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# HEALTH BULLETIN



**Zdravstveni glasnik**

# **Health Bulletin**

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Zdravstveni glasnik

Faculty of Health Studies  
University of Mostar

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## EDITORIAL

Dear and respected readers of our journal,

You have in front of you the eighteenth issues of the electronic journal Health Bulletin, where we once again publish various work from the field of healthcare. We strive to maintain the achieved level and continuously work to make it even better.

In this issue, we have eleven quality papers (six original scientific, four professional and one case report) written by our current and former students and our PhD students and teachers. Five papers were written by authors from Bosnia and Herzegovina, and five from the Republic of Croatia. Our continuous goal is our aspiration and struggle to raise the level of our journal and seriously "attack" the Internet databases Scopus and WoS.

I am thankful and proud of our faculty's progress and the increasing number of publishing work. The editorial board is directly involved in the work of our faculty, the assistant editors are young doctors of science of the Faculty of Health Studies and make great contribution to raise the level of knowledge at our faculty and university. They are: Assistant Professor Josip Šimić, PhD; Assistant Professor Roberta Perković, PhD; Assistant Professor Darjan Franjić, PhD. I hope they will continue to progress and eventually take over the editorship.

I hope that by reading the Health Bulletin, you will benefit from expanding and supplementing your knowledge, which will also help in your practical work, and give you additional motivation to have your work published in it. I would like to thank everyone who contributed to the publication of this issue, and at the same time invite all those interested to send their work for our next editions exclusively in English.

Mostar, November 2023

Dragan Babić

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## PERSISTENCE IN SCIENCE AND SCIENTIFIC PUBLICATION

Ivan Ćavar

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Upon enrolment at university and during studies, the most important step is to successfully pass the courses and obtain a diploma, contemplating about the end of studying period. During our studies, we are given the advice to critically think about the obtained knowledge, we are also encouraged to take a scientific approach to biomedicine, although we are not aware of its importance at the time. I will try to paint a picture and portray our knowledge with a symbol of a "tree". Only after obtaining the diploma do we realize that our studies were the root and tree that gradually grew with care and attention. However, a tree also consists of branches and leaves that change every season. Old branches are cut, the leaves fall and are replaced by new ones. It is easy to conclude that branches and leaves symbolize the continuous change and upgrading of existing knowledge.

Every doctor, nurse/technician, physiotherapist, midwife, or pharmacist must keep track and follow the latest scientific achievements in order to be successful in their profession, in other words they must be scientifically active. Of course, not everyone has the affinity for

scientific writing and experimental work, and not everyone has to have it. But all medical professionals must be educated in order to find correct medical information, and diagnostic and therapeutic algorithms in biomedical databases.

*The Health Bulletin* is a form of a brand of the Faculty of Health Studies University of Mostar. The journal was founded with the idea of enabling scientific advancement for all biomedical scientists, especially graduates of the Faculty of Health Studies. Year after year, the journal continued to improve and moved upward on the scale of excellence as a result of hard work of the editorial staff and everyone else involved in journal activity. Continuity of scientific work and publication is very important for a scientist. Reading and studying professional and scientific literature enriches our fund of knowledge, but also increases our ability to critically analyse and think about the processed information. Recently, there has been an "explosion" of published works, there are many pharmaceutical preparations on the market for various diseases, emergence of new diseases/syndromes, there are numerous



medical theories that are often contradictory, not to mention the number of alternative routes and paramedical information. A logical question arises: How to navigate in the sea of information and be as objective as possible in our judgment? This is only possible with a critical approach and good knowledge. Criticism or self-criticism are extremely important qualities of every scientist and are acquired by constant investment in oneself that is, by reading relevant biomedical literature and

publishing. Therefore, my message to anyone who wishes to aspire in science and academia is to be persistent. I would like to sincerely congratulate the editorial staff of the *Health Bulletin* for their efforts and achieved results, and send a message: "Be persistent and relentless in your future endeavours, continue to be guided by criteria of scientific excellence and honesty, all in order to ensure a safe future of the journal".

## GAMBLING HABITS AMONG VIDEO GAME PLAYERS

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### ABSTRACT

**Introduction:** Gambling is a legal and socially accepted recreational activity that can progress into a serious public health problem. The prevalence of gambling is higher among men of younger age and lower economic status, and older divorced men. There are many similarities between playing video games and gambling that the industry encourages by implementing the elements gambling into video games, and the elements of video games in gambling, but despite the similarities, in problem use we recognize two separate behavioral disorders.

**Methods and participants:** The research was conducted on an intentional and judgmental sample of adolescents and young adults who play video games. A questionnaire containing questions on sociodemographic characteristics, video game playing and gambling habits, and the SOGS-RA was used to assess the gambling risk.

**Results:** Most of the participants gamble very rarely or not at all, but 5.1% of the participants gamble every day. Almost all of the participants play several types of games of chance, with lottery games, sports betting and games on electronic devices leading the way. Pronounced problems with gambling were recognized in 28.3% of the research participants.

**Discussion:** The lifetime prevalence of gambling in this research is similar to the results of other research conducted among video game players, although the results of all research in this area are not homogeneous. When comparing the results of gambling among video game players and the general population, the prevalence of gambling among video game players is significantly higher than in the general population.

**Conclusion:** Adolescent and young adult video game players play more games of chance, and prefer gambling games that have a higher addictive potential. Considering the age, easy accessibility and the difficult recognition of the development of problem gambling, it is important to focus preventive activities on the youngest age group.

**Key words:** games of chance, video game players, problem gambling

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## INTRODUCTION

Participating in games of chance (further referred to as gambling) has been a part of all cultures throughout history. Evidence of this has been found already in the years 2300 B.C. in China, 1500 B.C. in India, in ancient Greece at the time of the Trojan wars, in Persia, the Roman Empire, England... A legend says that Julius Caesar decided to cross the river Rubicon only after throwing a die, and the quote attributed to him: "Alea iacta est" (The die is cast) is still used today as a synonym for a made decision. The Bible also talks about gambling in both the Old and the New Testament. Although it does not prohibit gambling, it warns of the possible dangers of gambling. Betting, on the other hand, is a new age activity whose beginnings are usually attributed to France in the 19th century (1).

Although gambling is considered to be a type of game according to Sutton-Smith's categorization (2), and gambling, if lasting for a short period, does not cause any health or socio-economic consequences in most people, gambling that lasts for a longer period of time represents a risk for the development of addiction, the loss of assets, family, the incurrance of debt, and even committing a criminal offence (3). Looking at it historically, the attitude of rulers

towards gambling was mostly negative, exactly because of these consequences, although many of them gambled themselves, too (1).

The law on games of chance in Croatia defines games of chance as "games in which the participants have the possibility of gaining a profit in money, things, services or rights in return for a certain payment, by which the profit or loss predominantly depends on some uncertain event." By law, every person of age is allowed to gamble, if not regulated otherwise by the organizer (4). Because of the liberalization in market regulation, the number of consumers of games of chance is growing, and problem gambling, and betting, is growing at the same time. Accordingly, gambling is no longer viewed as social deviance. It is, instead, a legal, socially acceptable and promoted activity, although the risk of developing an addiction comes from every type of gambling, and gamblers are marginalized by the society (5).

Gambling disorder is the first behavioral addiction included in the Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association (APA). As all other behavioral addictions, gambling disorder is difficult to recognize and diagnose, and long-term

handling by an educated multidisciplinary team is needed in order to treat it and rehabilitate the patient.

The goals of this research is to investigate the gambling habits among video games players in adolescence and the young adult age, as well as the prevalence of gambling and the prevalence of problem gambling, and to analyze gambling according to sex and the type of gambling.

### Gambling

Gambling as the investment of money or material values into an event of an uncertain outcome with the goal of material profit (6) has a very wide spectrum of subtypes. Most often we talk about card-playing, sports betting, the lottery, games on gambling machines, roulette, gambling or card-playing in casinos, betting on animal racing, poker, or slot machines. Gambling is possible online or in casinos, and most gamblers use both of these possibilities to gamble, which makes the availability and the distribution of consumption easier (4). In regards to the potential for the development of an addiction, almost all types of gambling have an addictive potential to a lesser or a greater degree. The core of every game of chance is the uncertainty and the potential profit which leads to the condition of concealed

excitement, because gambling is primarily an exciting activity, and, secondary, a recreational activity (6).

Gambling machines have the highest addictive influence, while contests and lottery games are almost not associated with addiction because of the inability to play them fast, the changing rhythm of playing, the increase in the stakes and generally the influence of the dynamics of gambling. With every playing of a game of chance, the probability of the development of the addiction increases (5).

Research show that more than 60% of people play one of the games of chance at least once during their lifetime, and this number is even higher in adolescents (71%-82%) (7). However, this is mostly socially accepted gambling with the goal of socializing and recreation, without negative consequences. Looking at the difference in sex, boys gamble more often than girls, and mostly in ways that are connected with the development of problem gambling (8).

In literature, problem gambling is often also referred to as the gambling disorder, excessive gambling, pathological gambling, gambling addiction and others, and it is characterized by the loss of control over gambling with the undermining of everyday social and professional functioning. The American Psychiatric Association states

that the gambling disorder is manifested through a minimum of 4 out of 9 symptoms (investing increasingly bigger material means in order to achieve the desired excitement; restlessness or irritability when cutting back on gambling or during abstinence; repeated unsuccessful attempts to cut back on or stop gambling, compulsive thinking about gambling; gambling because of your own negative feelings; gambling after a loss in order to win back what has been lost; lying about gambling, endangering the emotional, professional, school or academic success because of gambling and leaning on others in order to ensure the material means for fixing the financial situation caused by gambling, and in order to continue gambling) lasting for at least one year (9).

The World Health Organization (WHO) introduced the diagnosis of pathological gambling into the International Classification of Diseases (ICD) already in 1980, and it characterizes pathological gambling by a pattern of long lasting or recurring gambling, be it online or offline, and it is manifested by impaired control over gambling, prioritizing gambling to the degree where gambling has a priority over other life interests and everyday activities, and by the continuation or escalation of gambling in spite of negative consequences.

The gambling pattern can be continuous or episodic and recurring, which leads to significant damages in the personal, family, social, educational, professional and other important areas of functioning (10).

The beginning of the disorder in men is often linked to early adolescence, while with women it is more common in the middle age. The assessments of prevalence in the world tell us that approximately 0.12 to 5.8% of the overall population suffers from the gambling disorder (11), and it is estimated that around 40,000 people in Croatia are addicted to gambling, in a 5:1 ratio of men to women (1). The gambling disorder is connected to comorbidities such as alcoholism and substance addiction (12), suicidal ideas and a higher risk for suicide (13). Except age and sex (younger men), Ciarrocchi (2001) lists ancestry (close family suffering from the gambling disorder) as a risk factor for the development of the gambling disorder (14), while Kessler (2008) adds a low level of education, lower socio-economic status and unemployment to the existing risk factors (13). Further research conducted among pathological gamblers, especially those of a more mature age, showed that the marital status is a further risk factor (single and divorced people had a higher probability of developing the disorder) (14); followed by

the type of game (electronic devices for games of chance and online gambling) and comorbidities from the specter of mental illnesses (15).

The availability of gambling in a certain area is also connected to the development of problem gambling, but in today's age, when there is a vast network of places that offer gambling and online gambling, which implicates that everyone is exposed to gambling, a strong emphasis is placed on the intrinsic risk factors, such as personality traits (impulsiveness, extrovercy, competitiveness), the need for excitement and neuroticism (1, 15).

### **Gambling and playing video games**

Research show that people that gamble or play video games excessively have some common personality traits, such as a higher rate of aggressiveness, the need for excitement, more frequent problems with mental health, narcissism, the tendency to use illegal substances, or, on the other hand, the excessive use of legal substances and a tendency to be bored (19). Although there is a higher probability that video game players will gamble and that gamblers will more often play video games, research have not confirmed a causality within this relation (20). The industry of video games and games of chance alone is intertwined, and

combining gambling and playing video games by the developers themselves (digitalized gambling, the possibility of e-sports betting), as well as using elements of video games in gambling, can be noticed increasingly more often (21).

Gambling is a game, but also a significant socio-economic and health problem, especially among adolescents and young adults. Many authors connect gambling and playing video games (22), especially when talking about the development of the disorder. There are many similarities (behavioral addictions based on a reward system, impulsiveness, hyperreactivity (23), using material means (24), socialization and many others) that make distinguishing playing games and gambling increasingly more difficult (25). Programmers from both industries contribute to this problem by implementing elements of gambling into video games, and elements of video games into games of chance.

### **METHODS AND PARTICIPANTS**

The quantitative methodology was used in order to achieve the goal of this research. A questionnaire was developed that consisted of socio-demographic questions (age, sex, employment status), questions determining video game habits (the length of playing

video games, the duration of playing and the type of video game), questions determining gambling habits (intensity, type of gambling, behavior connected to gambling), and the South Oaks Gambling Screen: revised for adolescents – SOGS-RA.

The SOGS-RA questionnaire (26) consists of 12 variables that analyze the gambling or betting activities in the last three months. The first question relates to the attempt of returning the loss and the questions are answered with the use of the Likert scale (1-4). The answers to further questions related to the planning or abstinence from gambling, borrowing money, and the changes in relationships caused by gambling are dichotomous (yes or no).

The overall result provides the data about the scale of the problem connected to gambling and classifies the examinees into 4 categories:

1. no problems connected to gambling (0 points)
2. insignificant problems connected to gambling (0-1 point)
3. moderate problems connected to gambling (1-2 points)
4. pronounced problems connected to gambling (2-4+ points).

The research was conducted using a Google forms form that was forwarded to video game players during August 2023. The criteria for including the participants was the affiliation to the subculture of video game players and the age between 17 and 35. All younger and older video game players were excluded from the research.

The results were processed using the program Python, Python Software Foundation, version 3.11.5.

## SAMPLE

The sample of the research was intentional and judgmental, that is, it was chosen based on the judgement of the researcher about the individuals from the population of video game players that they will include in the research. The sample according to the socio-demographic characteristics (sex, age and employment status) and the characteristics connected to video game playing habits (the type of video game they prefer, the intensity of playing, the average duration of playing on the daily basis and the duration of playing video games from the very start) can be seen in table 3.1.

