, Byington RP, Goff DC Jr, Bigger JT, Buse JB, et al. Effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med* 2008 Jun 12;358(24):2545-59. 3. Kenny HC, Abel ED. Heart failure in type 2 diabetes mellitus. *Circ Res* 2019 Jan 4;124(1):121-41. 4. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, et al; Authors/Task Force Members; Document Reviewers. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur J Heart Fail* 2016 Aug;18(8):891-975.

1. Faculty of Medicine, University of Pristina, Kosovska Mitrovica, Serbia.
2. University Clinical Centre Priština, Gračanica, Serbia.

Correspondence:

KRISTINA BULATOVIĆ
E: kristinajakovljevic@gmail.com

ABSTRACT INFO

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Therapy of Heart Failure in Patients With Diabetes

Tatjana Novaković,¹ Zdravko Vitošević,¹ Nenad Milošević,¹ Emilija Novaković,² Jovana Milošević¹

Abstract

Heart failure is a common but often overlooked complication of diabetes. The strong link between diabetes and coronary artery disease, hypertension and renal failure plays an important role in the development of cardiomyopathy and heart failure in patients with diabetes. It is thought that the first lesion that diabetes manifests on the cardiovascular system may be a depressive effect on the myocardium, which is clinically manifested as diabetic cardiomyopathy. The pathophysiological link between diabetes and heart failure is complex and multifactorial, including various abnormal biochemical pathways, abnormal calcium signalling, impaired glucose and fatty acid metabolism and inflammatory pathways leading to fibrosis, stiffness and myocardial hypertrophy. The prevalence of heart failure in people with type 2 diabetes mellitus (T2DM) ranges between 9 % and 22 %, depending on the characteristics of the study population. Diabetes is also very common among patients with heart failure. In studies examining modern drugs for heart failure, 32 % to 43 % of patients with chronic heart failure had diabetes at the same time.

The primary goals in the treatment of heart failure are to improve the clinical status of patients, quality of life and functional capacity, prevention of hospitalisations due to worsening heart failure and reduction of mortality. The main components of the treatment of clinically present heart failure are education and support for heart failure self-control, lifestyle changes, monitoring, management of underlying causes and related comorbidities, pharmacological therapy, rehabilitation, apparatus therapy, mechanical circulatory support and heart transplantation. The main components of the recommended lifestyle change are physical exercise, smoking cessation, restriction or abstinence from alcohol consumption, change in diet and avoidance of obesity.

Pharmacotherapy is a cornerstone in the treatment of heart failure with a reduced ejection fraction and should be used before considering device therapy and in addition to non-pharmacological interventions. The treatment of heart failure is similar in patients with and without diabetes. In August 2021, the European Society of Cardiology (ESC) published guidelines for the treatment of acute and chronic heart failure. The new recommendations indicate 4 basic principles of therapy, namely: angiotensin receptor neprilysin inhibitor (ARNI) or angiotensin converting enzyme inhibitor (ACE), beta-blocker (BB), mineralocorticoid receptor (MRA) antagonists and selective inhibitors of sodium-glucose-type glucose 2 (SGLT2). It is recommended that this therapy be introduced in all patients as soon as possible. The ARNI / ACE triad, beta blockers and MRA serve as the basis of pharmacotherapy for patients with heart failure. They should be increased to the doses used in clinical trials or to the maximum tolerable if this is not possible. The results of the DAPA-HF study showed that the antidiabetic drug dapagliflozin reduces cardiovascular risk in patients with heart failure and reduced ejection fraction, regardless of whether they have T2DM or not. In patients with diabetes and advanced heart failure, pharmacological therapy and short-term mechanical circulatory support may be required until long-term MCS implantation or heart transplantation becomes available.

Key words: Heart failure; Diabetes mellitus; Therapy.

References: 1. Kristensen SL, Preiss D, Jhund PS, Squire I, Cardoso JS, Merkely B, et al. Risk related to pre-diabetes mellitus and diabetes mellitus in heart failure with reduced ejection fraction: insights from prospective comparison of ARNI with ACEI to determine impact on global mortality and morbidity in heart failure trial. *Circ Heart Fail* 2016;9(1):1–12. 2. Chen YT, Vaccarino V, Williams CS, Butler J, Berkman LF, Krumholz HM. Risk factors for heart failure in the elderly: A prospective community-based study. *Am J Med* 1999;106(6):605–12. 3. Kannel WBB, Hjortland M, Castelli WPP. Role of diabetes in congestive heart failure: The Framingham study. *Am J Cardiol* 1974;34(1):29–34. 4. Amato L, Paolisso G, Cacciatore F, Ferrara N, Ferrara P, Canonico S, et al. Congestive heart failure predicts the development of non-insulin-dependent diabetes mellitus in the elderly. The Osservatorio Geriatrico Regione Campania Group. *Diabetes Metab* 1997;23(3):213–8. 5. Ponikowski P, Voors AAA, Anker SDD, Bueno H, Cleland JGFGF, Coats AJSJS, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J* 2016;37(27):2129–200.

1. Faculty of Medicine, University of Priština, Kosovska Mitrovica, Serbia.
2. Psychiatric Clinic "Dr Laza Lazarević", Belgrade, Serbia.

Correspondence:
TATJANA NOVAKOVIĆ
E: novakovictanja65@gmail.com

ABSTRACT INFO

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Acute Coronary Syndrome and Diabetes

Vladan Perić¹

Abstract

Diabetes is a major risk factor for coronary heart disease. About 3/4 of diabetics die from cardiovascular diseases. Coronary heart disease is the leading cause of morbidity and mortality in patients with diabetes. During acute coronary syndrome (ACS), glyco-regulation disorders occur in both patients with and without diabetes (hyperglycaemia and hypoglycaemia may occur). Due to the release of stress hormones (catecholamines, cortisol), but also proinflammatory cytokines (hs CRP, IL6, IL18, TNF α), there is a transient increase in insulin resistance. Hyperglycaemia in ACS is associated with more frequent occurrence of major cardiovascular events and poorer prognosis in hospital. Hypoglycaemia is much rarer, almost always of iatrogenic origin, and worsens the prognosis more than moderate hyperglycaemia.

ACS occurs in diabetics at a much earlier age (from 25 to 40 years). Characteristic precordial pains are usually missing or are of lesser intensity ("dumb" forms). The probable cause is the existence of neuropathy of the autonomic nervous system and the consequent functional damage to the afferent sympathetic fibres, which transmit painful sensations from the area of the myocardium. The character of the existing painful sensations in the middle chest is quite atypical in relation to non-diabetics, which is why patients recognise their disease late. Very often, there are problems that are not specific to the clinical picture of ACS: general weakness, weakness, fatigue, nausea, vomiting, dyspnoea, confusion. Since these problems also occur in acute complications of diabetes, they can be the most common cause of differential diagnostic difficulties. The described changes in ACS are manifested in 30-40 % of diabetics with, and only in 5-15 % of non-diabetics. The ECG shows ST depression without pain in 75 % of diabetics and only in 25 % of non-diabetics (asymptomatic patients - "silent" ischaemia).

Acute complications of acute myocardial infarction are significantly more present in people with diabetes. During ACS diabetics, heart failure is more common, as well as heart rhythm disorders (tachycardia, bradycardia, ventricular tachycardia and fibrillation, branch blocks, as well as disorders of A-B conduction). The occurrence of cardiac shock is three times more common than in non-diabetics, which is one of the most important reasons for the high mortality rate in diabetics and in the coronary units themselves, where there is a possibility of hemodynamic support. Myocardial reinfarction is also more common, because in diabetics catecholamines (especially in younger diabetics) and free fatty acids worsen the metabolism in cardiomyocytes. Diabetes lost the protective effect of female sex hormones, as found in non-diabetics. The main reason for the worse prehospital, intrahospital and prognosis one year after ACS in diabetics is the more frequent occurrence and severity of heart failure.

Short-acting insulin (insulin analogues) is the drug of choice whenever the glycaemic level exceeds 10 mmol/L (caution due to the risk of hypoglycaemia). Strict glycoregulation (blood glucose value close to physiological) should be imperative both in the prevention and treatment of ACS, but also in the prevention of reinfarction, heart failure or malignant arrhythmias.

Key words: Acute coronary syndrome; Diabetes; Glycoregulation.

References: 1. Katsiki N, Papanas N. Diabetes mellitus and acute coronary syndrome: a lethal combination requiring better therapeutic strategies. *Curr Vasc Pharmacol* 2020;18(1):77-9. 2. Liu XL, Shi Y, Willis K, Wu CJ, Johnson M. Health education for patients with acute coronary syndrome and type 2 diabetes mellitus: an umbrella review of systematic reviews and meta-analyses. *BMJ Open* 2017;7(10):e016857. doi:10.1136/bmjopen-2017-016857. 3. Sharma A, Vaduganathan M, Ferreira JP, Liu Y, Bakris GL, Cannon CP, et al. Clinical and biomarker predictors of expanded heart failure outcomes in patients with type 2 diabetes mellitus after a recent acute coronary syndrome: insights from the EXAMINE trial. *J Am Heart Assoc* 2020;9(1):e012797. doi: 10.1161/JAHA.119.012797. 4. Collet JP, Thiele H, Barbato E, Barthélémy O, Bauersachs J, Bhatt DL, et al; ESC Scientific Document Group. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *Eur Heart J* 2021;42(14):1289-367.

1. Faculty of Medicine, University of Priština, Kosovska Mitrovica, Serbia.
2. University Clinical Centre Priština, Gračanica, Serbia.

Correspondence:

VLADAN PERIĆ

E: pericvladan@yahoo.com

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Diet Habits of Primary Health Care Workers During COVID-19

Marina Jotić Ivanović,¹ Marizela Šabanović,² Senada Selmanović³

Abstract

Background / Aim: The COVID-19 pandemic has had a major impact and blow to the lives of people around the planet. However, the first to be hit and those who faced an unknown infectious agent were health workers. Healthcare systems around the world have been brought to the brink of collapse and during this turbulent period have had to go through organisational changes to protect healthcare workers while providing the best possible healthcare to all users. It is precisely these changes in the work regime and work overload among health workers that have led to the appearance of stress, changes in eating and living habits. The paper aimed to determine the eating habits of health workers in primary health care centres and whether there was a change during the COVID-19 pandemic.

Methods: The collection of data was performed using the survey method via Mediterranean Diet Adherence Screener. The research was conducted in primary health care centres from 18.08.-10.10.2021. using the google.forms platform.

Results: Responses were obtained from a total of 121 respondents. Most eating habits of participants did not fit with Mediterranean diet recommendations, especially regarding intake of fish, red meat, meat products. Worsening of diet was noticed in 23.14 % participants.

Conclusion: Since primary health care workers are the cornerstone of the healthcare system, especially during emergencies, it is very important to research how those situations impact on their health (diet, sleep, physical activity, mental health...). Only this way we can prevent future bad outcomes.

Key words: COVID-19 pandemic; Diet habits; Primary healthcare workers.

References: 1. Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attinà A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med* 2020 Jun 8;18(1):229. doi: 10.1186/s12967-020-02399-5.

1. Family Medicine, Primary Health Care Centre Doboj, Doboj, Bosnia and Herzegovina.
2. Faculty of Technology, University of Tuzla, Tuzla, Bosnia and Herzegovina.
3. Family Medicine, Primary Health Care Centre "Dr Mustafa Šehović" Tuzla, Tuzla, Bosnia and Herzegovina.

Correspondence:
MARINA JOTIĆ IVANOVIĆ
E: jotic.marina@yahoo.com

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Challenges in Nursing During COVID-19 Pandemic

Milica Dikić,¹ Zlatko Maksimović¹

Abstract

The pandemic has shown the importance of the role of nurses in recognising and responding to numerous health challenges all over the world. In the past period they have shown a high level of professionalism and dedication during the COVID-19 pandemic. The pandemic highlighted the weaknesses of health systems around the world and the need for nursing, that considers more than 50 % of all health workers, to become an integrated part of future planning. For the past two years and even longer, the nurses have worked under tremendous pressure, but with incredible dedication and courage. Facing the unknown, unpredictable working hours, caring for patients as well as their own loved ones, cessation of normal daily functioning and general uncertainty was accepted by nurses unconditionally and with enthusiasm known only to them. During the pandemic, of nurses deployed to work at COVID-19 hospitals in Bijeljina, about 90 % were volunteers. However, the great patience and great affection with which nurses provide care to all patients can have negative consequences. Burnout syndrome is known to be widely present among healthcare professionals and the possibility of its occurrence has been increased by additional work stress caused by the COVID-19 pandemic. Adequate organisation of the health institution is one of the most important protective factors of the development of burnout syndrome. Various studies have shown that working environment affects the burnout syndrome at nurses, as well as job satisfaction and their intentions to leave the health care institutions where they work. The impact and challenges posed by the COVID-19 pandemic highlighted the commitment, courage and expertise of the nursing profession, as well as their exceptional role, especially in demonstrating adaptability to new situations, acting as a real driving force for the constantly changing health system due to COVID-19. The pandemic pointed to the shortcomings of health systems and it is clear today that the nursing workforce is not an inexhaustible resource in the world. Improving working conditions and increasing the number of nurses according to the number of patients increases the quality of health services provided and reduces mortality rates. It follows from the above that it is necessary to protect health care professionals, especially nurses. In addition to the necessary organisational measures in everyday work that affect the protection of psychophysical health and reduce the negative impact of COVID-19, economic and political measures are needed to improve working conditions and empower nurses and motivate them for further education and career advancement as to improve the quality of services provided. Now is the right time for structural changes that will make nurses visible and provide them with the well-deserved social recognition.

Key words: Nursing; COVID-19; Burnout syndrome; Continuing education.

References: 1. San Martín-Rodríguez L, García-Vivar C, Escalada-Hernández P, Soto-Ruiz N. Nurses after the Covid-19 pandemic: What now? *Enferm Clin (Engl Ed)* 2022 Jan-Feb;32(1):1-3. 2. Jaklič A, Munič J. Epidemic of COVID-19 disease in Slovenia – activities and challenge for health and midwife care providers. *SG/NJ* 2020;25:10-1. 3. Maksimović Z. Our fight against Covid: monograph. 1st ed. Bijeljina: Public Institution National Library „Filip Višnjić“, 2021 (Laktaši: Grafomark). 4. Kilibarda T, Trgovčević S, Ivanović S, Stanković M. Nurse burnout in response to COVID-19 – risk factors and prevention. *SG/NJ* 2020;25:21-2. 5. Chen YM, Fang JB. Correlation between nursing work environment and nurse burnout, job satisfaction and turnover intention in the western region of mainland China. *Hu Li Za Zhi* 2016 Feb;63(1):87-98. 6. Labrague LJ, De Los Santos JAA. COVID-19 anxiety among front-line nurses: Predictive role of organisational support, personal resilience and social support. *J Nurs Manag* 2020 Oct;28(7):1653-61.

1. Public Health Institution "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
MILICA DIKIĆ
E: mica_90@hotmail.com

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Management and Treatment of Breast Malignity in COVID-19 Era - Our Clinical Experience

Siniša Maksimović,¹ Biljana Marjanović,¹ Sandra Mijatović,¹ Biljana Mijović,¹ Vidak Simić,¹ Gordana Đurić,¹ Slaviša Dabić,¹ Jovica Vidović,¹ Milica Maksimović,¹ Zlatko Maksimović¹

Abstract

Background / Aim: COVID-19 represents a challenging period in medicine, requiring a special focus on the value and priorities of health interventions, including reshaping care for patients with malignancies - a special review of value-based and patient-centred decision-making. Aim of this study was to point out the clear implementation of the guidelines of the European Society of Medical Oncology (ESMO) for clinicians, defining three levels of priority in terms of interventions in patients with breast malignancies in our hospital.

Methods: ESMO has established guidelines defining three levels of priority for medical interventions: level 1 (high priority intervention), level 2 (medium priority) and level 3 (low priority).

Results: In the period from 1 March 2020 to 1 March 2022, 121 patients with breast cancer were treated in our institution. According to the ESMO guidelines, set of priorities in terms of medical interventions in patients with breast malignancies has been set. Prioritisation was guided by the size of the benefit, the biology of the tumour, the stage of the disease and the clinical scenarios for the development of malignancy. Level 1: the patient's condition is currently life-threatening, clinically unstable and / or the size of the benefit qualifies the intervention as a high priority (eg significant increase in overall survival (OS) and / or significant improvement in quality of life (QoL)). There were 61 patients in this group. These patients were given priority in referral to diagnostic procedures, consultative examinations and therapeutic procedures that included surgical, medical oncological and radiological treatment. Level 2: The patient's condition is not critical, but a delay after 6-8 weeks can potentially affect the overall outcome and / or the magnitude of the benefit that qualifies as a medium priority. There were 38 patients in this group. Level 3: The patient's condition is sufficiently stable to allow delays in services during the COVID-19 pandemic and / or intervention is not a priority based on the magnitude of the benefit. There were 23 patients in this group.

Conclusion: Planning the treatment of patients with breast malignancies was a great challenge in the COVID-19 era. We claim with a high degree of responsibility that the patients in our hospital had access to oncological health care. No patient was denied any intervention due to the weakness of the organisation of the local system. All ESMO recommendations have been fully complied.

Key words: Management; Breast malignity; COVID-19.

References: 1. Burki TK. Cancer guidelines during the COVID-19 pandemic. *Lancet Oncol* 2020;21:629-30. 2. Baker T, Schell CO, Petersen DB, Sawe H, Khalid K, Mndolo S, et al. Essential care of critical illness must not be forgotten in the COVID-19 pandemic. *Lancet* 2020 Apr 18;395(10232):1253-4.

1. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
SINIŠA MAKSIMOVIĆ
E: maksimovicsinisa66@gmail.com

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Comprehensive Cardiovascular Imaging and Circulating Biomarkers in Therapy of Heart Failure

Tamara Kovačević-Preradović^{1, 2}

Abstract

Heart failure (HF) is a clinical syndrome defined through the presence of current or prior symptoms, such as orthopnoea, dyspnoea and fatigue and evidence of cardiac dysfunction as a cause of these symptoms. The main causes of HF are: left ventricular (LV) dysfunction and right ventricular (RV) dysfunction with elevated filling pressures; valvular heart disease, pericardial disease, obstructive lesions in the heart or great vessels. The diagnosis, risk stratification as well the treatment of HF are based on the combination of cardiovascular imaging and levels of circulating biomarkers, especially transthoracic echocardiography (TTE), transoesophageal echocardiography (TOE) and natriuretic peptides (NPs). Global longitudinal strain (GLS) is an important diagnostic tool which has a significant role in predicting cardiovascular outcomes, compared to left ventricular ejection fraction (LVEF) where reduced GLS has been a predicting measure to provide a good prognosis for many heart failure-related outcomes independent of LVEF. In the HF with reduced ejection fraction (HFrEF), HF with midrange ejection fraction (HFmrEF) and HF with preserved ejection fraction (HFpEF) subgroups the strain has been found to have an important prognostic value that is independent of LVEF. For the HFpEF patient population GLS has more sensitive and objective modality than LVEF to quantify LV contractile performance where abnormal LV GLS correlates with decreased peak oxygen consumption (VO_2) and higher levels of natriuretic peptides. GLS has been shown to be a potential predictor of HF related hospitalisations and cardiovascular (CV) death in HFpEF patient population. The diagnostic work up for HF requires additional tests which include the measurement of circulating levels of B-type natriuretic peptide (BNP) and/or amino terminal proBNP (NT-proBNP), as the most reliable markers for diagnosis, prognosis, and monitoring of HF. The single commonly accepted cut-off points for BNP and NT-proBNP in non-acute ambulant cases where HF may be suspected are > 35 pg/mL and > 125 pg/mL, respectively. Besides, measuring of NT-proBNP or brain natriuretic peptide (BNP) levels may be useful in monitoring therapeutic responses in patients admitted to the hospital with acute HF as well in patients on guideline-directed medical therapy (GDMT) for HF.

Key words: Heart failure; Cardiovascular imaging; Cardiac biomarkers.

References: 1. Lakhani HV, Pillai SS, Zehra M, Dao B, Tirona MT, Thompson E, et al. Detecting early onset of anthracyclines-induced cardiotoxicity using a novel panel of biomarkers in West-Virginian population with breast cancer. *Sci Rep* 2021 Apr 12;11(1):7954. doi: 10.1038/s41598-021-87209-8. 2. Vaikunth SS, Lui GK. Heart failure with reduced and preserved ejection fraction in adult congenital heart disease. *Heart Fail Rev* 2020 Jul;25(4):569-81.

1. Department of Cardiology, University Clinical Centre of the Republic of Srpska, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
2. Faculty of Medicine, University of Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
TAMARA KOVAČEVIĆ-PRERADOVIĆ
E: tamara.kovacevic@medicolaser.info

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Acute Success of Radiofrequency Ablation of Idiopathic Ventricular Extrasystoles (VES) According to Focus Localisation VES

Sladana Božović Ogarević,¹ Nebojša Tasić,¹ Danijela Tasić,¹ Biljana Despotović,¹ Marko Filipović,¹ Zorana Kovačević,¹ Milan Arsić¹

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.

Abstract

Background / Aim: Ventricular arrhythmias are one of the most common arrhythmias in clinical practice and may occur in patients with or without heart disease. Clinical presentation can range from asymptomatic to left ventricular (LV) dysfunction with congestive heart failure or sudden cardiac death. Radiofrequency catheter ablation therapy is mainly reserved for patients with frequent VES whose quality of life is impaired by persistent symptoms despite drug therapy. This study was designed to gain insight into the patient characteristics, acute success and possible complications of ablation procedures for symptomatic idiopathic premature ventricular complexes (PVC).

Methods: Data were collected from patients who underwent radiofrequency catheter ablation for symptomatic and idiopathic PVC / ventricular tachycardia (VT) in the Institute for Cardiovascular Diseases Dedinje. Patients with structural heart disease (SHD) were excluded. SHD was excluded by echocardiography, exercise stress testing, cardiac catheterisation, or a history of prior infarcts. Demographic and clinical data, including age, sex, risk factors, PVCs burden, the origin and number of PVCs/24 h and complications were collected. The study protocol was approved by the a Institutional review board. PVCs localisation was classified as right ventricular outflow tract (RVOT) and left ventricular outflow tract (LVOT); acute ablation success was defined as the elimination of targeted PVCs at least 30 min after the last ablation procedure. The procedural endpoint was elimination or non-inducibility of the clinical arrhythmia.

Results: The results of this study show that ablation was effective for PVCs with a high overall success rate. Cohort consisted of 100 patients who underwent ablation procedure. Acute procedural success was achieved in 74 % of patients (50 patients (83.3 %) with RVOT and 24 (60.0 %) with LVOT had acute success. Most arrhythmias originated from the right ventricular outflow tract (60 %) or left ventricular outflow tract (40 %). Complications occurred in 2 (3.3 %) subjects with RVOT localisation (1 puncture and 1 AV block) and in 5 subjects (12.5 %) with LVOT localisation (of which 1 mechanical, 3 puncture and 1 AV block). In subjects with RVOT localisation 53.3 % were male and 46.7 % female, while in subjects with LVOT focus localisation, 45.0 % were male and 55.0 % female. Subjects with RVOT focus localisation were most often aged 31 to 40 years (30.0 %), while subjects with LVOT focus localisation were most often aged 51-70 years (27.5 %). There was no statistically significant difference in age categories in relation to focus localisation ($U = 987.0$; $p = 0.125$). 33.3 % of subjects with RVOT localisation and 45.0 % with LVOT localisation had arterial hypertension. 3.3% of subjects with RVOT localisation and 15.0 % with LVOT localisation had diabetes. 28.3 % patients with RVOT localisation and 47.5 % with LVOT localisation had a smoking habit as a risk factor.