Table 3.1. The description of the sample according to the socio-demographic characteristics and video game playing habits

			Number of participants 99 (N)	100%
1.	sex	female	40	40.4
		male	<b>59</b>	<b>59.6</b>
2.	Age	17-18	4	4
		19-20	24	24.4
		21-23	<b>39</b>	<b>39.4</b>
		24-26	9	9.1
		27-30	4	4
		30- 35	19	19.2
3.	employment status	Student	6	6.1
		university student	<b>47</b>	<b>47.5</b>
		Employed	30	30.3
		Unemployed	2	2
		student employee	14	14.1
4.	type of video game	casual games	12	
		Puzzles	20	
		sports games	17	
		MOBA	<b>38</b>	
		shooter games	<b>34</b>	
5.	gaming intensity	Daily	<b>31</b>	<b>31.3</b>
		3-5 times/week	19	19.2
		1-2 times/week	18	18.2
		less than once per week	<b>31</b>	<b>31.3</b>
6.	average gaming duration	up to 1 hour/day	36	36.4
		1-3 hours	<b>38</b>	<b>38.4</b>
		3-6 hours	13	13.1
		7-8 hours	7	7.1
		more than 8 hours	5	5
7.	duration of gaming through lifetime	less than a year	18	18.2
		1-3 years	6	6.1
		3-6 years	11	11.1
		6-10 years	7	7.1
		more than 10 years	<b>57</b>	<b>57.6</b>

The research was conducted on a sample of a total of N=99 participants. The sample had a slightly larger number of male video game players, 59.6% of them (n=59), and 40.4%

(n=40) of video game players were female. By analyzing the participants of the research according to age, the lowest percentage of them were 17-18 years old



(n=4), and most of the participants of the research were between 21 and 23 years old (n=39).

According to the employment status, participating in the research were students 6.1% (n=6), university students 47.5% (n=47), employed video game players 30.3% (n=30), unemployed video game players 2% (n=2) and video game players that are employed and studying at university part-time 14.1% (n=14). The participants of the research could choose more games or types of games that they frequently play. They mostly played strategy action games

(MOBA) (n=38) and first and third person shooter games (FPS, TPS) (n=34), and the least played games were simple casual games (Casual) (n=12). The participants play video games equally daily (31.3%) and less than once per week (31.3%). On average, most of the participants spend 1-3 hours daily playing video games (38.4%), after that up to one hour (36.4%), while 12.1% of the participants spend more than 7 hours per day playing video games. More than a half of the participants have been playing video games for more than 10 years (57.6%).

## RESULTS

As shown in table 4.1, one fifth of the research participants do not gamble at all,

while 45.4% of them gamble very rarely. However, 5.1% of them gamble every day.

Table 4.1. Games of chance playing habits

		N (99)	%
Playing games of chance	yes	78	78.8
	no	21	21.2
Intensity of playing games of chance	Daily	5	5.1
	several times per week	9	9.1
	once per week	7	7.1
	several times per month	12	12.1
	less than once per month	45	45.4
	Never	21	21.2

Considering the type of video game, the participants could choose more than one type of game of chance that they play (table 4.2.). They mostly use lottery games

(45.1%) and scratch cards (47.7%), followed by sports betting and games on gambling machines in the same percentage (42.3%).

*Table 4.2. Frequency of answers according to type of game of chance among players of video games*

		<b>N (78)</b>	<b>%</b>
<b>Type of game of chance</b>	sports betting	<b>33</b>	<b>42.3</b>
	lottery games	<b>43</b>	<b>45.1</b>
	TV Bingo	14	18
	Bingo in the casino	6	7.7
	scratch cards	<b>45</b>	<b>47.7</b>
	games on gambling machines	<b>33</b>	<b>42.3</b>
	Roulette	31	39.7
	card games in the casino	14	17.9
	virtual races	18	23
	online casinos	20	25.6
	betting at Hrvatska Lutrija	13	16.7

Although almost half of the participants (48.5%) have not reported having a gambling problem, 28.3% of the participants reported having more than

three problems on the SOGS-RA questionnaire and they fulfil the criterion of having pronounced problems connected to gambling (table 4.3.).

*Table 4.3. SOGS-RA*

Gambling problems		N	%
	no problems connected to gambling score 0	<b>48</b>	<b>48.5</b>
	insignificant problems connected to gambling (score 0-1)	15	15.2
	moderate problems connected to gambling (score 1-2)	12	12.1
	pronounced problems connected to gambling (score 2-4+)	<b>28</b>	<b>28.3</b>

When analyzing the results according to scored items of the SOGS-RA questionnaire (table 4.4), the participants most often admit to feeling guilty (30.3%), to hiding the evidence of gambling in front

of family members and friends (11.1%), to losing control over the intensity of gambling and to gambling repetitively after a loss in order to regain what has been lost (9.1%).

Table 4.4. The frequency of answers according to scored items of the SOGS-RA questionnaire

Scored items		Never/some of the time	Most of the time/ Every time
How often have you gone back another day to try and win back money you lost gambling/betting?	n= %	90 90.9	<b>9</b> <b>9.1</b>
		<b>NO</b>	<b>YES</b>
When you were gambling/betting, have you ever told others you were winning money when you were not?	n= %	88 88.9	<b>11</b> <b>11.1</b>
Has your gambling/betting money ever caused any problems for you such as arguments with family and friends, or problems at school?	n= %	97 98	2 2
Have you ever gambled or betted more than you had planned to?	n= %	88 88.9	<b>11</b> <b>11.1</b>
Has anyone criticized your gambling/betting, or told you that you had a gambling/betting problem (whether you thought it true or not)?	n= %	89 89.9	10 10.1
Have you ever felt bad about the amount of money you bet, or about what happens when you gamble/bet money?	n= %	69 69.7	<b>30</b> <b>30.3</b>
Have you ever felt like you would like to stop gambling/betting, but did not think you could?	n= %	96 97	3 3
Have you ever hidden from family or friends any betting slips or money from games of chance, or any other signs of gambling/betting?	n= %	83 83.8	<b>16</b> <b>16.2</b>
Have you had money arguments with family or friends that centered on gambling/betting?	n= %	86 86.9	13 13.1
Have you borrowed money to gamble/bet and not paid it back?	n= %	99 100	0 0
Have you ever skipped or been absent from school or work due to gambling/betting activities?	n= %	96 97	3 3
Have you borrowed money or stolen something in order to gamble/bet or to «cover» gambling activities?	n= %	99 100	0 0

Men gamble statistically more often by sports betting, using electronic devices or online casinos and betting on virtual races (table 4.5.).

*Table 4.5. The difference between preferred type of gambling according to gender*

<b>Type of game of chance</b>	<b>Male (N)</b>	<b>Female (N)</b>	<b>Chi2</b>	<b>p&lt;0,05</b>
sports betting	30	3	18.253	<b>0.00001</b>
lottery games	27	16	1.303	0.71
TV Bingo	10	4	0.462	0.49
Bingo in the casino	4	4	0	1
scratch cards	23	22	1.862	172
Roulette	19	12	0.0001	0.99
games on gambling machines	25	8	4.409	<b>0.03</b>
card games in the casino	11	3	1.606	0.2
virtual races	16	2	6.423	<b>0.01</b>
online casinos	17	3	5.46	<b>0.01</b>
betting at Hrvatska Lutrija	9	4	0.2	0.64

*Legend: N - the number of participants; Chi2 -  $H_i^2$  test; p - statistical significance*

## DISCUSSION

The goal of this research was to investigate the habits and characteristics of gambling in the video game player population. The results show that the lifetime prevalence of gambling among video game players is 78.8%, while the monthly prevalence is 33.4%, which concurs with the results of the research conducted by Sanders et al (2019), which showed that the yearly prevalence of gambling among video game players is 78.5%, and they also research the prevalence of playing video games among gamblers, which was a bit lower (70.7%) (19). Comparing these results with those of similar research, the yearly prevalence of gambling among adolescents in Spain was 20.6%(27), and the yearly prevalence of gambling in Croatia among the general population, between the ages of 15 and 64, is 60.3%, and it is the highest between the ages of 25 and 34 (64.5%) (28). It is noticed that the prevalence of gambling among video game players is considerably higher, and it is a bit higher among men (65.7%) than among women (54.8%). Although research show that men gamble significantly more, especially during adolescence and young adulthood, the increase in the number of women that seek help because of problem gambling can also be noticed (29).

When considering gambling according to the type of game of chance and gender, we notice a statistically significant difference. Men gamble significantly more by sports betting, using gambling machines, online casinos and by betting on virtual races, and we have already mentioned that these have the highest addictive potential. This is similar to the results of a research conducted in Poland that showed that gambling in online casinos and sports betting is more preferred by younger men (30).

Considering the whole sample, half of the participants of the research (48.5%) do not report to having any problems connected to gambling, while 28.3% of the participants report to having more than three problems in the SOGS-RA questionnaire. Because of this, they satisfy the criteria for having pronounced problems connected to gambling. Considering the different methodologies and a small number of found research about gambling among video game players, it is difficult to compare the results, but looking at the results of the research conducted on the general population, we can see a higher prevalence of problems among video game players than among the general population. In Croatia, in the general population, this percentage is a bit higher by 8% for men (3.6% intense and 5% moderate intensity) and 1.4% for women

(0.7% intense and 0.7% moderate intensity) (28).

In recent times, we notice an increase in e-sport betting that prevails among younger employed, college educated men. Although it is not exclusively related to video game players (non-players also gamble), video game players gamble to a greater extent and more often because of their beliefs about their own e-sport knowledge and skills, which will ensure they gain a profit (31). Research showed that e-sport gamblers have significantly more problems with gambling than people gambling on traditional gambling activities. Actually, some authors consider video games to be a gateway into gambling, especially when talking about adolescents, often also

## CONCLUSION

Most people have gambled at least once in their life, without any negative consequences, and the same is true for playing video games. Although these are two different activities, they have their similarities that are underscored by the developers by implementing the elements of the one into the other. Both activities are, in the first place, recreational with a possibility of developing behavioral addiction in a portion of the consumers. The goal of this research was to primarily

underage persons to whom e-sport betting is easily available (32), which is worrying, but, on the other hand, the results of some research do not show a correlation between playing video games and gambling (33).

Although this research included a very high percentage of video game players with a pronounced gambling problem, the research was conducted on a cross-sectional, intentional and relatively small sample of video game players, and the results cannot be generalized onto all video game players. Considering that gambling can be a serious social and public health problem, it is recommended that a causal research continues the research on a representative sample with an emphasis on causality.

investigate the gambling habits among video game players, and then the prevalence of problem gambling in the same population, which have shown to be alarmingly high, and the results cannot be generalized. The results of this research showed that video game players gamble more than the general population. Although the results cannot be generalized, considering that the research was conducted on young people and considering the potentially serious consequences, we recommend continuing the research, and to

intensify and systematize the prevalence as early in life as possible.

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## NAVIKE KOCKANJA MEĐU IGRAČIMA VIDEOIGARA

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### SAŽETAK

Uvod: Kockanje je legalna i društveno prihvaćena zabavna aktivnost koja se može progredirati u ozbiljan javnozdravstveni problem. Prevalencija kockanja je veća kod muškaraca mlađe životne dobi i nižeg ekonomskog statusa i starijih razvedenih muškaraca. Postoji velik broj sličnosti između igranja videoigara i kockanja koje industrija potiče uvodeći elemente kockanja u videoigre i elemente videoigara u kockanje, no unatoč sličnostima, kod problematične upotrebe govorimo o dva zasebna bihevioralna poremećaja.

Metode i sudionici: Istraživanje je provedeno na namjernom prosudbenom uzorku adolescenta i mlađih odraslih osobama koji igraju videoigre. Korišten je upitnik s pitanjima sociodemografskih obilježja, navika igranja videoigara i kockanja i SOGS-RA za procjenu rizičnosti kockanja.

Rezultati: Većina sudionika kocka vrlo rijetko ili uopće ne kocka, no 5,1% sudionika kocka svaki dan. Gotovi svi igraju više vrsta igara na sreću, a prednjače lutrijske igre, sportska kladionica i igre na elektronskim aparatima. Izraženi problemi s kockanjem su prepoznati kod 28,3% sudionika istraživanja. Rasprava: Životna prevalencija kockanja u ovom istraživanju je slična rezultatima drugih istraživanja među igračima videoigara iako nisu rezultati svih istraživanja na tom području homogeni. Uspoređujući rezultate kockanja među igračima videoigara i u općoj populaciji, prevalencija kockanja među igračima je znatno viša nego u općoj populaciji.

Zaključak: Adolescenti i mlađi odrasli igrači videoigara igraju više igara na sreću, preferirajući kockarske igre koje imaju veći adiktivni potencijal. S obzirom na dob, laku dostupnost i teško prepoznavanje razvoja problematičnog kockanja, važno je usmjeriti preventivne aktivnosti na što mlađu dobnu skupinu.

**Ključne riječi:** igre na sreću, igrači videoigara, problematično kockanje

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## RELATIONSHIP BETWEEN THE DISTANCE OF CARDIAC ARREST LOCATION FROM THE EMERGENCY MEDICAL DEPARTMENT AND THE FINAL OUTCOME OF CARDIOPULMONARY RESUSCITATION

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### ABSTRACT

**Introduction:** Cardiopulmonary arrest is a serious medical emergency that can be reversed with prompt and sufficient cardiopulmonary resuscitation (CPR). Out-of-hospital cardiac arrests (OHCA) occur on average at a rate of 60 per 100.000 people. Cardiopulmonary resuscitation must start immediately in order to achieve the desired outcome.

**Aim:** To investigate the association between proximity to the emergency department and the return of spontaneous circulation (ROSC).

**Subjects and methods:** This study is a single-center registry-based retrospective cohort study. All the patients from the cardiopulmonary resuscitation registry of the Emergency department of the Health Center Livno were included and divided into 2 groups: the patients who experienced cardiac arrest within a radius of less than five kilometers and the patients who experienced cardiac arrest within a radius of more than five kilometers.

**Results:** Patients who experienced OHCA within a radius of less than five kilometers had an overall better prognosis for achieving ROSC ( $p=0.002$ ). Even though men experienced cardiac arrest at a higher percentage (74.1 %) than women, there was no significant difference regarding the final outcome. The total incidence did not differ regarding the initial cardiac rhythm.

**Conclusion:** Providing prompt, sufficient CPR is essential for attaining the most favorable outcomes regarding OHCA.

**Keywords:** Cardiopulmonary Resuscitation, Out-of-Hospital Cardiac Arrest, Return of Spontaneous Circulation

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## INTRODUCTION

Cardiopulmonary arrest is unquestionably one of the most serious medical emergencies. Without prompt and sufficient cardiopulmonary resuscitation (CPR), the patient will pass away or suffer severe brain damage in a matter of minutes (1). According to several registries, there are on average 60 out-of-hospital cardiac arrests (OHCA) per 100.000 people; the majority of these happen at home (75.0 %), followed by workplaces (15.0 %) (2). Furthermore, there is a wide range in the reported outcomes for cardiac arrests that take place outside of a hospital. Even though the incidence of the return of spontaneous circulation (ROSC) is approximately 30.0 % (3), only 6.7 % of all OHCA patients, according to one meta-analysis, are reported to have survived past hospital release (4, 5). A recent study found that in Europe, 10.0 % of patients who experienced cardiac arrest survived to be discharged from the hospital (1). The main contributor in the increased survival rate after cardiac arrest is so-called "bystander CPR," as shown in a recent study by Wissenberg et al. (6) This places emphasis on the importance of required training in effective cardiac resuscitation (7), following five key components of high-quality CPR: minimizing interruptions in

chest compressions, providing compressions of adequate rate and depth, avoiding leaning on the chest between compressions, and avoiding excessive ventilation (8). The prompt recognition of cardiac arrest is essential since the possibility of survival depends heavily on the interval between the onset of the event and the beginning of CPR. A person in cardiac arrest is unresponsive, unconscious, and not breathing normally or not at all. Electrocardiography or other advanced monitoring techniques, as well as palpating for a carotid pulse, should only be used by medical professionals with clinical evaluation abilities because they consume a lot of time (9). The European Resuscitation Council currently recommends 30 chest compressions followed by two ventilations until a tracheal tube or other airway device has been inserted, then continuing ventilation at 10 breaths per minute while compressing the chest continually (10). When possible, defibrillators should be used. Two high-quality population-based cohort studies have demonstrated that automated defibrillators, which are simple to use and do not require special training, double survival following out-of-hospital cardiac arrest (11, 12). There are some disagreements regarding gender relations and the final outcome after OHCA. Some

studies suggest that women have a higher rate of ROSC (13, 14). But Winther-Jensen et al. showed that there were no gender differences in mortality following OHCA (15). Early recognition of OHCA, followed by bystander CPR and early defibrillation lead to improved survival (16, 17). According to a study by Meaney et al., the most common initial rhythm in OHCA is asystole (39.0 %), followed by pulseless electrical activity (37.0 %), ventricular fibrillation (17.0 %), and ventricular tachycardia (7.0 %) (18). In a recent study from Germany, researchers found that patients who experienced cardiac arrest in public places had overall higher chances of surviving, as well as, when the first rhythm was shockable and defibrillation was performed (19).

The aim of this study was to investigate the association between proximity to the emergency department and the return of spontaneous circulation (ROSC).

## **SUBJECTS AND METHODS**

### **Study design**

It is designed as a single-center retrospective cohort study based on the cardiopulmonary resuscitation registry of the Emergency department of Health Center Livno. All of the patients who were unresponsive, had no palpable pulse, and

had received basic life support and/or advanced life support as specified in the resuscitation guidelines were included in the aforementioned registry.

### **Data collection**

The study included all OHCA cases treated with CPR by the emergency department staff of Health Center Livno between February 2019 and May 2023. The only excluding factor was insufficient medical data in the registry. In total, 27 patients were included in our study, with seven cases excluded due to a lack of medical documentation. The informations used were gender (male or female), date of the OHCA, location, initial rhythm (shockable or unshockable), duration of the CPR, and the final outcome (ROSC or death). All of the data was input into previously created Excel tables. Regarding the location in which OHCA occurred, two groups were formed: the patients who experienced cardiac arrest within a radius of less than five kilometers of the Health Center Livno formed the first group, and the second group were the patients who experienced cardiac arrest within a radius of more than five kilometers.

### **Statistical analyses**

Data analysis was performed using Statistical Package for Social Science statistical software version 26.0 (IBM

Corp., Armonk, NY, USA) with a probability level of  $p < 0.05$  regarded as statistically significant. To identify significant differences chi square ( $\chi^2$ ) test followed by Fisher's exact test for small samples were used and to test the strength of association between two nominal variables Cramér's V measurement was used. The results are presented as mean, maximum and minimum values, or absolute (f) and relative (%) frequencies when appropriate.

This study was approved by the Committee of the Health Center Livno (01/1-732/2-23).

## RESULTS

### Association between gender and the final outcome

Of the total number of patients 20 were men, and 7 were women. As shown in Table 1, there was no significant difference between gender and the final outcome.

*Table 1. Association between gender and the final outcome*

		ROSC <sup>1</sup>		Death		p
		f	%	f	%	
Gender	Male	5	83.3	15	71.4	0.498
	Female	1	16.7	6	28.6	

<sup>1</sup> Return of spontaneous circulation

### Association between the initial rhythm and the final outcome

There were 19 individuals with unshockable rhythms (asystole or pulseless electrical activity) compared to 8 patients with shockable rhythms (ventricular

tachycardia or ventricular fibrillation). As shown in Table 2, despite the fact that a higher percentage of patients with an unshockable rhythm passed away, there was no apparent association between the initial rhythm and the outcome.

Maglica M, Kasalo-Pešić A, Čavar V, Šesto A. Relationship between the distance of cardiac arrest location from the emergency medical department and the final outcome of cardiopulmonary resuscitation. *Zdravstveni glasnik*. 2023;9(2):28-38.

*Table 2. Association between the initial rhythm and the final outcome*

		ROSC <sup>1</sup>		Death		p
		f	%	f	%	
Rhythm	Shockable	3	50	5	23.8	0.319
	Unshockable	3	50	16	76.2	

<sup>1</sup> Return of spontaneous circulation

Additionally, there was not a statistically significant difference in the association

### Association between the location and the final outcome

Eleven patients (40.7 %) experienced cardiac arrest within a radius of less than 5 kilometers of the emergency department, and 16 patients (59.3 %) were distant by

between the initial rhythm and gender (p=0.633).

more than 5 kilometers. As shown in Table 3, there was a significant difference (p=0.002) as well as a strong association (Cramer's V=0.645) between the location and the final outcome.

*Table 3. Association between the location and the final outcome*

		ROSC <sup>1</sup>		Death		p	Cramer's V
		F	%	f	%		
Location	< 5 kilometers	6	100	5	23.8	0.002	0.645
	>5 kilometers	0	0	16	76.2		

<sup>1</sup> Return of spontaneous circulation

Cardiopulmonary resuscitation procedures ranged in length from 15 minutes to 65 minutes, with the average time being 31 minutes and 30 seconds.

## DISCUSSION

In the analyzed period of time, men encountered cardiac arrest at a proportion

that was noticeably higher than that of women. This result is entirely consistent with the majority of studies that investigated the association between gender and the frequency of cardiac arrests (20-22). Gender structure in a recent study by Mody et al. was 63.0 % in favor of men, which is closely comparable to our study structure



(21). This finding might be explained by higher risk factors in men, including high cholesterol, smoking, high blood pressure, diabetes and a high body mass index, as well as a lack of physical activity.

According to research conducted by Bloom et al., women had a much worse prognosis after cardiac arrest and had a lower chance of surviving to be discharged from the hospital (23). Same findings regarding prognosis after OHCA were confirmed by multiple authors (21, 24-26). However, Winther-Jensen et al. demonstrated that there is no significant difference in mortality between men and women if we eliminate disparities in arrest circumstances (15), which is in agreement with our findings.

Shockable rhythms made up around 30.0 % of all cases in our study. According to different authors, the incidence of VF/VT is anywhere between 25.0 and 30.0 % of all cardiac arrests (18, 27). Additionally, these researchers found that successful CPR outcomes and hospital release are less frequent when the initial rhythm of cardiac arrest is unshockable (PEA or asystole). It is probably because these patients are more likely to have pre-existing cardiac disease, myocardial infarctions, and congestive heart failure (18, 27-29). However, there was not a significant difference in survival

between shockable and unshockable rhythms in our study, which included 19 patients with PEA/asystole and 8 patients with VF/VT.

Studies comparing the incidence of shockable rhythms in men and women were not widely available. Women are less likely to initially present with VF or VT in OHCA, according to research by Lakbar et al. (30). This conclusion is likely the result of ignoring the risk factors and possibly referring patients too late if symptoms appear prior to cardiac arrest. However, we did not find association between these two variables.

Since time and distance are proportionate, determining the distance will help us determine the approximate start time of the CPR procedure for both groups of patients. In our study, patients with cardiac arrest who were less than 5 kilometers from the emergency department had a considerably greater incidence of ROSC than those who were more than 5 kilometers away. Our findings are consistent with the most recent literature; the majority of authors were in the agreement that patients who had cardiac arrests in public places and when CPR was initiated immediately after the arrest had a considerably higher percentage of ROSC (19, 31, 32).

Cardiopulmonary resuscitation must begin right away in order to achieve desirable outcome. The patient has little to no chance of a ROSC if the spectators are reluctant to start the procedure and wait until the emergency department staff arrives (6, 33). Unfortunately, out of all patients that were enrolled in our study, only two were cardiopulmonary resuscitated before the arrival of our team. In both cases, medical doctors were the spectators of the cardiac arrest and without hesitation started the procedure. This occurrence highlights the value of training in basic life support techniques, and that is one of the reasons why we decided to investigate this issue.

Our study has several limitations. This was a registry-based retrospective study. The data sample collected from one center is quite small. The incidence of OHCA is around 60 cases per 100,000 inhabitants, meaning that the emergency department of our city encounters around 10 arrests per year. As data collection stopped at hospital admission, we did not follow-up on mortality or other outcome parameters, so in this study we examined the incidence of ROSC and not of "survival to discharge". Hopefully other emergency departments in our region will soon start to keep records/registries of CPR procedures, and

we will be able to expand our study in terms of total cases.

## CONCLUSION

We demonstrated that the incidence of ROSC is significantly influenced by the location of OHCA. However, the total incidence did not differ regarding gender or initial rhythm. This shows that providing prompt, sufficient CPR is essential for attaining the most favorable outcomes.

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## POVEZANOST UDALJENOSTI LOKACIJE SRČANOG ZASTOJA OD SLUŽBE ZA HITNU MEDICINSKU POMOĆ I KONAČNOG ISHODA KARDIOPULMONALNE REANIMACIJE

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### SAŽETAK

Uvod: Kardiopulmonalni zastoj je ozbiljno medicinsko stanje, koje može biti "preokrenuto" brзом i dostatnom kardiopulmonalnom reanimacijom (KPR). Vanbolnički srčani zastoj ima incidenciju od 60 slučajeva na 100,000 ljudi. Kardiopulmonalna reanimacija mora biti započeta odmah kako bi se postigao željeni ishod.

Cilj: Ispitati povezanost između udaljenosti od službe za hitnu medicinsku pomoć i povratka spontane cirkulacije.

Ispitanici i metode: Istraživanje koje je retrospektivno, kohortno, provedeno je u jednom centru (Dom Zdravlja Livno), koristeći "Reanimacijski protokol" Službe za hitnu medicinsku pomoć Livno. Pacijenti su podijeljeni u 2 grupe: oni koji su imali srčani zastoj na udaljenosti manjoj od 5 kilometara i oni koji su bili udaljeni više od 5 kilometara u trenutku srčanog zastoja.

Rezultati: Pacijenti koji su imali srčani zastoj na udaljenosti manjoj od 5 kilometara su imali veću učestalost postizanja povratka spontane cirkulacije ( $p=0,002$ ). Iako su muškarci u većem postotku imali srčani zastoj, nije pokazana statistička značajnost između spolova u konačnom ishodu. Ukupna incidencija nije ovisila o inicijalnom srčanom ritmu.

Zaključak: Pružanje brze i kvalitetne KPR je ključno za postizanje najpoželjnijeg ishoda kod pacijenata s vanbolničkim srčanim zastojem.

**Ključne riječi:** Kardiopulmonalna reanimacija, vanbolnički srčani zastoj, povratak spontane cirkulacije

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## UNETHICAL BEHAVIOR OF STUDENTS ON EXAMS

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### ABSTRACT

**Introduction:** The unethical behavior of students on exams represents a serious challenge for the education system. This disturbing trend requires immediate attention and the implementation of appropriate measures to raise awareness about the importance of academic integrity and promote ethical awareness among students.

**Objective:** Examine the unethical behavior of students on exams.

**Subjects and methods:** The study involved students from the Medical School in Šibenik. Out of the total number of participants, 155 students took part, with 75 (48,4%) specializing in general nursing, and 80 (51,6%) in pharmaceutical studies. The participants completed a questionnaire based on the Šimić Šašić and Klarin model (2009).

**Results:** The results showed a high percentage of cheating during knowledge assessments. A total of 81,9% of respondents admitted to cheating at least once. In the domain of attitudes towards the acceptability of cheating, 52,9% of respondents agreed that cheating is entirely natural and inherent to human nature. Regarding different grades, fourth-grade students significantly held a stronger attitude toward the acceptability of cheating compared to students from other grades. Regarding reasons for cheating, the most common internal reason, stated by 50,4 % of respondents, was insufficient time for studying, while 49,6% cheated to help a friend, and 49% cheated to achieve good grades. External reasons for cheating, such as weak supervision, were mentioned by 52,9% of respondents, unfairness by 52,2%, and difficulty of the exam by 49% of respondents. Female respondents exhibited more pronounced internal and external reasons for cheating compared to male respondents. **Conclusion:** The research confirmed that academic dishonesty is a routine occurrence among students. The students themselves do not view cheating as ethically wrong and rationalize it in numerous ways.