Conclusion: RF ablation is effective and safe and therefore it can be considered as first-line therapy. Catheter ablation therapy for idiopathic ventricular arrhythmias is very effective with a sustained success rate of 74 %. Risk for complications is not negligible, even in experienced hands. A PVC origin from the RVOT was the independent predictor of an acute successful outcome.

Key words: Catheter ablation; Idiopathic premature ventricular beats; Outflow tract.

References: 1. Cuculich PS, Schill MR, Kashani R, Mutic S, Lang A, Cooper D, et al. Noninvasive cardiac radiation for ablation of ventricular tachycardia. *N Engl J Med* 2017 Dec 14;377(24):2325-36.

Correspondence:
SLADANA BOŽOVIĆ OGAREVIĆ
E: sladjanaogarevic@gmail.com

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Echocardiographic Screening of Congenital Heart Diseases in the Maternity Hospital of the General Hospital Bijeljina

Snežana Simić-Perić,¹ Zlatko Maksimović,¹ Ružica Borović,¹ Mikajlo Lazić,¹ Nela Mitrović,¹ Valerija Perić¹

Abstract

Background / Aim: Congenital heart diseases (CHD) indicate a structural abnormality of the heart with haemodynamic disturbances and homeostasis with which a child is born. The aetiology of CHD in most patients is still not precisely determined. An important role is played by genetic predisposition and the corresponding adverse environmental influences that act during a certain period of pregnancy. The incidence of CHD ranges from 0.8-1 % of new-borns (nn) in the general population. 25 % of them have severe CHD and high mortality within the first month of life and require emergency intervention or cardiac surgery. Only 50-60 % of critical CHDs are detected at foetal anomaly screening. Signs and symptoms of severe CHD are nonspecific during the early neonatal period and cannot be detected by routine physical examination during this period. Routine pulse asymmetry performed in the maternity ward can detect cyanogenic CHD, while cyanogenic defects cannot be detected by this method. Delayed diagnosis of CHD is associated with a poor outcome and it is extremely important to recognise asymptomatic CHD and introduce postpartum screening for it. Ventricular septal defect (VSD), coarctation of the aorta, transposition of the great arteries, tetralogy of Fallot, pulmonary stenosis, aortic stenosis, truncus arteriosus and tricuspid atresia are the most common CHD in the neonatal period. These eight flaws make up 80-95 % of all CHD. Aim of this study was detection of the most complex CHD at birth.

Methods: On the second or third day, echocardiography was performed on all nn born in the period from January 1 to February 28, 2022 in the maternity ward of the General Hospital Bijeljina.

Results: Structurally normal heart rate was found in 16.7 % nn (14.13 % male nn and 18.60 % female nn). Foetal open structures (FOA and DAP) had a total of 56.29 % nn (57.61 % male nn, 54.67 % female nn). ASD type secondary it was found in 21.56 % nn (21.74 % male nn, 21.33 % female nn). VSD was represented by 4.79 % nn (5.43 % male nn, 4 % female nn). Hypertrophic cardiomyopathy was present in - 0.6 % of all defects (male nn), *dysplasia v. mitralis* in 0.6 % (female nn).

Conclusion: Since prevention is the gold standard in medicine, the purpose of this screening was to diagnose, monitor and timely interventional cardiology and cardiac surgery in order to ensure a longer and better life for children with CHD with minimal retardation in growth and development. It is of great importance to monitor each subsequent pregnancy of the mother of a child with CHD from the very beginning, in order to be referred to genetic tests and foetal echocardiography in a timely manner. Significantly high detection of open foetal structures is most likely the result of a short follow-up period and early screening before spontaneous occlusion.

Key words: Echocardiographic screening; Congenital heart disease; New-born.

References: 1. Singh Y, Lakshminrusimha S. Perinatal Cardiovascular physiology and recognition of critical congenital heart defects. *Clin Perinatol* 2021 Aug;48(3):573-94. 2. Williams K, Carson J, Lo C. Genetics of congenital heart disease. *Biomolecules* 2019 Dec 16;9(12):879. doi: 10.3390/biom9120879. 3. Meller CH, Grinenco S, Aiello H, Córdoba A, Sáenz-Tejera MM, Marantz P, et al. Congenital heart disease, prenatal diagnosis and management. *Arch Argent Pediatr* 2020 Apr;118(2):e149-e161. 4. Houyel L, Meilhac SM. Heart development and congenital structural heart defects. *Annu Rev Genomics Hum Genet* 2021 Aug 31;22:257-84. 5. Bouma BJ, Mulder BJ. Changing landscape of congenital heart disease. *Circ Res* 2017 Mar 17;120(6):908-22.

1. General Hospital "Sveti Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
SNEŽANA SIMIĆ-PERIĆ
E: snezanaaperic@gmail.com

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Multidisciplinary Approach in Prevention of Cardiovascular Complications in Post-COVID-19 Era

Nebojša Tasić,^{1,2} Danijela Tasić,^{1,3} Biljana Despotović,¹ Zorana Kovačević,¹
Marko Filipović,¹ Slađana Božović,¹ Milan Arsić¹

Abstract

Cardiovascular diseases are today the number one cause of death in the world. In Serbia and Balkan region every second death is a consequence of diseases of the cardiovascular system. During pandemic of COVID-19 virus we are witnessing very often sudden deaths, although they are usually based on long-term exposure to numerous risk factors. Hypertension and other risk factors are often called silent killers. Especially today, in post-COVID-19 era there is a huge demand for efficient program for prevention, diagnosis and treatment of patients with high cardiovascular risk. Hypertension, infarction, stroke prevention association (HISPA) represent network of highly equipped specialised diagnostic and treatment centres and educated doctors for cardiovascular risk reduction in high-risk patients. HISPA program is based on personalised and multidisciplinary approach with specific and active involvement of different doctor profiles: cardiologist, endocrinologist, neurologist, nephrologist, nutritionist, clinical pharmacologist. Team of doctors work together in order to create a personalise HISPA program for cardiovascular risk reduction of each patient. Multidisciplinary approach include also risk factors education of general population and education of HISPA doctors. During the COVID-19 virus pandemic, there was a specific intersection of two pandemic curves: acute infectious and chronic non-infectious diseases. Aggressive control of all risk factors in patients after COVID-19 infection is necessary for adequate prevention of possible cardiovascular outcomes.

Key words: Multidisciplinary approach; Prevention; Post-COVID-19.

References: 1. Tasic N, Jakovljevic VLJ, Mitrovic M, Djindjic B, Tasic D, Dragisic D, et al. Black chokeberry *Aronia melanocarpa* extract reduces blood pressure, glycemia and lipid profile in patients with metabolic syndrome: a prospective controlled trial. *Mol Cell Biochem* 2021 Jul;476(7):2663-73. 2. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Böck M, et al; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur J Prev Cardiol* 2022 Feb 19;29(1):5-115. 3. Stevanovic A, Tasic D, Tasic N, Dragisic D, Mitrovic M, Deljanin-Ilic M, et al. Similarities and differences in epidemiology and risk factors of cerebral and myocardial ischemic disease. *Serb J Exp Clin Res* 2017;18(3):75-80.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.
2. Faculty of Medicine, University of Belgrade, Serbia.
3. Faculty of Medicine, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
NEBOJŠA TASIĆ
E: nebtasa@yahoo.com

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Renal Denervation – Patient Selection

Danijela Tasić,^{1, 3} Biljana Despotović,¹ Zorana Kovačević,¹ Marko Filipović,¹
Slađana Božović,¹ Milan Arsić,¹ Nebojša Tasić^{1, 2}

Abstract

Hypertension is among the risk factors leading causes of mortality and morbidity in the Serbia and Balkan region. Resistant hypertension is a special form of hypertension when, despite taking an adequate number of medications, blood pressure is still elevated. The best invasive method to solve this problem is the renal denervation procedure, ie "ablation" of the nerves of the blood vessels of the kidneys, which have been shown to participate in the formation and maintenance of high blood pressure. It is the 21st century that brings a new idea: to do radiofrequency ablation of afferent and efferent renal nerves. Renal denervation acts simultaneously on efferent and afferent effects and lowers both blood pressure and the action of neurohormones. It should be noted that a consensus document of experts was passed a few years ago, which emphasises the need for careful selection of patients for renal denervation. The Centre for Hypertension IKVB Dedinje has a developed program of diagnostics, treatment and monitoring of patients with "real" resistant hypertension. The Centre emphasise the importance of process of patient selection in order to achieve optimal results. In the last few years, a renal denervation program has been launched as part of the standard therapeutic modality in solving the problem of effective treatment of resistant hypertension within the regular work of the Centre for Hypertension and the Centre for Invasive Cardiology.

Key words: Renal denervation; Patient selection; Hypertension; Radiofrequency ablation.

References: 1. Tasić D, Topouchian J, Dragišić D, Tasić N, Hakobyan Z, Vatinyan S, et al. Reproducibility of the European Society of Hypertension - International Protocol for validation of blood pressure measuring devices in obese patients. *J Hypertens* 2019 Sep;37(9):1832-7. 2. Tasić D, Tasić N, Dragišić D, Mitrović M. Orthostatic hypotension and ACE inhibitor therapy in hypertensive patients. *Serb J Exp Clin Res* 2017;18(3):61-6.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.
2. Faculty of Medicine, University of Belgrade, Serbia.
3. Faculty of Medicine, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
DANIJELA TASIĆ
E: dtasic74@yahoo.com

ABSTRACT INFO

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Pandemic Reflections on Man and Community (From the Point of View of Sociological Analysis)

Dragomir Drago Vuković,¹ Zlatko Maksimović,² Vladimir Đurić²

Abstract

The COVID-19 pandemic is already entering its third year and has the characteristics of a social phenomenon that seriously endangers not only human lives and health, but also represents a serious test of endurance for both humans and the community as a whole. To what extent has this phenomenon shown the (in) ability of institutions to function, the economic strength of a society, its social responsibility, solidarity, etc. What is the impact of the pandemic on the processes of work, education, marriage and family relations? As in an emergency situation, institutions show the ability to fulfill their role and obligations to citizens, is this environment suitable for the spread of crime and corruption? Will the consequences of this pandemic significantly change the way of life, communication between people, will something that was rooted in our tradition be abandoned?

Key words: Pandemic; Health; Family; Economy; Communication; Tradition; Society.

References: 1. Babuç ZT. A Relational sociological analysis on the impact of COVID-19 pandemic lockdown on Syrian migrants' lives in Turkey: The case of Mersin province. *J Int Migr Integr* 2021 Oct;12:1-22.

1. Faculty of Medicine Foča, University of East Sarajevo, the Republic of Srpska, Bosnia and Herzegovina.
2. General Hospital "St. Vračevi" Bijeljina, Bijeljina, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:

DRAGOMIR DRAGO VUKOVIĆ
E: dragovukovic55@gmail.com

ABSTRACT INFO

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The Efficiency of Endovascular Stroke Treatment in Post-COVID-19 Patients

Slobodan Čulafić,¹ Aleksandra Milošević¹

Abstract

The paper analyses COVID-19 related strokes and the efficiency of endovascular stroke treatment for post-COVID-19 patients. The starting point in this study was the assumption that COVID-19 virus is related to stroke cases in the Republic of Serbia. Another assumption in this study was that COVID-19 related strokes have affected young individuals. This assumption is based on literature review and practical cases in Serbia. The sample included 52 patients with stroke, where the post COVID-19 patients presented 42.3 % of the research sample. The research goal was to examine the influence of COVID-19 pandemic on stroke cases as well as to indicate COVID-19 related strokes in young adult patients. During the statistical data processing, the following techniques and methods were implemented: the descriptive statistical measures (frequencies and percentage, arithmetical midranges), the measures of variability, the correlation method. National Institutes of Health (NIH) Stroke Scale/Score (NIHSS) was used in order to evidence the efficiency of endovascular treatment. The findings provided insight into the variables age and COVID-19 infection, showing that all stroke cases in the youngest adult patients were related to post COVID-19 patients.