**Keywords:** unethical behavior, students, exam

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## INTRODUCTION

Numerous studies attest the alarming increase in student cheating during education (1, 2, 3). Students need to be made aware of academic integrity, and it is essential to raise awareness about how such actions are unethical and dishonest (4). This must be the stance of the entire society, not only teachers and students (5). One of the early researchers on this issue was Bill Bowers, who in his 1964 study provided a definition of academic dishonesty: "students engaging in dishonest behavior, not limited to activities such as plagiarism and cheating" (6). According to Cizek, cheating is defined as intentional behavior that violates an existing rule on a test or assignment, giving one student an advantage over others (7). Academic dishonesty encompasses any deceitful or unjust act aimed at achieving a more favorable outcome on an exam, assignment, homework, or other learning assessment (8). The majority of students consider cheating on exams to be morally acceptable (9). Cizek has categorized cheating into three domains: giving, taking, or receiving information during a test (10). Overall, academic dishonesty becomes particularly concerning when professors, who are guardians of academic integrity and future of students, engage in academic dishonesty.

Cheating on exams refers to students' attempts to answer exam questions using pre-prepared materials (11). Eisenberg distinguishes between active and passive cheating, where students weigh the effort invested against the gains. When they assess that there is a higher risk of getting caught cheating due to better supervision, they adjust their stance towards cheating and conclude that it is inappropriate in that situation (12).

The aim of this study is to examine the prevalence and causes of dishonesty on written exams at the Medical School Šibenik, taking into account overall performance, specialization, and grade level, as well as to highlight the implications that such behavior has on the academic level of the education system. This paper is motivated by the belief that academic dishonesty and all other forms of cheating pose a significant threat to our society and, consequently, to our profession.

## SUBJECTS AND METHODS

In this study, students from the Medical School Šibenik participated, including 75 (48,4%) respondents specializing in general nursing and 80 (51,6%) students in pharmaceutical studies. A total of 155 respondents (N=155) took part in the study, comprising 24 male respondents and 131



female respondents. The study was conducted from April 6, 2021, to April 28, 2021. It was approved by the Ethics Committee of the Medical School of Šibenik. The questionnaire was created using Google Forms application and, in collaboration with class teachers, distributed to students through Google Classroom. Participation in the study was voluntary and anonymous. The study utilized a questionnaire created based on the Šimić Šašić and Klarin model (2009) (with the authors' consent) (9). It was divided into three parts. The first part of the questionnaire included questions related to socio-demographic characteristics such as gender, age, the specialization the respondent is attending, grade level, and overall performance at the end of the previous academic year. The second part of the questionnaire consisted of a cheating scale, which comprised 17 questions where respondents assessed their agreement with statements about cheating and reasons for cheating on a scale from 1-3; where 1 means never, 2 means 1-2 times, and 3 means more than two times. The third part of the questionnaire was a scale of reasons for cheating, consisting of a total of 26 questions. Eight questions examined attitudes towards the acceptability of cheating, which respondents evaluated on a 5-point Likert scale ranging from 1 -

strongly disagree, to 5 - strongly agree. Following this, respondents were presented with a set of 11 questions related to internal reasons for cheating and a set of 7 questions related to external reasons for cheating, all assessed on the aforementioned 5-point Likert scale.

## STATISTICAL DATA ANALYSIS

Categorical data in the study are presented in absolute and relative frequencies. Chi-square tests were used to examine differences in categorical variables, supplemented by the exact Fisher's test if necessary. The Shapiro-Wilk test was employed to test the normality of the distribution of continuous variables. Numerical data are presented with interquartile range boundaries and medians due to the distribution of numerical data that does not follow a normal distribution. Non-parametric methods were used for testing. Mann-Whitney U tests were used to test differences in numerical variables between two independent groups, and Kruskal-Wallis tests (with post hoc Conover) between three or more groups. All reported P values are two-tailed. The significance level was set at Alpha = 0.05. The MedCalc® Statistical Software version 19.6 was used for statistical analysis.

## RESULTS

The study examined attitudes of students towards cheating on examinations and their acceptability at the Medical School in Šibenik. When asked, "Have you ever cheated in school?" 81.9% of respondents stated that they had cheated at least once or more. Out of the 155 respondents, 82 (52.9%) agreed or strongly agreed with the

statement that cheating is natural in the domain of attitudes towards the acceptability of cheating, believing it to be inherent to human nature and something to be expected. Additionally, 80 respondents (45.1%) believed that cheating is quite common because there are no serious consequences for the cheater (Figure 1).

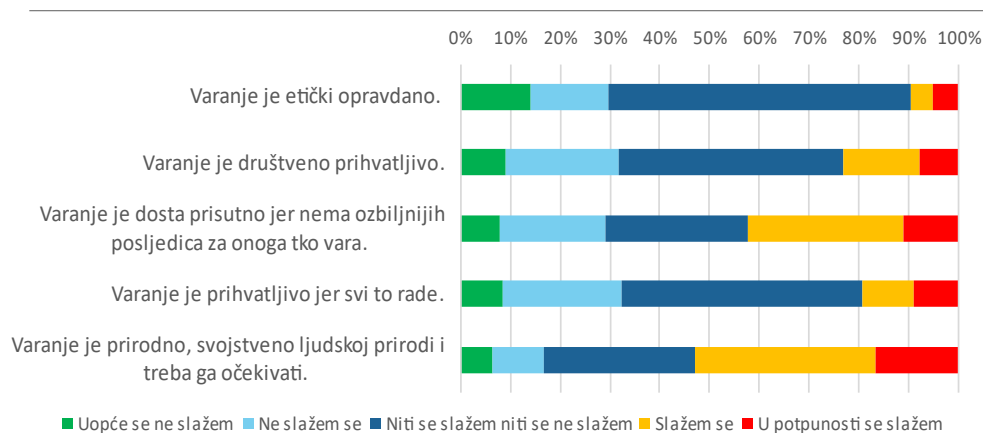


Figure 1. - Distribution of respondents according to attitude towards the acceptability of cheating

Female respondents slightly more agreed that implementing an ethical code in schools would reduce the rate of cheating on exams, while male respondents believed that cheating leads to dishonesty in later careers. However, there was no statistically significant difference. Those who strongly agreed that an ethical code implemented in schools would reduce cheating on exams were students who completed the previous grade with excellent or very good grades, compared to students with good grades, though without statistical significance.

Regarding inappropriate behavior, such as allowing other students to copy from them during an exam, a total of 139 (89.6%) respondents agreed. Similarly, a high percentage was observed for allowing others to copy assignments, with 138 (89.1%) students resorting to this method. Following closely behind were instances of copying from other students in written exams, reported by 125 (80.7%) students, and whispering to other students during oral or written exams, mentioned by 125 (80.6%) students (Figure 2).

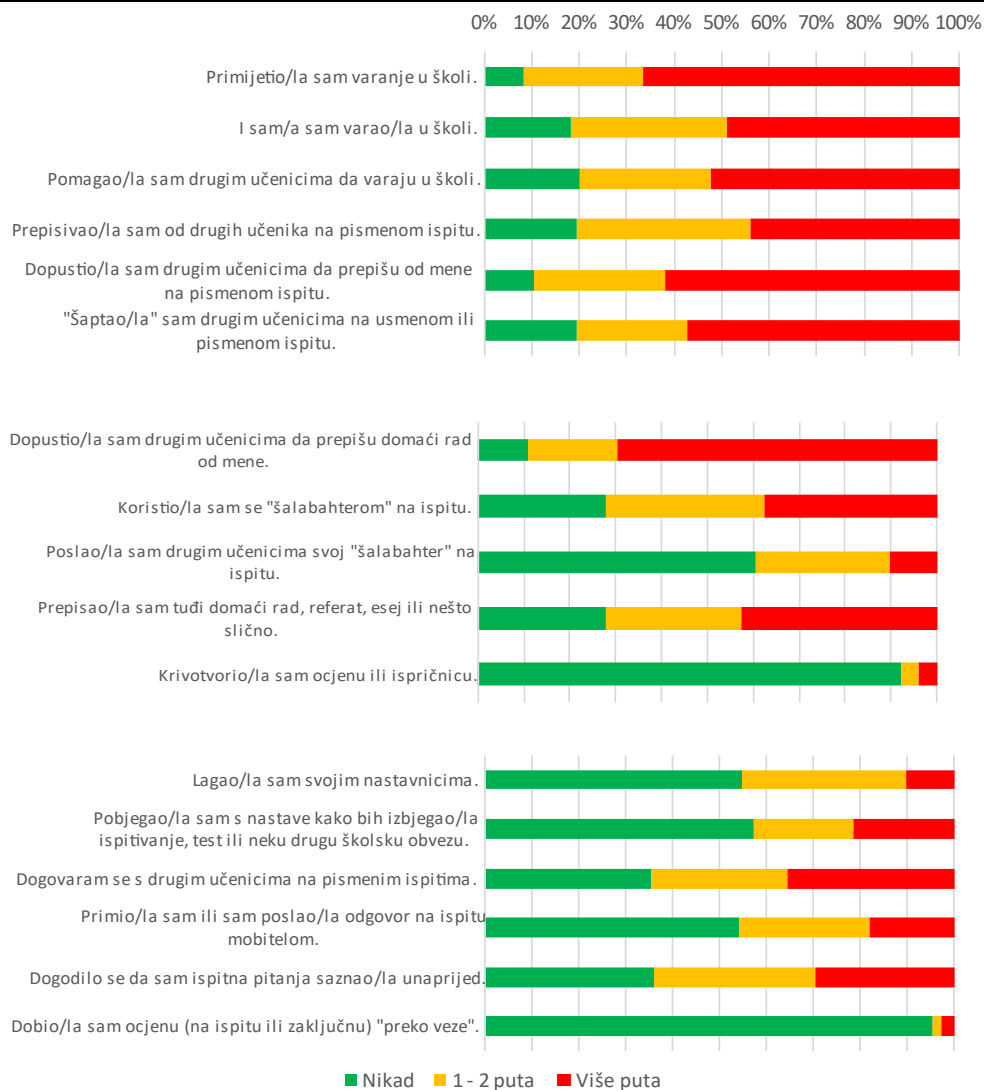


Figure 2. - Distribution of respondents according to cheating in examinations

When comparing general nursing students and pharmaceutical students regarding who lies to their teachers, either never or more than once, pharmaceutical students were significantly more likely to do so compared to general nursing students ( $\chi^2$  test,  $P = 0.01$ ).

Regarding obtaining exam questions in advance, 53 (34.2%) students mentioned doing so 1-2 times, while 46 (29.7%)

students did it more frequently. Obtaining a grade through connections was reported by 3 students 1-2 times and never by 4 students. Likewise, sending answers via mobile phone was less frequently used, as reported by 18.1% or more precisely, 28 students. When comparing general nursing students and pharmaceutical students, "obtaining a grade through connections" was reported more frequently by general nursing students compared to

pharmaceutical students ( $\chi^2$  test,  $P = 0.03$ ). All of this indicates that students consider these behaviors unacceptable. Arranging with other students multiple times during a written exam was used by 55 (35.5%) students, 1-2 times by 45 (29.0%), and never by 55 (35.5%) students. In the domain of internal reasons for cheating, the most common forms of cheating stem from a desire to help a friend, not having enough time to study, and wanting to achieve good grades. A total of 78 respondents (50.4%) agree or strongly agree with the statement that they cheat because they don't have enough time to study in this study, while 77 (49.6%) agree or strongly agree that they cheat to help a friend. Similarly, 76 (49.0%) respondents agree or strongly agree with the

statement that they cheat in school because they want to have good grades. Meanwhile, 49 respondents (31.6%) neither agree nor disagree with the statement that they cheat because they are too lazy to study, and 51 (33.1%) respondents agree with the statement that they are afraid of punishment if caught cheating in school. The majority of respondents, 78 (50.3%), do not agree at all with the statement that they cheat because other students are better than them, and 73 (47.1%) agree with the statement that they cheat because they can't otherwise get a good grade. Additionally, 52 respondents (33.5%) do not agree at all with the statement that they cheat on exams with a teacher they don't like (Figure 3).

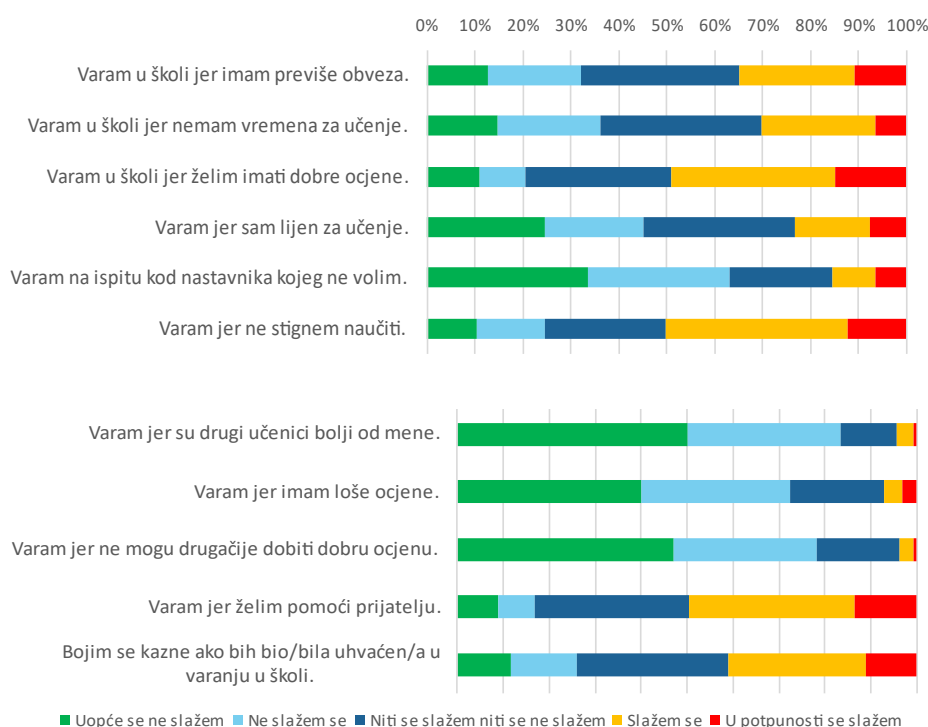


Figure 3. - Distribution of respondents according to domain of internal reasons for cheating

Analysis of external reasons provides us with data indicating that the majority of students engage in cheating when there is weak supervision, if the exam is perceived as unfair, or if it is exceptionally difficult. A total of 82 respondents (52.9%) either agree or strongly agree with the statement that they cheat when there is inadequate supervision during exams. Regarding the assertion that they cheat when the exam is perceived as unfair, 81 of them (52.2%) agree or strongly agree, while 76 respondents (49.0%) agree or strongly agree with the statement that they cheat when the exam is exceptionally difficult. When it

comes to the notion of cheating when the exam is highly important, 53 respondents (34.2%) expressed indifference, and 50 (32.3%) did so when asked about cheating due to poor exam organization. Surprisingly, a significant number of 92 respondents (59.8%) either completely disagree or disagree with the statement that they cheat in school because their parents and teachers expect high grades from them. Additionally, if their seating arrangement allows it, 37 of them (24.0%) completely disagree with cheating, while 47 (30.5%) express indifference (Figure 4).

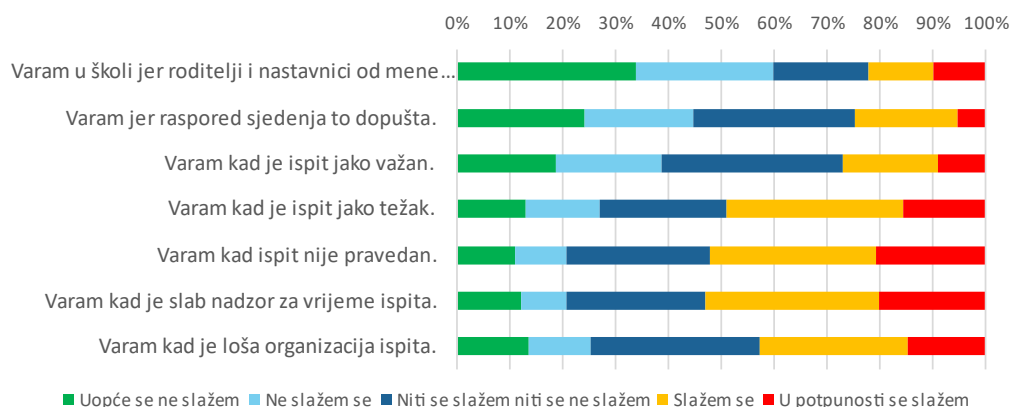


Figure 4 - Distribution of respondents according to the domain of external reasons for cheating

In the analysis of the assessment of attitudes towards the acceptability of cheating and both internal and external reasons for cheating, we arrive at the data that students are more inclined to cheat due to external reasons, which confirms one of the research objectives.

Furthermore, we wanted to determine if the occurrence of cheating is associated with overall performance, field of study, and grade level. There are no significant differences in the assessment of attitudes towards the acceptability of cheating, internal and external reasons for cheating,

based on the field of study and whether it is an initial or final year. Students in the 4th grade significantly exhibit more pronounced external reasons for cheating compared to the 1st, 3rd, and 5th grades. Similarly, students in the 2nd grade show significantly more pronounced external reasons for cheating compared to students in the 5th grade (Kruskal-Wallis test, post hoc Coover,  $P = 0.008$ ), while there is no difference compared to students in the 1st and 3rd grades.

Respondents who completed the previous grade with very good success significantly exhibit the highest internal reasons for cheating compared to respondents with good or excellent success. There is also a significant difference when comparing respondents with good and excellent success (Kruskal-Wallis test, post hoc Coover,  $P = 0.004$ ). Students who completed the previous grade with good success exhibit significantly fewer external reasons for cheating (Kruskal-Wallis test, post hoc Coover,  $P = 0.02$ ).

## DISCUSSION

This study provides alarming data on the prevalence of academic dishonesty among students. Almost 82.0 % of respondents admit to cheating at least once. Additionally, over half of the respondents believe that cheating is a natural and

inherent human behavior. Understanding cheating is particularly important given the trends indicating an increase in cheating. The first major study in higher education was conducted by Browsers in 1964, involving over 5000 students from 99 American colleges. It was found that three-quarters of the respondents engaged in one or more forms of academic dishonesty (6). McCabe and Trevino replicated this study 30 years later in 9 schools that participated in Browsers' research, which indicated a modest increase in cheating. However, there was an observed increase in cheating on exams. This could be attributed to a change in the definition of what constitutes cheating (13). In this study, students agree that an ethical code implemented in schools would reduce the rate of cheating on exams, which aligns with the findings of McCabe and Trevino (4). However, the existence of an ethical code and the enforcement of laws alone are not enough; it is the responsibility of the school to instill this ethical code in students. When it comes to the prevalence of cheating on exams, research spanning from 1963 to 1993 shows a clear increase from 39.0 % to 64.0 % (2). The study conducted by Šimić Šašić and Klarin in 2009 led to alarming data, revealing that 92.71 % of high school students cheated at least once (9). According to Hrabak's study, a concerning fact is that 94.0 % of students

at the Medical School cheated at least once during their studies (14). Therefore, cheating is a common occurrence present in all segments of education. As competition for the most desirable positions in the job market grows, so does the incidence of academic dishonesty (2, 6, 15). Dishonesty becomes particularly concerning when professors, ministers, judges, and engineers engage in academic dishonesty. According to numerous studies, dishonesty is more prevalent than ever, and universities need to take appropriate action to educate students about academic integrity (16). Of course, the responsibility is not solely on the students; teachers often fail to react when they catch students cheating on exams (17, 18). The only study conducted among teachers in Croatia was carried out by Štambuk and colleagues. Their results indicate that the majority of teachers agree with the lack of consequences for cheaters. Additionally, it is disheartening that as much as 60% of teachers overlook academic dishonesty (19). A similar claim is confirmed by Coren's research, where 40,3% of professors overlook cheating, mostly to avoid conflicts (20). Teachers are the ones who should create a negative atmosphere towards all forms of dishonesty because they are the most important role models for students (21). Only after teachers do students consider the institution

responsible for preventing cheating, with students themselves being considered the least responsible (22). Many studies indicate that high school is the time when the incidence of academic dishonesty is highest, and this behavior often carries on to further education (9, 18, 19, 23, 24). In a 1992 study, when asked "Is cheating wrong?", about 90 % of students answered affirmatively, indicating that students know it is unfair. However, upon reviewing the results of the actual frequency of dishonesty, of the 90.0 %, a staggering 76.0 % admitted to engaging in academically dishonest behaviors (8). Research based on age shows that younger students cheat more than their older counterparts (13), which is confirmed in this study. Additionally, they cheat more during high school education than college students (18). Students who cheated in high school continue with their cheating habits in higher education (25). Academic dishonesty represents a significant problem in the education system, especially in the field of health education. Since students in health sciences play a crucial role in society and must adhere to high ethical standards, it is important to ensure that their actions are reliable. Research has shown that individuals who engaged in academic dishonesty during their education often exhibit unethical behavior in professional practice.

## CONCLUSION

Academic dishonesty is widespread in the educational system, particularly among students in health education. Research confirms alarmingly high numbers: almost 90% of students admit to some form of inappropriate behavior, including allowing cheating during exams. Even 80,7 % admit to copying from other students during written exams. The majority of students cheat when exam supervision is inadequate, and nearly 60.0 % do so due to the expectations of parents and teachers for high grades. These findings underscore the importance of further research and the development of strategies to prevent inappropriate behavior.

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## NEETIČNO PONAŠANJE UČENIKA NA ISPITIMA

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### SAŽETAK

Uvod: Neetično ponašanje učenika na ispitima predstavlja ozbiljan izazov u obrazovnom sustavu. Ovaj uvredljivi trend zahtjeva nužnu pažnju i poduzimanje odgovarajućih mjera kako bi se osvijestila važnost akademske čestitosti te promicala etička svijest među učenicima. Cilj: Ispitati neetično ponašanje učenika na ispitima.

Ispitanici i metode: U istraživanju su sudjelovali učenici Medicinske škole Šibenik. Od ukupnog broja ispitanika 155 (učenika) njih 75 (48,4 %) je smjera medicinska sestra – tehničar općeg smjera i 80 (51,6 %) učenika farmaceutskog smjera. Mjerni instrument koji su ispunjavali ispitanici je anketni upitnik po uzoru Šimić Šašić i Klarin (2009). Rezultati: Rezultati su pokazali visok postotak varanja na provjerama znanja. Čak 81,9 % ispitanika izjavljuje da je varalo barem jedanput. U domeni stava o prihvatljivosti varanja 52,9 % ispitanika se slaže da je varanje sasvim prirodno i svojstveno ljudskoj prirodi. Gledajući po razredima učenici četvrtih razreda značajno više imaju izražen stav o prihvatljivosti varanja u odnosu na učenike drugih i petih razreda. U domeni razloga varanja, najčešći internalni razlog 50,4 % ispitanika navodi premalo vremena za učenje, 49,6 % jer žele pomoći prijatelju dok 49 % ispitanika zbog želje za dobrim ocjenama. Eksternalni razlozi za varanje poput slabog nadzora navodi 52,9 % ispitanika, zbog nepravdnosti 52,2 % i teškog ispita 49 % ispitanika. Ženske ispitanice imaju izraženije internalne i eksternalne razloge varanja u odnosu na ispitanike muškog spola.

Zaključak: Istraživanje je potvrdilo da je akademsko nepoštenje rutinska pojava među učenicima. Sami učenici varanje ne smatraju etički pogrešnim te ga relativiziraju na brojne načine.

**Ključne riječi:** neetično ponašanje, učenici, ispit

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## QUALITY OF LIFE OF PATIENTS WITH STRESS URINARY INCONTINENCE TREATED WITH TWO SURGICAL METHODS: A RANDOMIZED CONTROLLED STUDY

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### ABSTRACT

**Introduction:** Static or stress urinary incontinence unquestionably in women has a significant negative impact on quality of life. Surgical treatment is the standard way of treating women with static stress incontinence, if the desired effect is not achieved with a conservative method of treatment.

**Objectives:** To compare the quality of life of a group of patients with stress urinary incontinence surgically treated with Hammock method with the group treated by Needle method, and to compare the results with the quality of life of a healthy population of women.

**Methods:** The study used the recommended questionnaire from the International Consultation on Incontinence, a short questionnaire ICIQ- SF. This questionnaire was used to collect data on symptomatology, frequency, amount of urine, and the impact on the quality of life before and after surgical treatment.

**Results:** A statistically significant difference ( $p < 0.05$ ) in improving the quality of life of patients operated on needle method was found, significantly higher after surgery. It was also found that there was a statistically significant difference ( $p < 0.05$ ) in improving the quality of life and in patients operated on by the Hammock method. Patients who underwent Needle surgery reported a better quality of life after surgery, compared to patients who underwent Hammock surgery. No statistically significant difference ( $p > 0.05$ ) was found between the postoperative quality of life of patients operated on the Needle method and people without incontinence difficulties.

**Conclusion:** The results of the research have shown that the Needle method is more effective in improving the quality of life of patients with stress urinary incontinence 6 months after surgery.

**Keywords:** stress incontinence, quality of life, surgical methods

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## INTRODUCTION

Urinary incontinence is a significant health and socioeconomic problem that is underestimated by both health professionals and patients. Every day in clinical work we meet patients who, due to fear of stigmatization and lack of information, ignore the symptoms of urinary incontinence for years, until the problems significantly impair the quality of their life (1). Stress urinary incontinence (SUI), defined by the International Association for Continence (ICS), is an involuntary runoff of urine when exercising, exercising and coughing or sneezing. Stress incontinence can occur at any age and today occurs in about 30% of women (2). When conservative and pharmacological treatment do not achieve a satisfactory result, surgical treatment is indicated. As there are numerous theories about the occurrence of stress urinary incontinence, so there are numerous methods of surgical treatment, relying on each of the hypothesized theories of occurrence. Currently, there is no standardized definition of the success of surgical treatment of stress urinary incontinence. Therefore, it seems very challenging to compare different procedures due to the high heterogeneity among the surgical methods used. It is strictly recommended to

use high-quality questionnaires, assessing both the patient's description of symptoms and their impact on the quality of life.( 3). The International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form- ICIQ-SF (3) is recommended. The European Association of Urology (EAU) recommends evaluating the symptoms described by patients, quality of life, objective outcomes, complications and health economic outcomes (4,5). There is no standardized definition of follow-up periods after surgical treatment, but it is believed that outcomes should be monitored for a period of 6 months or more. The aim of this study was to compare the quality of life of patients treated with two similar surgical methods .

## INTERVIEWEES AND PROCEDURES

The study was organized as a randomized controlled prospective study conducted at the Clinic for Gynecology and Obstetrics and the Department of Urology of the University Clinical Hospital (UCH) Mostar. I formed the groups in such a way that upon the arrival of the patient we distributed the operated into one group, and with a random sample using the age formed another group of women without symptoms. The time of the survey was from January 2016 to

December 2017. age. A total of 105 women were included in the study, of which 70 with diagnosed stress urinary incontinence who were recommended for surgical treatment. Patients of the study group were divided into two groups. One study group of 35 patients consisted of patients who were surgically treated with a technique based on the "Hammock" theory (6). The second study group consisted of 35 patients treated with suspension surgery using needles by Raz (7). After completing the surgical treatment, patients from both groups applied for a follow-up examination 6 months after the operation and on that occasion filled out the ICIQ SF questionnaire (8). The control group consisted of 35 women of a healthy population.

Criteria for inclusion in the study: age over 35, symptoms and signs of stress urinary incontinence, involuntary loss of urine without contraction of detrusors.

Exclusion criteria from the study: patients with neurogenic bladder, patients with suspected intrinsic sphincter deficiency (ISD), earlier gynecological or urological operations due to urinary incontinence, pelvic organ prolapse, pharmacological therapy for other diseased conditions.

All patients were diagnosed with stress urinary incontinence and were recommended surgical treatment. During

the preparation for surgical treatment, after signing the informed consent form, all subjects completed a modular questionnaire for the purpose of clinical assessment of symptoms and quality of life according to the recommendation of expert guides of the European Association of Urology-*guidelines* and the International Continence Society (ICS), *International Consultation on Incontinence Modular Questionnaire-ICIQ*, ICIQ – SF. The questionnaire serves to assess symptoms and quality of life before and after surgical treatment.

ICIQ - SF questionnaire is a questionnaire that evaluates the frequency of urinary incontinence, the amount of urine in incontinence, the overall impact on the quality of life, and self-diagnostic questions (8-10).