Key words: Endovascular treatment; Mechanical thrombectomy; Post-COVID-19 patients; Stroke.

References: 1. Belani P, Schefflein J, Kihira S, Rigney B, Delman BN, Mahmoudi K, et al. COVID-19 is an independent risk factor for acute ischemic stroke. *AJNR Am J Neuroradiol* 2020 Aug;41(8):1361-4. 2. Čulafić S. [The protocol for interventional neuroradiological procedures]. Belgrade: Aja grafika, 2019. 3. Fara MG, Stein LK, Skliut M, Morgello S, Fifi JT, Dharmoon MS. Macrothrombosis and stroke in patients with mild Covid-19 infection. *J Thromb Haemost*. 2020 Aug;18(8):2031-3. 4. Fifi JT, Mocco J. COVID-19 related stroke in young individuals. *Lancet Neurol* 2020 Sep;19(9):713-5. 5. Fuentes B, Alonso de Leciana M, Garcia-Madrone S, Diaz-Otero F, Aguirre C, Calleja P, et al. Stroke acute management and outcomes during the COVID-19 outbreak: a cohort study from the Madrid Stroke Network. *Stroke* 2021 Jan;52(2):552-62. 6. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, et al. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA Neurol* 2020 Jun 1;77(6):683-90. 7. Pisano TJ, Hakkinen I, Rybinnik I. Large vessel occlusion secondary to COVID-19 hypercoagulability in a young patient: a case report and literature review. *J Stroke Cerebrovasc Dis* 2020 Dec;29(12):105307. doi: 10.1016/j.jstrokecerebrovasdis.2020.105307. 8. Saver JL, Adeoye O. Intravenous thrombolysis before endovascular thrombectomy for acute ischemic stroke. *JAMA* 2021 Jan 19;325(3):229-31. 9. Sweid A, Hammoud B, Bekelis K, Missios S, Tjoumakaris SI, Gooch MR, et al. Cerebral ischemic and hemorrhagic complications of coronavirus disease 2019. *Int J Stroke* 2020 Oct;15(7):733-42.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.

Correspondence:
SLOBODAN ČULAFIĆ
E: slobodan.culafic62@gmail.com

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Adiponectin Resistance Parameter as a Marker for High Normal Blood Pressure and Hypertension in Patients With Metabolic Syndrome

Sanja Stojanović,¹ Marina Deljanin-Ilić,¹ Steva Ilić,¹ Ivana Krstić,¹ Nebojša Tasić²

Abstract

Background / Aim: The development of hypertension (HT) is caused by dysfunctional adipose tissue and different degrees of adiponectin/insulin sensitivity.^{1,2} Aim of this study was to measure the concentration of adiponectin (AD) in patients with metabolic syndrome (MetS) and high-normal blood pressure (BP) or hypertension and to estimate whether Homeostatic Model Assessment-AD (HOMA-AD) index could be a predictor of adiponectin/insulin resistance in hypertension.

Methods: This cross-sectional study included 145 subjects: 72 men and 73 women, with an average age of 53.69 ± 13.72 years, consisting of 97 patients with MetS, and 48 healthy subjects without MetS (control group, $n = 48$). The patients with MetS were further divided into two groups according to their BP: MetS with high-normal BP (MetS + high-normal BP, $n = 48$), and MetS with HT (MetS + HT, $n = 49$). The control group ($n = 48$) was constituted from healthy females and males who were age-matched with the MetS group. Enzyme-linked immunosorbent assay method was utilised to measure serum adiponectin concentration in all patients. Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) and HOMA-AD index were calculated.

Results: The serum AD concentrations were statistically the lowest in the patients with MetS and HT ($p < 0.001$) and significantly lower in the patients with MetS and high-normal BP ($p = 0.003$) than in the control group. Low AD levels and high values of HOMA-AD were significantly associated with increased BP values. The logistic regression analysis identified that HOMA-AD was the most sensitive predictor for high-normal BP. In the patients with MetS, the value of $\text{HOMA-AD} \leq 1.12$ was associated with a lower risk of developing high-normal blood pressure. The value of $\text{HOMA-AD} \leq 2.54$ was associated with a lower risk of developing hypertension.

Conclusion: The lower serum AD levels and higher values of HOMA-AD index were associated with hypertension, especially in the early stages of the disease. The HOMA-AD index may be a useful marker in screening the patients with an increased risk of high-normal BP and hypertension.

Key words: Homeostatic Model Assessment-adiponectin; HOMA-AD index; Adiponectin resistance; Blood pressure; Biochemical marker.

References: 1. Maeda N, Funahashi T, Matsuzawa Y, Shimomura I. Adiponectin, a unique adipocyte-derived factor beyond hormones. *Atherosclerosis* 2019;292:1-9. 2. Jin SW, Pham HT, Choi JH, Lee GH, Han EH, Cho YH, et al. Impressic acid, a lupane-type triterpenoid from *Acanthopanax koreanum*, attenuates TNF- α -induced endothelial dysfunction via activation of eNOS/NO pathway. *Int J Mol Sci* 2019 Nov 16;20(22):5772. doi: 10.3390/ijms20225772.

1. The Clinic for Cardiovascular Diseases, Institute for Treatment and Rehabilitation "Niška Banja", Niš.
2. Cardiovascular Institute „Dedinje“, Belgrade, Serbia.

Correspondence:
SANJA STOJANOVIĆ
E: sanjastdr@gmail.com

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Post-COVID-19 Syndrome and Hypertension - a Duo Without a Coxswain

Biljana Despotović,¹ Danijela Tasić,^{1, 3} Zorana Kovačević,¹ Marko Filipović,¹ Slađana Božović,¹ Milan Arsić,¹ Nebojša Tasić^{1, 2, 4}

Abstract

Post-COVID-19 syndrome is a condition of persistence of symptoms and complications of infection in the period longer than four weeks from the beginning of the disease. So far, over 200 post-COVID-19 symptoms have been reported by patients. Previous research has not shown that patients with hypertension are at increased risk of SARS CoV-2 virus disease, nor that hypertension affects the severity of the clinical picture and mortality rate from COVID-19. In the previous 6 months, 138 patients with hypertension who had contracted SARS CoV-2 virus infection were examined at the IKVB "Dedinje" Hypertension Clinic. Severe clinical form of COVID-19 infection was present in 24 patients, moderate in 35 and the other 79 patients had a mild clinical picture. 104 of them reported various post-COVID-19 symptoms at the control examination (most often according to the type of feeling of shortness of breath, atypical chest pain, constant fatigue and palpitations). Polymorphic post-COVID-19 disorders were present in 75.9 % of patients with a milder form and 12 of them also reported poor regulation of blood pressure in the last month. All patients who had a more severe form complained of intolerance to exertion and in 12 of them, with current antihypertensive therapy, hypotension occurred and drug doses were adjusted. In the group of patients with moderate clinical picture, 57.1 % of them had polymorphic post-COVID-19 symptomatology and 91.4 % reported good regulation of blood pressure.

Key words: Post-COVID-19; Hypertension; Severe clinical picture.

References: 1. Schiffrin EL, Flack JM, Ito S, Muntner P, Webb RC. Hypertension and COVID-19. *Am J Hypertens* 2020 Apr 29;33(5):373-4. 2. Li X, Xu S, Yu M, Wang K, Tao Y, Zhou Y, et al. Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. *J Allergy Clin Immunol* 2020 Jul;146(1):110-8. 3. Cillóniz C, Pólvora E, Ewig S, Aliberti S, Gabarrús A, Menéndez R, et al. Impact of age and comorbidity on cause and outcome in community-acquired pneumonia. *Chest* 2013 Sep;144(3):999-1007. 4. Reynolds HR, Adhikari S, Pulgarin C, Troxel AB, Iturrate E, Johnson SB, et al. Renin-angiotensin-aldosterone system inhibitors and risk of Covid-19. *N Engl J Med* 2020 Jun 18;382(25):2441-8. 5. Zhang P, Zhu L, Cai J, Lei F, Qin JJ, Xie J, et al. Association of inpatient use of angiotensin converting enzyme inhibitors and angiotensin II receptor blockers with mortality among patients with hypertension hospitalized with COVID-19. *Circ Res* 2020 Jun 5;126(12):1671-81. 6. Yang G, Tan Z, Zhou L, Yang M, Peng L, Liu J, et al. Effects of angiotensin II receptor blockers and ACE (angiotensin-converting enzyme) inhibitors on virus infection, inflammatory status and clinical outcomes in patients with COVID-19 and hypertension: a single-center retrospective study. *Hypertension* 2020 Jul;76(1):51-8. 7. Wu C, Chen X, Cai Y, Xia J, Zhou X, Xu S, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med* 2020 Jul 1;180(7):934-43.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.
2. Medical Faculty, University of Belgrade, Serbia.
3. Medical Faculty, University of Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
4. HISPA, Bosnia and Herzegovina.

Correspondence:
BILJANA DESPOTOVIĆ
E: despotovicb55@gmail.com

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Mechanisms of Action of Tobacco Smoke on Blood Vessels and Cardiovascular Prevention

Milan Arsić,¹ Danijela Tasić,¹ Slađana Božović Ogarević,¹ Biljana Despotović,¹ Marko Filipović,¹ Zorana Kovačević,¹ Nebojša Tasić¹

Abstract

The mass smoking of tobacco can nowadays be freely considered an epidemic. Every year, exposure to tobacco smoke causes 600,000 premature deaths in Serbia. It is one of the main risk factors for cardiovascular disease and especially increases the risk of 25-30 % for the development of coronary heart disease. Exposure to cigarette smoke increases oxidative stress as a potential mechanism for triggering cardiovascular dysfunction. Impairment of vasodilatory function is one of the earliest manifestations of atherosclerotic changes in blood vessels. Several studies have shown that both active and passive exposure to cigarette smoke is associated with decreased vasodilatory function. In humans, exposure to cigarette smoke has disrupted endothelium-dependent vasodilation (EDV). Nitric oxide (NO), a free radical, is primarily responsible for the vasodilatory function of the endothelium. By changing the expression and activity of the endothelial NO synthase enzyme, tobacco smoke causes a decrease in NO. In order to prevent the development of cardiovascular diseases, an assessment of nicotine dependence and a smoking cessation program was made for each individual separately.

Key words: Tobacco smoking; NO; Cardiovascular diseases.

References: 1. Siasos G, Tsigkou V, Kokkou E, Oikonomou E, Vavuranakis M, Vlachopoulos C, et al. Smoking and atherosclerosis: mechanisms of disease and new therapeutic approaches. *Curr Med Chem* 2014;21(34):3936-48.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.

Correspondence:
MILAN ARSIĆ
E: arsicdr@gmail.com

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Reduce Stress - Strengthen Health

Nevena Simić¹

Abstract

Emotional and physical stress negatively affect the heart and vascular system. Stress hormones have harmful effects if the heart is exposed to elevated levels of catecholamines for a long time. Stress can cause an increased need for oxygen in the body, spasm of coronary blood vessels and electrical instability in the conduction system of the heart.

The idea that psychological conditions can affect physical health is not new and perhaps nowhere is the relationship between mind and body better studied than in cardiovascular diseases. Large prospective epidemiological studies and smaller basic science studies have established a strong link between cardiovascular disease and several psychological conditions, including depression, chronic psychological stress, post-traumatic stress disorder and anxiety. Most practical guidelines do not recognise the importance of stress screening in primary and secondary prevention of cardiovascular disease.