The ICIQ-SF questionnaire consists of 3 groups of questions, which are scored each for themselves, and are added to the total sum of the questionnaire points.

The first group of questions in the questionnaire refers to the frequency of urine escape and the maximum number of points for this group of questions is 5.

The second group of questions refers to the amount of urine when escaping, and the total number of points for this group of questions is 6.

The third group of questions relates to a subjective assessment of the quality of life

and the total number of points on the assessment of the quality of life for this group of questions is 10.

The total number of questionnaire points represents the sum of the points of all three groups of questions and is used for the overall assessment of the quality of life. The quality of life score is higher if the number of points is lower.

Postoperative follow-up - Six months after surgery to treat stress urinary incontinence, patients reported to a follow-up examination where they completed an ICIQ-SF questionnaire that was used to assess the quality of life after surgery and assess the improvement of symptoms and thus the outcome of treatment.

### Statistical data processing

Descriptive statistical methods were used to describe the frequency distribution of the investigated variables. All variables were tested for normal distribution by the Kolmogorov-Smirnov test. The mean values of continuous variables are expressed by the arithmetic mean and standard deviation for normally distributed variables. Nominal indicators are shown by the distribution of frequency by groups and share. The significance of the differences determined by statistical testing was expressed at the level  $p < 0.05$ . Originally

written database programs and statistical package Statistica for Windows 2010 (version 10.0, StatSoft Inc., Tulsa, OK) were used in the data processing.

## RESULTS

The average age of patients of the *Hammock* research group was 48.6 years.

Preoperative scoring related to the frequency of uncontrolled urination had an average scoring of 4.0, which would mean that most patients, as far as frequency is concerned, had involuntary or uncontrolled urinary escape several times a day. Scoring referring to the amount of urine that flowed uncontrollably, the average preoperative scoring, was 3.94, which would closely correspond to a moderate amount of urine escape. Scoring related to quality of life, i.e. how much these symptoms affected everyday life was an average of 9.82, and it is concluded that the symptoms had a significant negative impact on everyday life and that the problems they had significantly reduced their quality of life. The total preoperative questionnaire score was on average 17.85, which would correspond to the transition from severe to very severe symptoms in patients. Postoperative scoring shows a numerically significant recovery, so the scoring related to the frequency of uncontrolled urination averages 1.45. Such

scoring would correspond in a questionnaire on the frequency of uncontrolled urination once a week or less frequently. Postoperative scoring, which refers to the amount of uncontrolled urine output, is 2.34, and would refer to a smaller amount of urine. Skoring, which refers to the impact of uncontrolled urination on everyday postoperative life, averages 3.68, and is consistent with scoring on a scale from 0 to 10, some moderate negative impact on everyday life, i.e. what discomfort patients can cope well in relation to the impact they had before surgical treatment.

The total average postoperative score is 7.48 and in the scoring about the success of treatment is classified in the group of scores from 5 to 9 that would correspond to the successful result of treatment. The average age of the control group of 35 patients treated with the "needle" suspension method was 52.57 years. They were previously orally informed about the survey, after which they signed an informed consent form.

Preoperative single scoring of the frequency of uncontrolled urination for this group of patients preoperatively averages 3.4 and speaks of the frequency of involuntary urination between once a day and several times a day, somewhat closer to the frequency of once a day for sure. The

frequency of scoring the amount of uncontrolled urine uncontrolled is 4.45, varies between moderate and higher amounts of urine, but closer to a moderate amount uncontrollably muddles urine.

Skoring significantly affects everyday preoperative life, and the amount of 8.57 corresponds to a marked impact on everyday life on a scale from 0 to 10 corresponds to the number 9, which is close to an extremely negative impact on the daily life of patients. The total score of the preoperative questionnaire is an average of 17, corresponding to the gradation of symptoms, severe symptoms.

Postoperative scoring of completed questionnaires, frequency of uncontrolled urination postoperatively averages 0.3, says that uncontrolled urination never occurs. Scoring uncontrollably muddles the amount of urine postoperatively averages 0.68, would correspond to a negligible amount of urine to almost no negligence of urine. The scoring of the impact on everyday life postoperatively is 0.88, corresponding to the negligible impact on the daily life of patients. The postoperative total scoring of the questionnaire averages 1.91, corresponds to a scoring of 1 to 4, which speaks of the overall cure and success of treatment.

*Table 1. Arithmetic mean and standard deviation, and normality of distribution of quality of life results on two time occasions (before and after surgery) by two methods and in the control group (N=105).*

Method and time period	M	Sd	Flattened coefficient	Standard flattened error	Coefficient of asymmetry	Standard asymmetry error
Needle before surgery	17.00	3.03	2.05	0.77	-1.21	0.39
Needle after surgery	1.91	2.67	-1.33	0.77	0.77	0.39
Hammock before surgery	17.85	1.19	0.39	0.77	0.40	0.39
Hammock after surgery	7.49	2.87	0.39	0.77	-0.62	0.39
Healthy respondents	2.03	2.23	0.39	0.77	0.31	0.39

Normality distribution testing indicates that the results obtained by the test approximately follow the normal distribution, i.e. near the point of average.

This distribution allows the use of parametric statistical procedures in the processing of results.

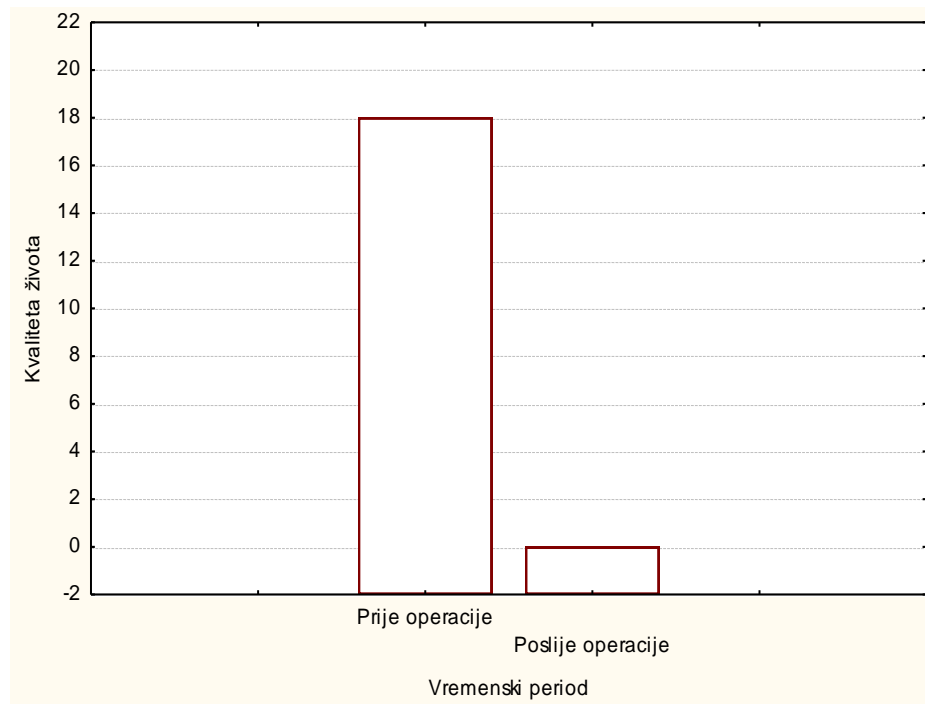


Tomić T, Ivanković A. Quality of life of patients with stress urinary incontinence treated with two surgical methods: a randomized controlled study. *Zdravstveni glasnik*. 2023;9(2):51-65.

*Table 2. Testing the significance of the difference in the quality of life of patients operated by the Needle method with respect to the time period (before and after surgery) with a t-test for dependent samples (N=35)*

	t	Df	P
Quality of life before and after needle surgery	26.60	34	0.000000*

\*significance at  $p < 0.05$  level



*Figure 1. Differences in the quality of life of patients operated on the Needle method with respect to the time period*

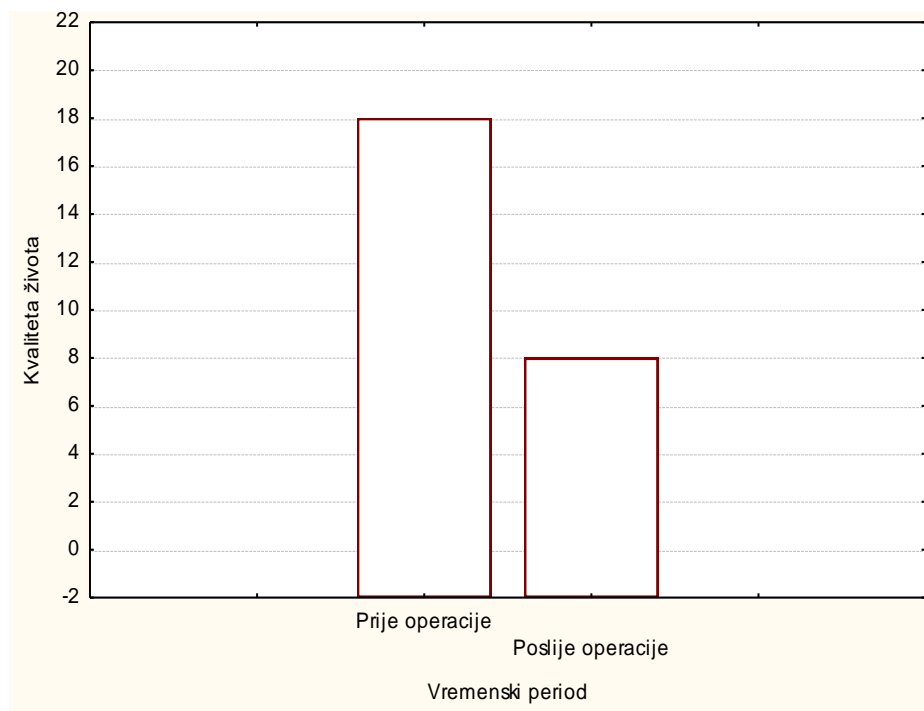
It was found that there is a statistically significant difference in the quality of life of patients operated on the Needle method with regard to the time period of filling out

the questionnaire (before or after surgery). The participants assessed the quality of life after surgery significantly higher than the period before the surgery.

*Table 3. Testing the significance of the difference in quality of life of patients operated by the Hammock method with respect to the time period (before and after surgery) by t-test for dependent samples (N=35)*

	T	Df	P
Quality of life before and after hammock surgery	22.18	34	0.000000*

\*significance at  $p < 0.05$  level



*Figure 2. Differences in the quality of life of patients operated by the Hammock method with respect to the time period*

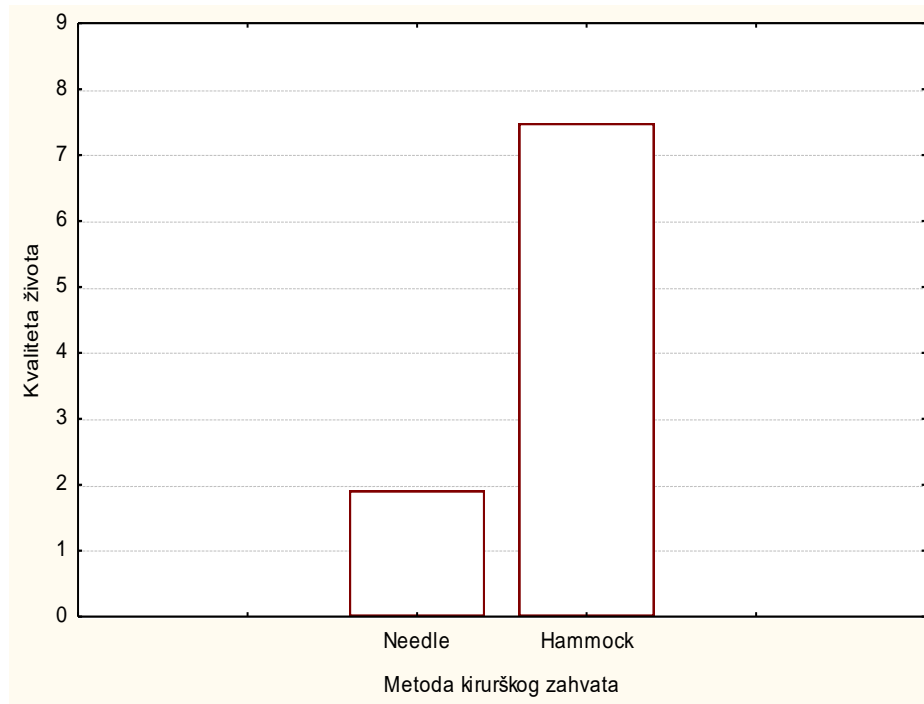
It was found that there is a statistically significant difference in the quality of life of patients operated by the Hammock method with regard to the time period of filling out

the questionnaire (before or after surgery). Subjects significantly higher assessment of the quality of life after surgery compared to the period before surgery.

*Table 4. Testing the significance of the difference in the quality of life of patients postoperative period of time in the function of different methods (Needle or Hammock) by t-test for independent samples (N=70)*

Quality of life after Needle surgery or Hammock method	T	Df	P
	-8.40	68	0.000000*

\*significance at  $p < 0.05$  level



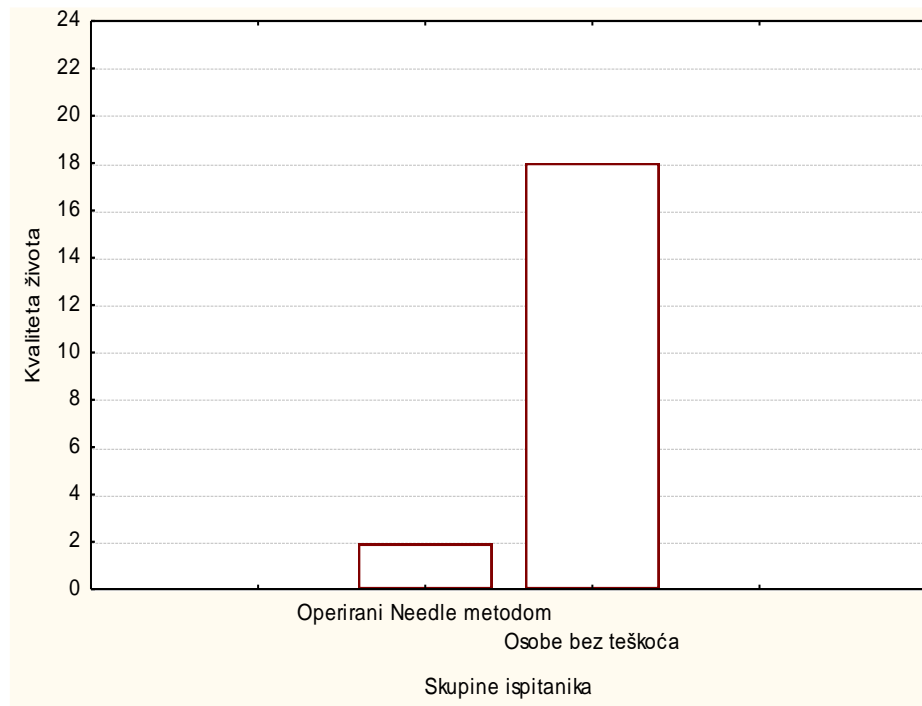
*Figure 3. Differences in the quality of life of patients in the postoperative period of time in the function of different methods*

There is a statistically significant difference in the quality of life of patients after surgery in the function of the method by which they were operated. Patients who underwent

Needle surgery reported a better quality of life after surgery compared to patients who underwent Hammock surgery.

*Table 5. Testing the significance of the difference in the quality of life of patients operated on the Needle method in the postoperative period of time and healthy individuals (N =70)*

	T	Df	P
Quality of life of patients after Needle surgery and healthy people	-0.19	68	0.846522



*Figure 4. Differences in quality of life of patients operated by Needle method in a percentage preative period of time without difficulty with incontinence*

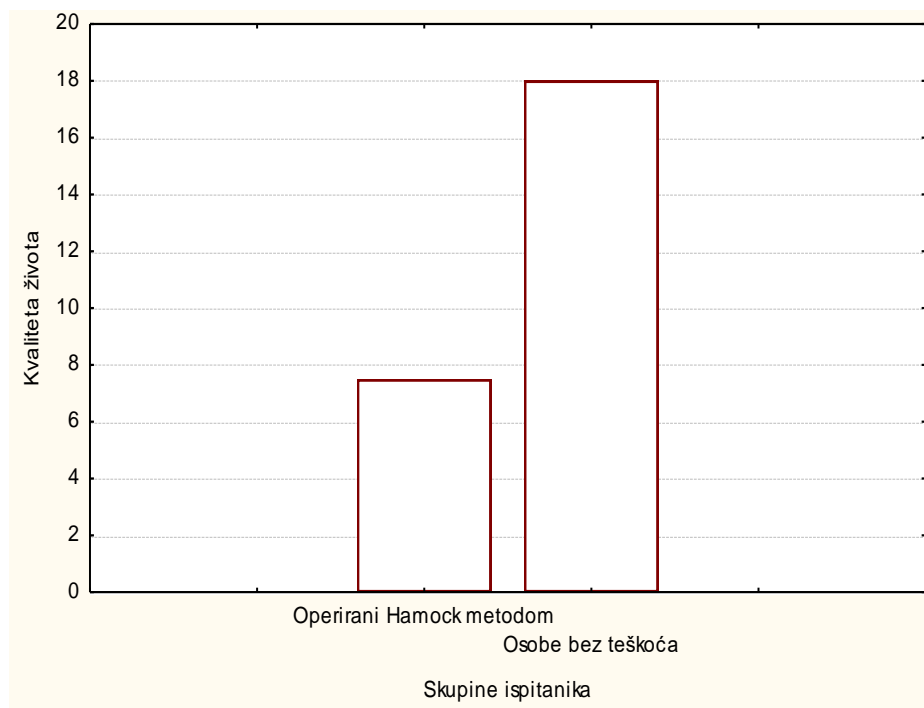
There was no statistically significant difference between the postoperative quality of life of patients operated on the

Needle method and healthy individuals. Thus, both groups of respondents give similar assessments of the quality of life.

*Table 6. Testing the significance of the difference in the quality of life of patients operated by the Hammock method in the postoperative period of time and people without difficulty with incontinence (N =70)*

	T	Df	P
Quality of life of patients after Hammock surgery and healthy people	8.88	68	0.000000*

\*significance at  $p < 0.05$  level



*Figure 5. Differences in the quality of life of patients operated on hammck in postoperative time and healthy individuals*

A statistically significant difference was found between the postoperative quality of life of patients operated on hammock method and healthy individuals. Patients operated on the Hammock method postoperatively reported a lower quality of life compared to healthy individuals.

## DISCUSSION

With this study, we found that patients operated on the Needle method after surgery reported a better quality of life compared to patients who underwent Hammock surgery. The average of the participants in this study is uniform and

there is no significant age difference compared to the study groups, and is similar to the age of the participants with the studies conducted so far.

Given that a very small number of publications reporting on medium and long-term outcomes of patients with Stress Urinary Incontinence, the analysis and discussion of the results of this study is limited. By analyzing the data obtained by the ICIQ -SF questionnaire, it was found that there was no significant difference between patients of the test and control groups due to the frequency of urinary escape, the amount of urine, and the degree of discomfort of patients due to urinary escape. This research has proven that the outcomes of treatment of patients treated with surgery "Hammock" and "Needle" suspension surgery, are not due to differences in health fitness of patients, which, since there are a whole range of methods for the treatment of stress urinary incontinence in women, an ideal surgical technique that would be effective, more economical, easy to learn and perform, with more durable effectiveness, minimally invasive and without long-term morbidity and functional the consequence, still does not exist (11, 12).

The analysis of the results confirms that there is a significant statistical difference in the overall score of the questionnaire as well

as in the quality of life due to the time period of filling out the questionnaire before and after the operation. For both groups of patients, those treated with the "Hammock" method and those with the "Needle" suspension method, it was characteristic that the subjects assessed the quality of their own life after surgery significantly higher compared to the period before the surgical procedure. By processing the results, it was also found that there is a statistically significant difference in the quality of life of patients after surgery in the function of the method by which they were operated (Hammock or Needle method). Analyses of the measures used in our study showed that ICIQ-UI SF showed high correlation coefficients with outcome measures.

This study found that the "Hammock" method also achieves a better quality of life, but still somewhat worse compared to a healthy population. This speaks in favor of successful treatment, which is in accordance with the set research criteria in scoring the success of treatment. Treatment results in both surgical methods show excellent short-term cure results, without severe complications. This fact is important to us, because it could draw a hypothesis for a long-term assessment of the results that would suggest that patients operated on "Needle" suspension surgery are likely to have better long-term treatment results, and

therefore a better quality of life than patients operated on the "Hammock" surgical method. There is currently an intensive debate at various professional levels about the use of meshes in transvaginal operations. The occurrence of unwanted allergic reactions to materials, changes in mesh positions after long-term monitoring, damage to the urethra, are mainly a topic of discussion whether to use nets at all in these procedures (13).

Limitations of this study could be the size of the sample of female subjects and short follow-up times. Also, a possible extension of the exclusion criteria would lead to a better analysis of the results. In addition, it should be noted that data on similar research on this topic are not available in Southeast Europe, which partly made it impossible to compare the results obtained more specifically. However, this study found that patients operated on the Needle method reported a better quality of life after surgery compared to patients who underwent Hammock surgery.

## CONCLUSION

Both groups of patients assessed significantly higher quality of life after surgical treatment. The analysis of the results did not reveal a statistically significant difference in the quality of life of

the control group of women and the group operated by the Needle suspension method. A group of patients operated on the Hammock method reported a lower quality of life compared to the control group of healthy women.

Comparing both groups of patients, it is concluded that a group of patients operated on the Needle method have a better quality of life compared to patients operated by the Hammock method, 6 months after surgery.

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## KVALITETA ŽIVOTA BOLESNIKA SA STRESNOM URINARNOM INKONTINENCIJOM LIJEČENA DVJEMA KIRURŠKIM METODAMA: RANDOMIZIRANOM KONTROLIRANOM STUDIJOM

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### SAŽETAK

Uvod: Statička ili stresna urinarna inkontinencija neupitno kod žena ima značajan negativan utjecaj na kvalitetu života. Kirurško liječenje je standardni način liječenja žena sa statičnom stresnom inkontinencijom, ako se željeni učinak ne postigne konzervativnom metodom liječenja.

Ciljevi: Usporediti kvalitetu života skupine bolesnika sa stresnom urinarnom inkontinencijom kirurški liječenom Hammock metodom s grupom liječenom iglom metodom, te usporediti rezultate s kvalitetom života zdrave populacije žena.

Metode: Studija je koristila preporučeni upitnik iz Međunarodnog savjetovanja o inkontinenciji, kratki upitnik ICIQ- SF. Ovaj upitnik korišten je za prikupljanje podataka o simptomatologiji, učestalosti, količini urina i utjecaju na kvalitetu života prije i nakon kirurškog liječenja.

Rezultati: Utvrđena je statistički značajna razlika ( $p < 0,05$ ) u poboljšanju kvalitete života pacijenata operiranih metodom igle, značajno veća nakon operacije. Također je utvrđeno da postoji statistički značajna razlika ( $p < 0,05$ ) u poboljšanju kvalitete života i u bolesnika operiranih Hammock metodom. Pacijenti koji su podvrgnuti operaciji igle izvijestili su o boljoj kvaliteti života nakon operacije, u usporedbi s pacijentima koji su podvrgnuti operaciji viseće mreže. Nije pronađena statistički značajna razlika ( $p > 0,05$ ) između postoperativne kvalitete života pacijenata operiranih metodom igle i osoba bez poteškoća s inkontinencijom.

Zaključak: Rezultati istraživanja pokazali su da je metoda igle učinkovitija u poboljšanju kvalitete života bolesnika sa stresnom urinarnom inkontinencijom 6 mjeseci nakon operacije.

**Ključne riječi:** stresna inkontinencija, kvaliteta života, kirurške metode

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## THEORETICAL KNOWLEDGE OF PHYSIOTHERAPISTS ABOUT GERONTOLOGY

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### ABSTRACT

**Introduction:** Because population aging is a global issue, healthcare practitioners should be educated in gerontology and work with senior patients. People in their third decade encounter new health challenges, which must be addressed adequately.

**Objective:** To examine the knowledge of physiotherapists about gerontology.

**Subjects and methods:** The research was conducted in August 2023. A questionnaire on general characteristics and a Knowledge Test questionnaire on aging and old age were used to collect data. The sample of respondents consists of 80 employed physiotherapists from Bosnia and Herzegovina. Data processing was performed using Google Forms and Microsoft Office Excel.

**Results:** The average respondent correctly answered 70.31 % of the questions. They had almost the same amount of right answers regardless of whether they had difficulty working with elderly patients or were familiar with active aging programs. The majority of physiotherapists (96.30 %) agree that gerontology should be discussed more in education and that a one-day gerontology workshop would improve the quality of their work with elderly patients (90.00 %).

**Conclusion:** Physiotherapists who participated in the research showed on average, relatively good level of knowledge in the field of gerontology, but there is room for improvement through a workshop in this field, which most respondents agree would improve their work.

**Keywords:** geriatrics, knowledge, attitude, physical therapists

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## INTRODUCTION

Population aging is a global problem. Healthcare professionals need to be more involved in the care of elderly patients because there are more elderly patients with multiple complex disorders with or without disabilities (1). Aging is a progressive and irreversible pathological process. It is characterized by a decline in tissue and cell function as well as a large rise in the risk of many age-related diseases such as neurodegenerative diseases, cardiovascular diseases, metabolic disorders, musculoskeletal diseases, and immune system diseases (2). Aging is connected to a progressive and widespread decrease in muscular mass and strength. However, there are considerable interindividual differences in muscle mass and strength gained throughout childhood, as well as the rate of decline in muscle mass and strength in maturity and old age. This explains the disparities in residual muscle mass and muscle strength across elderly people (3). Urinary incontinence is regarded as one of the most serious geriatric disorders due to its prevalence. It is a disease that causes psychological changes and significant challenges, mostly in terms of decreased quality of life, sadness, shame, social isolation, and physical issues such as incontinence-related dermatitis and urinary

tract infections. In addition, it threatens the autonomy of the affected person, with a greater need for institutionalization, maintenance of caregivers at home, and longer hospital stays (4).

It is critical to prevent rising handicaps in later life, and this begins far earlier than care for the elderly. Geriatrics is concerned with keeping the ever-increasing number of elderly individuals as autonomous as feasible (5). The final stage of people's lives in aging societies is dramatically altering, affecting standard care provisions in geriatric medicine and palliative care. Both professions must work closely together, and geriatric palliative care should be thought of as an interdisciplinary field of care based on the synergy of ethics and these two cares (6). Communication is a crucial aspect of palliative care, with the goals of reducing ambiguity, improving relationships, and providing guidance to the patient and his family (7). As we face an aging society, identifying solutions to deal with the issues of aging is a vital endeavor. External factors such as nutrition, exercise, and pharmacological therapy are critical in controlling healthy aging and extending life (8).

In light of the current development of lifelong learning, the area of gerontology, or the education of older people, is gaining prominence and steadily increasing as a

specialized academic field. As such, it demonstrates the significance of active caring in modern European society (9). The World Health Organization has identified its key goals as supporting the planning and implementation of elderly activity programs, collecting better general data and promoting research on healthy aging, aligning health systems with the needs of older people, laying the foundations, and securing the human resources required for long-term integrated care (10). Physiotherapists must read and compare published scientific studies to perform evidence-based practice, which is the most significant aspect of modern physiotherapy (11). Active exercise therapy aimed at improving mobility and functionality, counseling on the prevention and treatment of falls, pressure ulcers, urinary incontinence, malnutrition and sarcopenia, overweight, physical limitations, intertrigo, chronic wounds, behavioral and psychological symptoms in dementia, physical inactivity, and ergonomic and behavioral training are all examples of physiotherapy for the elderly (12). Aerobic and anaerobic training can help the elderly people maintain or improve their quality of life, as well as their independence. Walking, gardening and yard work, exercising at home, swimming, and cycling are the most common physical activities among the

elderly people. In addition to daily exercise, it is advised to limit sitting time and get enough sleep. Today, various organizations promote physical activity's health and well-being benefits for people of all ages (13). Physiotherapists carry out a variety of activity programs, one of which is a five-day program that comprises daily individual rigorous exercise with the patient of one or a combination of several distinct essential components of functional performance (14). Additional physiotherapy counseling on activity maintenance during hospitalization in elderly bedridden patients has been proven to be a favorable factor that results in an increase in physical activity and prevents loss of mobility (15).