How to keep stress under control and maintain the necessary balance? It is clear that one cannot do without stress, but lifestyle can significantly affect sensitivity and sensitivity to stress.

Key words: Stress; Heart; Preventive interventions.

References: 1. Iddir M, Brito A, Dingo G, Fernandez Del Campo SS, Samouda H, La Frano MR, et al. Strengthening the immune system and reducing inflammation and oxidative stress through diet and nutrition: considerations during the COVID-19 crisis. *Nutrients* 2020 May 27;12(6):1562. doi: 10.3390/nu12061562.

1. Cardiovascular Institute Dedinje, Belgrade, Serbia.

Correspondence:
NEVENA SIMIĆ
E: nevenava67@yahoo.com

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Percutaneous Myocardial Revascularisation in Late-Present Patients With STEMI (Case Report)

Nemanja Milićević,¹ Vladimir Miloradović¹

Abstract

Background / Aim: Clinicians and interventional cardiologists are often in a dilemma about deciding how and when to perform percutaneous coronary intervention in patients with acute ST-elevation myocardial infarction (STEMI) treated with fibrinolytic therapy. The aim of this paper was to help and facilitate colleagues in assessing the decision in the manner and timing of percutaneous coronary intervention in late-present patients with STEMI who were primarily treated with fibrinolytic therapy.

Case report: The patient, a man, aged 60 years, had chest pain for 3 days and on the day of admission to the neighbouring hospital he had severe chest pain for 1-2 hours. Acute inferio-posterior wall myocardial infarction was verified. Included therapy according to the protocol for acute infarction was acetylsalicylic acid 300 mg, clopidogrel 600 mg and prescribed fibrinolytic therapy (streptokinase), then continuous heparin infusion. After 3 days there still was present pain, nausea, weakness, malaise, with clinical symptoms and signs indulgences (hypotensive, decompensated, dyspnoea and cold sweat). Risk factors: he was ex-smoker and hypertensive. Laboratory findings: Cholesterol: 4.3 mmol/L, HDL-cholesterol: 1.04 mmol/L, LDL-cholesterol: 2.46 mmol/L, Triglycerides: 1.44 mmol/L, Glycaemia: 5.5 mmol/L, Fibrinogen: 2.8 g/L, AST: 95 U/L, ALT: 47 U/L, LDH: 588 U/L, CK: 639 U/L, CK-MB: 39 U/L, K: 4.0 mmol/L, Na: 135 mmol/L, Cl: 99 mol/L, Ca: 2.07 mmol/L, P: 41 U/L. Coronary angiography found: LM without stenosis, LAD without stenosis, OM about 80 % stenosis, RCA 90 % stenosis proximally; then percutaneous coronary intervention with an implanted stent in the right coronary artery, then right catheterisation of the heart. First, the pressure in the inferior vena cava: 18 mmHg was measured by access through the right femoral vein and after the implanted stent, the pressure in the same vein was again measured at 8 mmHg. Cardiac ultrasound after intervention found: EF: 60 %, FS: 32 %, LP: 38 mm, LK: EDD: 52 mm, ESD: 36 mm, septum: 12.5 mm, PW: 12 mm, hypokinesia 2/3 of the basal wall with MR1 +.

Conclusion: The use of percutaneous coronary intervention after acute myocardial infarction treated with fibrinolytic therapy is not only a problem of clinicians or patients but also of interventional cardiologists who should decide on the method of revascularisation, as well as decide on the method of intervention, which is a general problem in such patients. Through this case report, given the attitudes and recommendations, knowledge and information about the treatment of patients with STEMI, we will hopefully justify further research.

Key words: Acute ST-elevation myocardial infarction; Percutaneous coronary intervention; Fibrinolytic therapy.

References: 1. Bouisset F, Gerbaud E, Bataille V, Coste P, Puymirat E, Belle L, et al; FAST-MI Investigators. Percutaneous myocardial revascularization in late-presenting patients with STEMI. *J Am Coll Cardiol* 2021 Sep 28;78(13):1291-305. 2. Bogoyevitch MA, Glennon PE, andersson MB, Clerk A, Lazou A, Marshall CJ, et al. Endothelin-1 and fibroblast growth factors stimulate the mitogen-activated protein kinase signaling cascade in cardiac myocytes. The potential role of the cascade in the integration of two signaling pathways leading to myocyte hypertrophy. *J Biol Chem* 1994 Jan 14;269(2):1110-9. 3. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials. *Lancet* 2003 Jan 4;361(9351):13-20. 4. Andersen HR, Nielsen TT, Rasmussen K, Thuesen L, Kelbaek H, Thayssen P, et al; DANAMI-2 Investigators. A comparison of coronary angioplasty with fibrinolytic therapy in acute myocardial infarction. *N Engl J Med* 2003 Aug 21;349(8):733-42. 5. Widimský P, Budesínský T, Vorác D, Groch L, Zelízko M, Aschermann M, et al; 'PRAGUE' Study Group Investigators. Long distance transport for primary angioplasty vs immediate thrombolysis in acute myocardial infarction. Final results of the randomized national multicentre trial--PRAGUE-2. *Eur Heart J* 2003 Jan;24(1):94-104.

1. General Hospital "Sveti Vračevi"
Bijeljina, Bijeljina, the Republic of
Srpska, Bosnia and Herzegovina.

Correspondence:
NEMANJA MILIĆEVIĆ
E: nemil03@gmail.com

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HISPA Centres in the Post-COVID-19 Era

Marko Filipović,¹ Zorana Kovačević,¹ Milan Arsić,¹ Nebojša Tasić,¹ Danijela Tasić,¹ Slađana Božović-Ogarević,¹ Biljana Despotović¹

Abstract

Cardiovascular diseases are the most common cause of morbidity and mortality in Europe and the developed world and in Serbia they are responsible for about 50 % of all deaths. Well-known risk factors contribute to their development, the most common ones being hypertension, hyperlipidaemia, diabetes, smoking and obesity. In addition, other conditions and diseases contribute to the overall cardiovascular risk, which, in various pathophysiological pathways, ultimately lead to the acceleration of the process of atherosclerosis, which is in the basis of many cardiovascular diseases. Here we primarily mean on sleep apnoea as a disease that is widespread and has an even higher prevalence than traditional risk factors in a certain population and which is still insufficiently recognised in our country but also in our region. The consequence is that these patients are not treated, which impairs their quality of life and makes it difficult to treat associated conditions and diseases. In the past two years, due to the impact of the SARS-CoV-2 virus pandemic, it was much more difficult to schedule physicians and adequate specialists visit which has significantly affected the poor control of these risk factors. With this in mind, it can be said with certainty that, in addition to other negative effects, the pandemic has led to a significant increase in cardiovascular risk. At the same time the pandemic pointed out the importance of developing effective programs for prevention, diagnosis and treatment of cardiovascular diseases. However, in addition to affecting the cardiovascular system, COVID infection has shown its face as a multisystemic disease that affects all organ systems and causes polymorphic problems in patients and consequently has shown how important it is to facilitate patients access to doctors of other specialties, such as endocrinologists, neurologists, nephrologists. Mission of Hypertension, Infarction and Stroke Prevention Association (HISPA), which includes nurses / technicians and doctors of various specialties, is to aggressively control risk factors and through a multidisciplinary approach to reduce cardiovascular risk, prevent the development of cardiovascular disease and provide adequate treatment to the sick. Also, the task of all employees in the post-pandemic period will be especially focused on patients who have had the infection caused by the SARS-CoV-2 virus in order to identify potential complications on time. Therefore, it is important to get closer to our patients and provide them with access to health care through the development of a wide network of HISPA centres. Our program is based on our previous experience of working with a large number of patients, but also on the experience of other countries that have shown that controlling risk factors, educating about healthy lifestyles and better conditions of diagnosis and therapy can significantly reduce the number of patients and deaths. These experiences have been translated into the latest recommendations from the European Society of Cardiology guidelines on cardiovascular disease prevention in clinical practice released last year and which form the basis of work in HISPA centres.

Key words: Cardiovascular risk; SARS-CoV-2 pandemic; HISPA.

References: 1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Böck M, et al; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur J Prev Cardiol* 2022 Feb 19;29(1):5-115. 2. Van Camp G. Cardiovascular disease prevention. *Acta Clin Belg* 2014 Dec;69(6):407-11. 3. Drager LF, McEvoy RD, Barbe F, Lorenzi-Filho G, Redline S; INCOSACT Initiative (International Collaboration of Sleep Apnea Cardiovascular Trialists). Sleep apnea and cardiovascular disease: lessons from recent trials and need for team science. *Circulation* 2017 Nov 7;136(19):1840-50.

1. Institute for Cardiovascular Diseases
Dedinje, Belgrade, Serbia.
2. HISPA, Serbia.

Correspondence:

MARKO FILIPOVIĆ

E: filipovicmarko76@gmail.com

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Experiences and Attitudes of Nurses/Technicians on COVID-19 Immunisation - Qualitative Study

Ivona Ljevak,¹ Tanja Tomić,¹ Marijana Neuberg,^{2,3} Marijana Bartula-Ovčina^{1,4}

Abstract

The SARS-CoV-2 virus caused a COVID-19 pandemic that spread to almost the entire world and caused a crisis in the healthcare system. In less than a year, various vaccines were developed as the main solution in the fight against the pandemic. Vaccination against COVID-19 has started in most European countries and health workers were the first group that has received the vaccine. The attitude of health professionals towards immunisation is very important because of their role as "on the front line," which helps to raise awareness of the importance of vaccinating the general population. Many are still hesitant and do not want to be vaccinated, although their behaviour and attitudes should demonstrate the safety and importance of vaccination. This qualitative research aimed to examine the experiences and attitudes of the nurses and technicians vaccinated against COVID-19 who emigrated from Bosnia and Herzegovina and take care of the people suffering from COVID-19 in the other countries where they currently live. Qualitative research was conducted in the form of a focus group, over the platform Google Meet, with 6 respondents, 5 nurses (Germany, Norway, Croatia, Bosnia and Herzegovina) and 1 medical technician (Ireland), mostly aged 25–45. It was discussed about current issues related to COVID-19 such as attitudes and experiences about immunisation, vaccination, COVID-19 before and after vaccination, the incidence of unvaccinated workers in their environment, employer reactions to unvaccinated health professionals. Until now, there is no official data on the percentage of vaccinated nurses. Taking into account the percentage of vaccination of the general population, with at least one dose of vaccine (14.03.2022: Ireland 95.0 %, Norway 93.1 %, Croatia 56.8 %, Poland 59.7 %) the percentage of vaccinated nurses was estimated. Published research on the rate of vaccine acceptance by health professionals in China amounts 86.20 %, Italy 91.50 %, Czech Republic is 71.3 %. Research on the intention to vaccinate medical employers in Albania is 46.3 %, Kosovo 46.2 % and Russia 30.4 %. Research shows that in Croatia 73 % of medical workers have already been vaccinated (23 %) or intend to do so (49 %), 10 % do not know if they will be vaccinated at all. The results of the research showed that most of the respondents have already been vaccinated against COVID-19. The results indicate the existence of positive attitudes about vaccination and that vaccination is not conditioned by the employer in Germany, Norway and Ireland, but in Bosnia and Herzegovina and Croatia, employers have imposed and influenced attitudes towards vaccination in their health care systems. Most of the respondents were vaccinated voluntarily for their safety, the safety of their families, patients and of course, freedom of movement. One respondent has been afraid of vaccine side effects because she had a bad experience in her environment. Conclusions: Most nurses and technicians employed in other countries have already been vaccinated against COVID-19 and most have positive experiences and attitudes. Those who had COVID-19 and those who didn't understand the severity of the disease and its impact on the health of the general population, advised and recommended vaccination to their relatives for disease prevention. The only thing that exists is scepticism about the speed of vaccine development and respondents are afraid of possible vaccine side effects.

Key words: Attitude; Nurses; COVID-19; Immunisation.

References: 1. Patelarou A, Saliq A, Galanis P, Pulomenaj V, Prifti V, Sopjani I, et al. Predictors of nurses' intention to accept COVID-19 vaccination: A cross-sectional study in five European countries. *J Clin Nurs* 2021 Jul 26;10.1111/jocn.15980. doi: 10.1111/jocn.15980. 2. Khubchandani J, Bustos E, Chowdhury S, Biswas N, Keller T. COVID-19 vaccine refusal among nurses worldwide: review of trends and predictors. *Vaccines (Basel)* 2022 Feb 2;10(2):230. doi: 10.3390/vaccines10020230. 3. Sallam M, Al-Sanafi M, Sallam M. A Global map of COVID-19 vaccine acceptance rates per country: an updated concise narrative review. *J Multidiscip Healthc* 2022 Jan 11;15:21-45. 4. Vaccine tracker. [Internet]. Available at: <https://vaccinetracker.ecdc.europa.eu/public/extensions/COVID-19/vaccine-tracker.html#uptake-tab> [Cited: 13-March-2022].

1. Faculty of Health Studies, University of Mostar, Mostar, Bosnia and Herzegovina.
2. University North, University Centre Varaždin, Varaždin, Croatia.
3. Polyclinic "Dr Zora Profozić", Zagreb, Croatia.
4. University Clinical Hospital Mostar, Mostar, Bosnia and Herzegovina.

Correspondence:
IVONA LJEVAK
E: ivonaljevak@gmail.com

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The Power of Prevention in Pharmacy in Post-COVID-19 Era

Julijana Ivanović¹

Abstract

By concentrating the mind to the present, after lessons and knowledge learned from the past, it leads to a real possibility of easy adaptation to all changes, as new opportunities. A successful health institution obliges its employees. Progress must be made at the individual level. Art should be incorporated into all pores of pharmaceutical activity - the art of listening, understanding, giving smiles, medically justified and understandable advice and the art of achieving a high degree of altruism towards patients, because that is the best side of egoism. The requirements of service users are growing and changing, but at the same time new ideas and project algorithms are being born and constituted in the form of free preventive examinations, which will facilitate, speed up and speed up preventive action. In the last decade, in one of the pharmacies of the Pharmacy Institution, Aesculap Pharmacy, the concept of more advanced services to patients was introduced, which brought creativity to the pharmaceutical business and showed the strength and importance of preventive activities for the health of each individual. The activities can be divided into two large groups: the implementation of the Questionnaire and free preventive examinations with expert advice from patients. The first published papers from China¹ that analysed patients with COVID-19 disease indicate that there were significantly more patients in the group with severe pneumonia and death in smokers. The first systematic review of papers on this topic² confirms the more frequent occurrence of complications in smokers, but also ex-smokers. COVID-19 is a systemic disease that causes damage to the interior of blood vessels, liver, kidneys and blood vessels of the brain. At the Aesculap pharmacy, Apothecary Institution Apoteka Požarevac, blood pressure was measured in patients who had COVID-19 on a MICROLIFE BP A200 AFIB MAM blood pressure monitor with 3 consecutive measurements and a mean value display (National Guide to good clinical practice, Arterial hypertension, Belgrade, 2012). In the period May 2020-December 2021, 635 first measurements of patients of both sexes aged 20 to 83 years were performed. Patients did not consume coffee and cigarettes and were not physically active for half an hour before the measurement. For the next five days after the first measurement, three measurements were performed daily in patients with high blood pressure values measured at the first measurement. In case of confirmed hypertensive values, the intervention of sending patients to the doctor was performed. All smokers were advised to stop smoking. 70 % of the subjects were already being treated for hypertension and their values were stable before COVID-19. After measurements in the pharmacy, variations in blood pressure values were found in 35 % of them, which required re-examination and modification of the existing hypertension therapy. In 15 % of patients without previous problems with blood pressure, variations of the same were determined, which had to be referred to a doctor. After each preventive examination, the patients received expert advice, which improved their current condition, but also prolonged the possible occurrence of complications. These results showed and illuminated the power of prevention in pharmacy. If the pharmacist pays attention to the observed and susceptible failures, adequate training to certain skills needed for successful treatment and contributes to the expansion of accurate information, then long-term results will be indisputably for the pride of better quality of patients.

Key words: Hypertension; Prevention; Post-COVID-19.

References: 1. Liu W, Tao ZW, Wang L, Yuan ML, Liu K, Zhou L, et al. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. *Chin Med J (Engl)* 2020 May 5;133(9):1032-8. 2. Vardavas CI, Nikitara K. COVID-19 and smoking: A systematic review of the evidence. *Tob Induc Dis* 2020 Mar 20;18:20. doi: 10.18332/tid/119324.

1. Pharmacy Institution Požarevac,
Požarevac, Serbia.

Correspondence:
JULIJANA IVANOVIĆ
E: ivanovic.julijana75@gmail.com

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The Impact of Lifestyle on the Occurrence of Metabolic Syndrome in Adults Citizens of Banja Luka

Verica Petrović,^{1,2} Kosana Stanetić,^{1,2} Suzana Savić,^{1,2} Nevena Todorović,^{1,2}
Nataša Pilipović-Broćeta,^{1,2} Biljana Lakić,^{1,2} Mirna Popović^{1,2}

Abstract

Background / Aim: The increase of metabolic syndrome (MS) prevalence is a major public health issue of the 21st century. The most significant impact that MS has on health is the increase of atheromatous vascular disease incidence. The change of lifestyle is one of the possible solutions to this problem. The aim of this study was to determine the influence of lifestyle (eating habits, physical activity, smoking, alcohol consumption) on the occurrence of MS.

Methods: The research was conducted in 2016. It included 685 randomly selected examinees, 348 (50.80 %) men and 337 (49.20 %) women. For research purposes a survey was made, which consisted of a questionnaire, physical examination and laboratory analyses data. This questionnaire was formed on the basis of valid recommendations and referred to the examinee's lifestyle. International Diabetes Federation consensus worldwide definition of MS was used to assess the presence of MS in examinees.

Results: Only 10.2 % of examinees had a proper daily meal rhythm according to dietary recommendations. Most of them (42.3 %) consumed 2 meals a day. Examinees who consumed milk and dairy products at least once a day ($p = 0.049$) were statistically significantly more represented in the group without MS than in the group with MS (36.9 % : 29.6 %). Subjects with MS thought statistically significantly more about health when choosing foods in the diet than subjects without MS (15.2 % : 9.7 %, $p = 0.003$), but also had statistically significant higher presence of cardiovascular disease (CVD) (82.1 % : 36.6 %, $p = 0.000$). This indicated that subjects with CVD received recommendations for proper nutrition due to the need for diet therapy (secondary prevention). The prevalence of MS was statistically significantly lower in those who were moderately active (32.2 % : 49.6 %, $p = 0.000$) and active (38.0 % : 49.6 %, $p = 0.032$) compared to those who were inactive in their leisure time. Former smokers were at higher risk of developing MS than smokers (46.8 % : 31.4 %, $p = 0.013$). It was shown that moderate alcohol consumption reduced the risk of MS occurrence. MS was statistically significantly less present among those with moderate alcohol consumption (63.0 % : 72.2 %, $p = 0.012$).

Conclusion: There was no connection between daily meal rhythm and consumption of most type of food with the occurrence of MS. It was confirmed that consumption of milk according to recommendations (2 cups a day) was leading to a statistically significantly lower incidence of MS in women, but not in men. Recommendations for proper nutrition in people without CVD were underrepresented in primary prevention. The connection of the occurrence of MS with the level of physical activity in leisure time was confirmed but not with physical exertion at work. Former smokers were at a statistically significantly higher risk of developing MS compared to smokers. Moderate alcohol consumption was associated with a reduced risk of developing MS. It was shown that alcohol consumption in men contributed to development of MS.

Key words: Metabolic syndrome; Physical activity; Smoking; Alcohol consumption; Diet.

References: 1. Keane D, Kelly S, Healy NP, McArdle MA, Holohan K, Roche HM. Diet and metabolic syndrome: an overview. *Curr Vasc Pharmacol* 2013;11(6):928-45. 2. Lee J, Kim Y, Jeon JY. Association between physical activity and the prevalence of metabolic syndrome: from the Korean National Health and Nutrition Examination Survey, 1999-2012. *Springerplus* 2016 Oct 25;5(1):1870. doi: 10.1186/s40064-016-3514-5. 3. Foulds HJ, Bredin SS, Charlesworth SA, Ivey AC, Warburton DE. Exercise volume and intensity: a dose-response relationship with health benefits. *Eur J Appl Physiol* 2014;114(8):1563-71. 4. Cena H, Fonte ML, Turconi G. Relationship between smoking and metabolic syndrome. *Nutrition Reviews* 2011;69(12):745-53. 5. Slagter SN, van Vliet-Ostapchouk JV, Vonk JM. Associations between smoking, components of the metabolic syndrome and lipoprotein particle size. *BMC Med* 2013;11:195. doi: 10.1186/1741-7015-11-195. 6. Sun K, Ren M, Liu D, Wang C, Yang C, Yan L. Alcohol consumption and risk of metabolic syndrome: a meta-analysis of prospective studies. *Clin Nutr* 2014 Aug;33(4):596-602. 7. Suliga E, Kozielec D, Ciesla E, Rebak D, Gluszek-Osuch M, Gluszek S. Consumption of alcoholic beverages and the prevalence of metabolic syndrome and its components. *Nutrients* 2019;11(11):2764. doi:10.3390/nu11112764.

1. Faculty of Medicine, University of Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
2. Primary Health Centre Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
VERICA PETROVIĆ
E: drverica@hotmail.com

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Antibodies and COVID-19 Vaccines

Tanja Ješić Petrović,¹ Marina Jotić Ivanović,¹ Saška Đekić,¹ Vladimir Marković¹

Abstract

Background / Aim: The pandemic of COVID-19 was declared by the World Health Organization on 11 March 2020. First cases of cluster pneumonia without a known infective agent started in Wuhan, China in December 2019. A new infective agent was discovered in January 2020 and named SARS-CoV-2 and disease COVID-19. All of this caused a great change in everyday lives and put the world in lockdown. For healthcare and science it was a run against time to find the cure or vaccine that will put an end to pandemic. The rapidly growing infection rate of COVID-19 worldwide during 2020 stimulated international alliances and government efforts to urgently organise resources to make multiple vaccines on shortened timelines, with four vaccine candidates entering human evaluation in March. And first COVID-19 vaccines got approval at the end of 2020. The first vaccine receiving emergency authorisation by the FDA on 11 December 2020 and by the EMA on 21 December 2020, is the mRNA-based vaccine Comirnaty from Pfizer and BioNTech. The aim was to follow the serological response to different COVID-19 vaccines.

Methods: This is a one year prospective study done on 14 healthcare workers in Public Health Care Centre Dobož. Participation was voluntary. Nine of them received Sputnik V and five Sinopharm. During the one year period February 2021 to March 2022 the titre of antibodies prior and after COVID-19 vaccine (first, second, third dose) were followed. Those who have had COVID-19 confirmed infection during this period of time were also taken into account. There had one drop out after a second (Sinopharm) shot so in the end there were 13 participants. AFIAS COVID-19 Ab with AFIAS 6 Analyzer manufactured by Boditech Med Incorporated was used. Method used is an immunoassay intended for qualitative detection and differentiation of Ig M/Ig G antibodies to the SARS-CoV-2 virus in participants' capillary whole blood.

Results: Fourteen days after the first dose of Sputnik V COVID-19 vaccine there was a greater increase of IgG antibodies in participants who had pre-existing IgM and IgG with or without PCR confirmed prior SARS-CoV-2 infection. Those participants that have received Sinopharm after 14 days did not have significant increase of IgG antibodies. One month after the second dose, an increase in antibodies was also present in participants who received Sinopharm as well as those with Gamaleya, but still it was higher in those with antibodies detected before vaccination in both.

Conclusion: Although a small sample study is a limitation, it can be concluded that these findings are matching with the official data that after a second shot antibodies are declining and one must go through a booster dose.

Key words: COVID-19 vaccine; Antibodies; Healthcare workers.

References: 1. Thanh Le T, Andreadakis Z, Kumar A, Gómez Román R, Tollefsen S, Saville M, et al. The COVID-19 vaccine development landscape. *Nat Rev Drug Discov* 2020 May;19(5):305-6. 2. Yamey G, Schäferhoff M, Hatchett R, Pate M, Zhao F, McDade KK. Ensuring global access to COVID-19 vaccines. *Lancet* 2020 May 2;395(10234):1405-6.

1. Public Primary Healthcare Centre Dobož, Dobož, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
MARINA JOTIĆ IVANOVIĆ
E: jotic.marina@yahoo.com

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Innovations in Laboratory Diagnostics - Multiplex PCR

Vladan Jerinić¹

Abstract

Respiratory pathogens cause acute local and systemic disease, with the most serious cases occurring in children, the elderly and immunocompromised individuals. Respiratory symptoms may include cough, nasal secretions, obstruction, fever, "chest tightness", shortness of breath, headache and myalgia. Due to the similarities between diseases caused by many viruses and bacteria, it is difficult to establish a diagnosis solely on the basis of clinical symptoms. In order to improve diagnostics, due to the expressed need for rapid detection of positive patients for SARS CoV-2 virus, the Laboratory Diagnostic Service of the Institute for Cardiovascular Diseases "Dedinje" introduced a new health technology - multiplex polymerase chain reaction (PCR). This molecular method is based on the detection of nucleic acids of a large number of infectious agents (bacteria and viruses) in one reaction, directly from a sample of nasopharyngeal swab, in just 45 minutes, with high sensitivity and reliability of the results. Associated with respiratory tract infection from one sample taken by nasopharyngeal swab, from 388 samples 98.4 % positive percent agreement and 98.9 % negative percent agreement for SARS CoV-2, at the Institute for Cardiovascular Diseases "Dedinje" in the period from 23 October 2020 to 15 March 2022 was found. SARS CoV-2 virus was detected in 39 samples.

Key words: PCR; Laboratory diagnostics; COVID-19.

References: 1. 1. Hurtado JC, Mosquera MM, de Lazzari E, Martínez E, Torner N, Isanta R, et al. Evaluation of a new, rapid, simple test for the detection of influenza virus. *BMC Infect Dis* 2015 Feb 6;15:44. doi: 10.1186/s12879-015-0775-5. 2. Tang MS, Case JB, Franks CE, Chen RE, Anderson NW, Henderson JP, et al. Association between SARS-CoV-2 neutralizing antibodies and commercial serological assays. *Clin Chem* 2020 Dec 1;66(12):1538-47. 3. Chung HY, Jian MJ, Chang CK, Lin JC, Yeh KM, Chen CW, et al. Novel dual multiplex real-time RT-PCR assays for the rapid detection of SARS-CoV-2, influenza A/B, and respiratory syncytial virus using the BD MAX open system. *Emerg Microbes Infect* 2021 Dec;10(1):161-6.

1. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
VLADAN JERINIĆ
E: maliopanak@gmail.com

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Lipoprotein A and Cardiovascular Risk

Zorana Kovačević,¹ Nebojša Tasić,¹ Danijela Tasić,¹ Slađana Božović-Ogarević,¹
Milan Arsić,¹ Marko Filipović,¹ Igor Živković¹

Abstract

Background / Aim: Lipoprotein A (Lp(a)) is one of the best predictors of hypercholesterolaemia and future development of atherosclerosis. According to the newest European Society of Cardiology guidelines on cardiovascular disease prevention in clinical practice, Serbia counts as a country in very-high risk for cardiovascular diseases. The aim of this study was to assess frequency of elevated Lp(a) levels and correlation between elevated Lp(a) and elevated levels of other lipoproteins (total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides), as well as occurrence of major cardiovascular events.

Methods: This study included 103 patients examined in out-patient clinic for cardiovascular prevention at Institute for Cardiovascular Diseases "Dedinje", from July 2021 to January 2022. From each patient medical history and other relevant data was obtained, 10-year SCORE 2 and SCORE2-OP was assessed and a physical examination was performed. From each patient blood sample was taken for Lp(a) and other lipid analysis. Patients were then selected and compared between two groups – one with previous cardiovascular event and another without events.

Results: Vast majority of patients with elevated Lp(a) levels also had hypercholesterolaemia. There was no statistically significant difference between Lp(a) levels between groups. Also, 10-year SCORE 2 and SCORE2-OP was elevated in patients with previous event and elevated Lp(a) levels.

Conclusion: Further research is needed to assess correlation between Lp(a) and major cardiovascular events, although Lp(a) is a useful tool for assessing cardiovascular risk.

Key words: Lipoprotein A; Cardiovascular risk; Hypercholesterolaemia; Atherosclerosis.

References: 1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, et al; ESC National Cardiac Societies; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J* 2021 Sep 7;42(34):3227-337. 2. Kamstrup PR. Lipoprotein(a) and cardiovascular disease. *Clin Chem* 2021 Jan 8;67(1):154-66.

1. Institute for Cardiovascular Diseases
"Dedinje", Belgrade, Serbia.

Correspondence:
ZORANA KOVAČEVIĆ
E: maliopanak@gmail.com

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Initial Experience With Endoscopic Vein Graft Harvesting in the CABG Procedures

Igor Živković,¹ Petar Milačić,¹ Zoran Tabaković,¹ Zorana Kovačević,¹ Slobodan Micović¹

Abstract

Background / Aim: Coronary artery bypass grafting (CABG) is the most common treatment option for multiple coronary artery disease (CAD). The internal thoracic artery is a gold standard for revascularisation.¹ Although arterial grafts are being used increasingly frequently in recent years, saphenous vein grafts (SVG) are still the most frequently used conduit. According to the American cardiac surgery database, great saphenous vein grafts were used in about 89.3 % of CABG procedures.² The most common vein harvesting technique is conventional. The rate of postoperative leg wound complications was from 1 to 25 %. In an attempt to reduce trauma and increase patient satisfaction, endoscopic vein harvesting was introduced in the routine practice.³ Aim of this study was to analyse the learning curve and clinical outcomes of the endoscopic vein graft harvesting in CABG patients.

Method: It was a prospective cohort study performed from Mart 2020 to December 2020. The 25 consecutive patients were included. Vein grafts were harvested using an endoscopic CO₂ open system in the all-patients. Evaluation of the learning curve of the new technique (harvesting time) was performed. Then, analysis of the leg wound complication (infection, wound dehiscence, oedema, serous drainage, leg pain and numbness) during in-hospital, 30-day and one-year follow-up periods was done. The data was processed using the statistical software SPSS 25.0 for Windows 10.

Results: The endoscopic technique was performed in the 25 patients (75 % male) mean age was 66 ± 5.5. The mean number of vein grafts per procedure was 2 (IQR 1-3). Mean harvesting time for one vein graft in the first 10 cases was 30 ± 8.9 min. After the first 10 cases, the harvesting time significantly decreased to 10 ± 5.3 min per graft (p = 0.005). There was one conversion to conventional technique due to technical reasons. During the in-hospital period leg wound infection, dehiscence and oedema were not detected. Two patients (8 %) had leg pain and one (4 %) had leg numbness. 30 day follow up revealed a slightly higher rate of leg pain and numbness (8 % and 16 %, respectively). One year of follow-up detected a lower rate of leg pain and numbness (4 % and 8 %, respectively).

Conclusion: Endoscopic vein harvesting is a very applicable technique with a short learning curve. The postoperative leg wound complications rate is significantly lower than other implemented vein harvesting techniques.

Key words: CABG; Vein graft; Harvesting; The learning curve.

References: 1. Alexander JH, Smith PK. Coronary-artery bypass grafting. *N Engl J Med* 2016;374(20):1954-64. 2. Kopjar T, Dashwood MR. Endoscopic versus "no-touch" saphenous vein harvesting for coronary artery bypass grafting: a trade-off between wound healing and graft patency. *Angiology* 2016;67(2):121-32. 3. Schwann TA, Tatoulis J, Puskas J, Bonnell M, Taggart D, Kurlansky P, et al. Worldwide trends in multi-arterial coronary artery bypass grafting surgery 2004-2014: A tale of 2 continents. *Semin Thorac Cardiovasc Surg* 2017;29(3):273-80. 4. Black EA, Guzik TJ, West NE, Campbell K, Pillai R, Ratnatunga Cet al. Minimally invasive saphenous vein harvesting: effects on endothelial and smooth muscle function. *Ann Thorac Surg* 2001;71(5):1503-7.

1. Department of Cardiothoracic Surgery, Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
IGOR ŽIVKOVIĆ
E: igor88zivkovic@gmail.com

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Ambulatory Blood Pressure Measurement (ABPM) in HISPA Centre Doboj

Andrea Tomić,¹ Biljana Vukojević Jelić,¹ Radoslav Nikolić,¹ Nebojša Tasić²

Abstract

Background / Aim: Hypertension can lead to severe health complications and increase the risk of heart disease, stroke and sometimes death. Aim of this study was to analyse the significance of ambulatory blood pressure measurement (ABMP) in HISPA Centre Doboj.

Methods: According to evaluation, family doctors sent patients to the HISPA centre to measure blood pressure (BP). Most of the patients were with occasional high BP, those with headaches, vertigo with low BP or the patients in need for additional diagnosis for surgical interventions.

Results: In the period from December 2017 to June 2018, 92 analyses of ABPM were done at the HISPA Centre Doboj. 78 ABPMs completed successfully and 14 were technically unsuccessfully done. Of the 78 patients, 56 (71.7 %) were women (the youngest 33 years the oldest 79), 22 (28.2 %) men (the youngest 31 and the oldest 74). It has been established that 23 (29.4 %) patients were with dips - 16 women (69.5 %), 7 men (30.4 %) - without dips - 37 (47.4 %), of whom 29 (51.7 %) were women of whom 7 (24.1 %) had elevated BP from 4 to 6 in the morning, 8 (36.3 %) of men of whom 5 (62.5 %) has a BP jump in the period from 4 to 6 am - with inverse dips 11 (14.1 %) of patients, of whom 8 (14.2 %) were women and 3 (13.6 %) men. Women had a higher number percentage of non-dips situation for insomnia (anamnestic data) BP in the period from 4 to 6 in the morning. Therapy change was made for 17 patients, starting with therapy for 8 patients, monitoring BP without therapy for 3 patients. Other patients under therapy were advised for regular control of the BP and control ABPM in a given period.

Conclusion: The analysis of ABPM has established the importance of this method for the prevention of stroke and myocardial infarction and the prevention of disability. Although the method was done in such a small sample and with one device, it is evident that changes in therapy improve the prevention of possible complications in patients.

Key words: Ambulatory blood pressure measurement; Hypertension; HISPA.

References: 1. O'Brien E, Parati G, Stergiou G. Ambulatory blood pressure measurement: what is the international consensus? *Hypertension* 2013 Dec;62(6):988-94.

1. Primary Health Centre Doboj, Doboj, the Republic of Srpska, Bosnia and Herzegovina.
2. Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia.

Correspondence:
ANDREA TOMIĆ
E: tomic.andrea@gmail.com

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Prevention vs Intervention - How to Comply for Missed Preventive Examinations in the Past Two Years

Nevena Todorović,^{1,2} Vedrana Antonić Kovljenović¹, Nataša Pilipović-Broćeta^{1,2}

Abstract

Background / Aim: Prevention is important part of family doctor's work. During family medicine (FM) residency, doctors in B&H are been trained for conducting prevention and early detection of mass non-communicative (MND) and malignant diseases. WHO guidelines are being used. MoHRS has adapted those recommendations to local conditions. In B&H Federation preventive activities have been surveyed according to the recommendations of Health Care Quality and Accreditation Agency in B&H Federation (clinical pathways). The newest issues of clinical guidelines are been used.

Changes in demographics caused by population's life extension, increased MND occurrence, limited hospital capacities, lack of system's solution for palliative care in B&H, increase patients' needs for proper health care and treatment at home. The aim of this study was to present different ways of conducting preventive work in FM teams.

Methods: Insight into work of FM presents ways of surveying preventive.

Results: Preventive work involves an insufficient number of citizens in FM. In Primary Health Care Centre Banja Luka we designed a Project of Prevention in cooperation with Banja Luka City. All FM teams are involved in this Project and it includes every citizen aged from 18 to 70 years. The list of registered citizens is formed and it presents all the preventive examinations that need to be done for every citizen. Preventive examinations depend on gender, age, present diagnoses and preventive examinations previously done.

Conclusion: Local community support is essential to provide conditions for covering larger number of citizens with preventive activities. It is also necessary to form a special organisational unit within Primary Health Care Centre Banja Luka for providing preventive health care.

Key words: Family medicine; Prevention; Chronic diseases.

References: 1. Programme of early detection of malignant diseases and determination of risk factors for mass non-communicable diseases for adult population of Banja Luka City. Banja Luka, October 2019. 2. Public Health Institute, the Republic of Srpska. Republic of Srpska Population health status in 2015. Banja Luka: Public Health Institute, the Republic of Srpska; 2015. 3. Expert Guidance for determination and reduction of risk factors and early diseases detection from Programme of prevention and control of non-communicable diseases in Republic of Srpska (Republic of Srpska Health Care Fund, 2003). 4. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Böck M, et al; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. Eur J Prev Cardiol 2022 Feb 19;29(1):5-115. 5. Tešanović G, Stanetić K, Petrović V, Savić S. Family Medicine. Banja Luka: University in Banja Luka, Medical Faculty; 2014. 6. Stanetić K. Prevention in Family doctor work. Banja Luka: University in Banja Luka, Medical Faculty; 2015. 7. Petrović V. Characteristics of metabolic syndrome in adult population registered in Health Care Center in Banja Luka [Dissertation]. Banja Luka: University in Banja Luka, Medical Faculty; 2015. 8. Health Care Law, Official Gazette RS 102/11.

1. Primary Health Care Centre Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.
2. Family Medicine, Faculty of Medicine, University of Banja Luka, Banja Luka, the Republic of Srpska, Bosnia and Herzegovina.

Correspondence:
NEVENA TODOROVIĆ
E: nevena.todorovic@med.unibl.org

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Air Pollution and Cardiovascular Disease: Potential for Primary and Secondary Prevention

Zorana Jovanović Andersen¹

Abstract

Air pollution is a major environmental stressor posing huge health burden, with 6.7 million deaths attributed to particulate matter of diameter $< 2.5 \mu\text{m}$ (PM 2.5) globally in 2019 (Health Effects Institute, 2020).¹ As virtually everyone is exposed to air pollution² and so many different diseases are affected by it, air pollution ranks as the 4th leading global risk factor for morbidity and mortality surpassed only by high blood pressure, tobacco use and poor diet. The majority of deaths attributable to air pollution (65-80 %) are due to cardiovascular disease (CVD) (followed by chronic obstructive pulmonary disease (COPD), lower respiratory infections, diabetes and lung cancer) and these numbers will increase due to increase in longevity. In this talk we will give an overview of air pollution levels, globally, in Europe and locally, introduce new WHO Air Quality Guidelines and give overview of major health effects, with focus on the latest evidence on how air pollution affects cardiovascular system and specific diseases including myocardial infarction, stroke, atrial fibrillation and heart failure, as well as knowledge of biological mechanisms behind these associations. We will also talk about how health care sector and clinicians can contribute to help patients mitigate adverse effects of air pollution and prevent exacerbations of existing disease due to air pollution. We will also discuss how clinicians and other health care workers can play an important role, with their respected role in societies, as a strong voice in advocating for cleaner air policies, as way of preventing cardiovascular disease morbidity and mortality and improving life of cardiovascular patients.

Key words: Air pollution; Cardiovascular disease; Prevention.

References: 1. Health Effects Institute, 2020. State of global air 2020. Special Report, Boston, MA: World Health Organization, 2021. 2. WHO global Air Quality Guidelines, 2021. Particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Available at: <https://www.who.int/publications/i/item/9789240034228>. [Cited: 28-Feb-2022].

1. Department of Public Health, University of Copenhagen, Copenhagen, Denmark.

Correspondence:
ZORANA JOVANOVIĆ ANDERSEN
E: zorana.andersen@sund.ku.dk

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Road Traffic Noise and Cardiovascular Disease: Mechanisms, Overview and Newest Updates From Research in Denmark

Youn-Hee Lim¹

Abstract

Environmental noise, particularly road traffic noise, has been reported as a risk factor for cardiovascular disease. In this talk, I will talk about the known or postulated mechanisms of environmental health due to noise and present epidemiological studies conducted in Denmark.

Key words: Noise; Stress; Cardiovascular disease.

References: 1. Lim YH, Jørgensen JT, So R, Cole-Hunter T, Mehta AJ, Amini H, et al. Long-term exposure to air pollution, road traffic noise, and heart failure incidence: The Danish Nurse Cohort. *J Am Heart Assoc* 2021 Oct 19;10(20):e021436. doi: 10.1161/JAHA.121.021436. 2. World Health Organization. Environmental Noise Guidelines for the European Region (2018). Available at: <https://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2018/environmental-noise-guidelines-for-the-european-region-2018>. [Cited: 28-Feb-2022].

1. University of Copenhagen, Copenhagen, Denmark.

Correspondence:

YOUN-HEE LIM

E: younhee.lim@sund.ku.dk

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Available Data About COVID-19 Vaccines and Their Adverse Effects

Želimir Janjić,^{1,2} Jadranka Bjelaković,^{1,2} Snežana Mićanović³

Abstract

COVID-19 is a syndrome that is caused by novel type of coronavirus, isolated in Wuhan, China, in December 2019. Since the beginning of pandemic in January 2020 scientists began to search for cures. Numerous antiviral medicines have been tested and also different types of vaccines. Several vaccine types are present in the Republic of Srpska healthcare system. COVID-19 vaccination is voluntary and free of charge. However, collective immunity hasn't been reached. There is a great mistrust in vaccines, which was contributed by dis/information distributed by social networks and other modern communication mediums. Vaccines in general have become topic of dispute between different social groups, even though benefits of using them is far greater than risks they inherently carry. Vaccine safety profile is, as in the case of medicines, an important part of documentation submitted to the agencies in registration process. There are databases which collect adverse vaccines data from healthcare professionals (Uppsala monitoring centre) and those that collect reports from general public (CDC's VAERS database). They clearly show there is no mass morality after COVID-19 vaccinations. Healthcare professionals must have all necessary and up-to-date information in order to take care of patients according to best practices.

Key words: Misinformation; Vaccine; COVID-19.

References: 1. CDC. The Vaccine Adverse Event Reporting System (VAERS). Available at: <https://wonder.cdc.gov/vaers.html>; [Cited: 28-Feb-2022]. 2. VAERS. The Vaccine Adverse Event Reporting System. Available at: <https://vaers.hhs.gov/about.html>. [Cited: 28-Feb-2022].

1. Public Pharmacy Han Pijesak, Han Pijesak, the Republic of Srpska, Bosnia and Herzegovina.
2. Public Pharmacy Vlasenica, Vlasenica, the Republic of Srpska, Bosnia and Herzegovina.
3. Zvezda Pharmacy, Doboј, the Republic of Srpska.

Correspondence:
ŽELIMIR JANJIĆ
E: mr.ph.zelimir.janjic@gmail.com

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Non-Uniform Accumulation of Heavy Metals in the Heart: Post-Mortem Analyses of Two Cases

Ana Ćirović,¹ Milenko Bogdanović,² Aleksandra Repić,² Aleksandar Ćirović,¹ Nebojša Tasić^{3, 4}

Abstract

Heavy metals, particularly cadmium and lead accumulate in heart and are highly toxic to cardiomyocytes.¹ Therefore, it was necessary to examine whether cadmium and other heavy metals accumulate in heart uniformly or particular regions of the heart accumulate heavy metals in greater extent than the others. Here, we analyzed levels of cadmium (Cd), lead (Pb), mercury (Hg) and aluminum (Al) in two post-mortem cases (one female, age: 68; and one male, age: 78) at the Institute of the Anatomy we obtained two samples of left ventricle per case: proximal sample (piece of left ventricle at the place where the anterior interventricular branch of left coronary artery arises from the left coronary artery) and distal sample (piece of left ventricle close to most distal region of anterior interventricular branch of left coronary artery on the sternocostal surface of heart i.e. close to the apex of the heart). Measurement was performed by using Inductively coupled plasma mass spectrometry (ICP-MS; Agilent 7700x ICP-MS) at the Institute of Forensic Medicine. Both subjects signed informed consent that their body may be used in teaching and scientific research. We obtained following concentrations of Cd, Pb and Hg 0.92 µg/g, 2.91 µg/g, 0.09 µg/g, respectively at the proximal sample, in woman. Aluminum was not detectable in proximal sample in women. Measurement of distal sample in woman showed 4.99 µg/g, 22.66 µg/g, 0.136 µg/g and 0.0274, for Cd, Pb, Hg and Al, respectively. We found following levels of heavy metals in proximal sample of men, 0.49 µg/g, 2.4 µg/g, 0.097 µg/g, 0.0228 µg/g for Cd, Pb, Hg and Al, respectively. Values for the distal site in man were, 0.68 µg/g, 3.06 µg/g, 0.135 µg/g and 0.0001 µg/g for Cd, Pb, Hg and Al, respectively. In men, we found slightly higher levels of Cd, Pb and Hg at distal site, however in women levels of all four metals were dramatically higher at distal site, reaching almost 10-fold higher level of Pb and 5-fold for Cd, compared to proximal site. Cadmium is able to trigger cardiac arrhythmias and impair myocardial contraction,² therefore we speculate that accumulation of heavy metals, particularly Cd, in one region of the heart might be linked with sudden cardiac death, however future studies will resolve this important issue. Also, it was shown that cardiomyocytes are about 100 fold more sensitive to Cd toxicity than liver or kidney.¹ Our results suggest that heavy metals deposits in heart non-uniformly.

Key words: Heart; Heavy metals; Cadmium toxicity.

References: 1. Limaye DA, Shaikh ZA. Cytotoxicity of cadmium and characteristics of its transport in cardiomyocytes. *Toxicol Appl Pharmacol* 1999 Jan 1;154(1):59-66. 2. Haverinen J, Badr A, Vornanen M. Cardiac toxicity of cadmium involves complex interactions among multiple ion currents in rainbow trout (*Oncorhynchus mykiss*) ventricular myocytes. *Environ Toxicol Chem* 2021 Oct;40(10):2874-85.

1. Institute of Anatomy, Faculty of Medicine, University of Belgrade, Belgrade, Serbia.
2. Institute of Forensic Medicine "Milovan Milovanović", Faculty of Medicine, University of Belgrade, Belgrade, Serbia.
3. Department of Cardiology, Cardiovascular Institute "Dedinje", Belgrade, Serbia.
4. Department of Internal Medicine, Faculty of Medicine, University of Belgrade, Belgrade, Serbia.

Correspondence:
ALEKSANDAR ĆIROVIĆ
E: aleksandar.cirovic.7@gmail.com

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