This paper aims to examine the theoretical knowledge of physiotherapists about aging and old age.

## **SUBJECTS AND METHODS**

The target group of this research was physiotherapists. Inclusion criteria included completed appropriate education in physiotherapy, current work status of an employed physiotherapist, work experience of one year, and age limit of at least 20 years. Exclusion criteria in this research were lack of appropriate education, currently unemployed physiotherapists, lack of work experience, and

physiotherapists under 20 years of age. The sample size of 80 subjects was determined using a statistical calculation that takes into account the level of significance, the power of the study, the expected size effect, and the variability of the data. This analysis ensures that the sample is sufficiently representative and able to detect relevant differences or effects with some confidence. The structure of this research is cross-sectional research. It was conducted in August 2023, by surveying physiotherapists online using a form created in Google Forms. A convenience sample was gathered by presenting a link on social networks.

The measuring instruments that were used in this research are the "Questionnaire on the general characteristics of physiotherapists and their attitudes about gerontology", which was specially constructed for this research, and the questionnaire for checking knowledge about aging and old age "Knowledge test about aging and old age" which is a standardized questionnaire from the Education Institute for Public Health "Dr. Andrija Štampar" on whose website it is also available. "Questionnaire on general characteristics of physiotherapists and their attitudes about gerontology" consists of 13 items, of which 10 questions about characteristics such as gender, age, education, and work experience, and 3

questions about attitudes about the importance of gerontology in education, workshops and work with elderly patients. "Knowledge test about aging and old age" consists of 12 tasks, some of which are correct and some incorrect statements. For each item, respondents should mark "Correct" if they think that statement is true or "False" if they think the statement is false.

### Statistical analysis

The processing of the data collected through a survey of the target group of physiotherapists was carried out using the Google Forms web application and the Microsoft Office Excel computer program. The obtained data were analysed using descriptive statistic methods and they are shown in tables. For the obtained results, if necessary, the number of respondents ( $N$ ), the arithmetic mean ( $AM$ ), the minimum score ( $MIN$ ), the maximum score ( $MAX$ ), and the representation expressed in percentages (%) were calculated. Also, the multiple linear regression and Chi-Square ( $\chi^2$ ) Goodness of Fit methods were used to determine significant difference between two variables. The significance level for all tests is  $p < 0.05$ .

## RESULTS

The research included 80 participants, with slightly more women ( $N=44$ ) than men ( $N=36$ ), none of whom are younger than 20 years, 55.00 % of respondents are 20-29 years old ( $N=44$ ), 25.00 % are 30-39 years old ( $N=20$ ), 11.30 % are 40-49 years old ( $N=9$ ), 6.30 % are 50-59 years old ( $N=5$ ),

and 2.50 % are over 60 years old ( $N=2$ ). The total knowledge of physiotherapists about gerontology, i.e. the average number of correct answers on the knowledge test about aging and old age is approximately 8 ( $AM=8.44$ ) out of a total of 12 questions, which is 70.31 % of the entire test (Table 1).

*Table 1. Knowledge of physiotherapists about aging and old age*

Statements	The correctness of the statement	Number of respondents who answered "True" (%)	Number of respondents who answered "False" (%)	<i>p</i> -value
The number and share of elderly people in the population is rapidly increasing (old people are considered to be over 65 years old), and more women than men live to the age of 85.	True	73 (91.25 %)	7 (8.75 %)	<0.001
The majority of elderly people can independently perform all daily activities.	True	37 (46.25 %)	43 (53.75 %)	0.50
The gerontology center provides non-institutional care to older people in the local community where they live.	True	62 (77.5 %)	18 (22.50 %)	<0.001
Gerontological centers aim to prevent the growing geriatric institutional care and to keep the elderly in the family as long as possible.	True	69 (86.25 %)	11 (13.75 %)	<0.001
Mental abilities regularly decline with age.	False	64 (80.00 %)	16 (20.00 %)	<0.001
Older people should continue with regular physical exercise even in old age.	True	79 (98.75 %)	1 (1.25 %)	<0.001
Most families have abandoned their older members.	False	48 (60.00 %)	32 (40.00 %)	0.07
Extreme cold and heat can be especially dangerous for older people.	True	72 (90.00 %)	8 (10.00 %)	<0.001
If someone smokes for 30-40 years, nothing can be improved by quitting.	False	23 (28.75 %)	57 (71.25 %)	<0.001
In the elderly, there is a decrease in basal metabolism.	True	72 (90.00 %)	8 (10.00 %)	<0.001
Using preventive health measures, it is possible to prevent the occurrence of urinary incontinence in old age.	True	69 (86.25 %)	11 (13.75 %)	<0.001
Elderly people with increasing age should take less medicine, as a rule no more than three medicines a day.	True	37 (46.25 %)	43 (53.75 %)	0.50

Physiotherapists with a high school diploma showed the highest average knowledge in the „Knowledge test about aging and old age“, although there is no significant difference in the average number of correct answers. For the association of education level with an average number of correct answers, *p-values* were calculated using multiple linear regression. The average number of correct answers for physiotherapists with a postgraduate degree is 12, but it was not taken into account

because the number of respondents is 1 and as such cannot form a representative sample. The coefficient of determination is  $R^2=0.07$ , which means that 7.00 % of the results can be explained by the level of education. The relationship between the number of years of work experience and the average number of correct answers is not significant ( $p=0.99$ ), so regardless of the number of years of work experience, physiotherapists have approximately equal knowledge of gerontology (Table 2).

*Table 2. Total knowledge of physiotherapists about aging and old age in relation to general characteristics*

	Number of respondents (%)	Share of correct answers	Average number of correct answers (AM)	MIN and MAX number of correct answers	<i>p-value</i>
<b>Sex</b>					
Male	36 (45.00 %)	74.30 %	8.98	4-12	
Female	44 (55.00 %)	67.04 %	8.04	5-11	
<b>Education</b>					
High school	21 (26.30 %)	71.82 %	8.62	4-12	0.58
Undergraduate Studies	17 (21.20 %)	70.10 %	8.41	4-12	0.81
Graduate Studies	33 (41.30 %)	68.94 %	8.27	5-11	0.97
Postgraduate Studies	1 (1.20 %)	100.00 %	12	12	0.03
Higher School	8 (10.00 %)	68.75 %	8.25	6-10	0.73

The frequency of working with elderly patients can be rarely (less than once a month), periodically (once to twice a month), often (once to twice a week), very often (almost daily), and constantly (every

day). Using multiple linear regression, *p-values* were calculated for each category of frequency of work with elderly patients. It was shown that specific categories are statistically significant, i.e. the categories

„rarely“, „periodically“, and „often“ enter the range of significance. The coefficient of determination is  $R^2=0.09$ , which means that this model explains 9.00 % of the total knowledge about aging and old age. There is no significant difference in the knowledge of physiotherapists about aging and old age, regardless of whether difficulties in working with older patients are present or non-present ( $p=0.75$ ). Knowledge of the active aging program was

confirmed by more than a half of the respondents, but despite this, there is no significant difference in the number of correct answers, which indicates inadequate and superficial knowledge of the program. The relationship between the variable of knowledge of the active aging program and the variable of the average number of correct answers is not significant ( $p=0.16$ ) (Table 3).

*Table 3. Total knowledge of physiotherapists about aging and old age in relation to specific characteristics*

	Number of respondents (%)	Share of correct answers	Average number of correct answers (AM)	MIN and MAX number of correct answers	<i>p</i> -value
Frequency of work with elderly patients					
Rarely	5 (6.30 %)	58.33 %	7	4-9	0.04
Periodically	21 (26.30 %)	71.85 %	8.62	5-11	0.04
Often	13 (16.30 %)	72.43 %	8.69	7-10	0.05
Very often	29 (36.30 %)	68.10 %	8.17	6-12	0.13
Constantly	12 (15.00 %)	75.69 %	9.08	7-12	0.13
Difficulties in working with elderly patients					
Present	35 (43.80 %)	69.76 %	8.37	6-11	
Non-present	45 (56.30 %)	70.74 %	8.49	4-12	
Familiarity with active aging programs					
Present	48 (60.00 %)	72.05 %	8.64	6-12	
Non-present	32 (40.00 %)	67.71 %	8.12	4-10	

Almost all respondents agree that more attention should be paid to gerontology in education. Only 5.00 % of respondents ( $N=4$ ) attended workshops on gerontology or geriatrics outside of the educational

system, while 51.20 % ( $N=41$ ) attended a subject on gerontology or geriatrics as part of their study. Respondents who consider that their knowledge and skills in gerontology are sufficient for quality work



with elderly patients (71.30 %,  $N=57$ ), had an average of one correct answer more on the „Knowledge test about aging and old age“. The difference is significant ( $p=0.014$ ). The vast majority of respondents (90.00 %,  $N=72$ ) believe that a one-day workshop in the field of gerontology would improve the quality of their work with

elderly patients. For the first question the  $\chi^2$  value is 68.45, for the second question the  $\chi^2$  value is 14.45, and for the third question the  $\chi^2$  value is 51.2, which means that there is a significant difference between respondents who answered „Yes“ and those who answered „No“ (Table 4).

*Table 4. Attitudes of physiotherapists regarding education and work with elderly patients*

	Number of respondents (%)	<i>p</i> -value
Do you think that gerontology should be talked about more in the framework of education for physiotherapists?		<0.001
Yes		
No	77 (96.30 %) 3 (3.70 %)	
Do you think that your knowledge and skills in gerontology are sufficient for quality work with elderly patients?		<0.001
Yes		
No	57 (71.30 %) 23 (28.70 %)	
Do you think that a one-day workshop in the field of gerontology would improve the quality of your work with elderly patients?		<0.001
Yes	72 (90.00 %)	
No	8 (10.00 %)	

## DISCUSSION

According to the conducted research, it is concluded that the physiotherapists who participated in the research have average knowledge of aging and old age but that they could enrich their work with patients of

the third age. An additional workshop could be a good solution to this problem for each level of education.

Hobbs et al. in their study, they examined physiotherapy students at three-time points: at the beginning of their clinical internship, 6 months after the clinical internship, and

immediately at the end of their studies. Initial data at the first time point showed that participants' knowledge was inadequate with an average of 43.60 % correct answers. There was a significant increase in knowledge at the second time point of 3.30 % of correct answers which makes 46.90 % and at the third time point of 8.50 % of correct answers which makes 52.10 % (16). Respondents from our research showed overall knowledge about aging and old age with 70.31 % correct answers, which is more than in Hobbs' research. Although the results of our research show that experiential factors do not have a significant effect on knowledge in gerontology, an increase in knowledge with increasing years of work experience is not excluded because the research was conducted at only one measurement point.

According to Tisaj, the research in which the same „Knowledge test about aging and old age“ was used as in our research, Grammar School students had *MIN*=6 to *MAX*=11 correct answers, and medical high school students had *MIN*=5 to *MAX*=12 correct answers out of a total 12 questions (17). The results of our research showed that respondents with completed high school education for physiotherapists had *MIN*=4 to *MAX*=12 correct answers.

In her research, Mijoč states that the most incorrect answers on the knowledge test

were for the statement „Mental abilities regularly decline with age.“, as many as 78.70 % of high school students answered that this statement is „True“, even though this statement is incorrect. Most, or 59.93 %, of the correct answers, were for the statement „Extreme cold and heat can be especially dangerous for older people.“, which is correct (18). Also, in our research, it was shown that the most, or 80 %, incorrect answers by physiotherapists were for the same statement as in the research conducted in Mijoč's research. Most of the correct answers, more precisely 98.75 %, were for the statement „Older people should continue with regular physical exercise even in old age.“.

By including a comprehensive program of active aging in homes for the elderly and infirm people, which includes actions aimed at promoting empowerment, participation, and social openness, it brings many benefits to the elderly (19). As many as 40.00 % of physiotherapists who participated in our research are not familiar with active aging programs.

Physiotherapy in programs for the elderly has great potential for delaying and slowing down the development of chronic diseases that lead to disability. Undergraduate studies, as well as postgraduate studies, should have an appropriate and relevant curriculum that also includes gerontology

(20). Only about half of the physiotherapists, more precisely 51.20 % of the respondents from our research, attended a subject on gerontology or geriatrics within the educational system.

The lack of educators with gerontological knowledge, skills, and necessary attitudes requires great efforts by external and professional bodies and educational institutions to ensure the availability of resources to increase the expertise of educators in gerontology. There is a need for research into the factors that influence the knowledge, abilities, or attitudes of health professionals of various disciplines regarding the elderly and their care (21). Also, only 5.00 % of physiotherapists who participated in our research attended additional education in gerontology.

Educational workshops, according to Vellani et al., can assist in increasing multidisciplinary personnel's awareness of the palliative care approach and comfort in conducting advance care planning discussions with residents, family care partners, and long-term care staff (22). Also, 90.00 % of respondents who participated in our research believe that an educational workshop in the field of gerontology would improve the quality of their work with elderly patients.

Future research should include a larger sample of respondents to achieve more

precise results. It would be desirable to measure knowledge about aging and old age at two points in time, before and after the workshop on gerontology.

## CONCLUSION

Based on the research and findings, it is possible to conclude that physiotherapists' understanding of gerontology is lacking and may be greatly expanded. Most research participants think it should be more spoken about gerontology in school and that a one-day gerontology workshop would improve the quality of their work with elderly patients.

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## TEORIJSKO ZNANJE FIZIOTERAPEUTA O GERONTOLOGIJI

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### SAŽETAK

Uvod: Starenje stanovništva je globalni problem, zbog čega bi zdravstveni djelatnici trebali biti educirani o gerontologiji i o radu s pacijentima starije životne dobi. Osobe treće životne dobi se susreću s novim zdravstvenim problemima i potrebno je brinuti se o njima na adekvatan način.

Cilj: Ispitati teorijsko znanje fizioterapeuta o gerontologiji.

Ispitanici i metode: Istraživanje je provedeno u kolovozu 2023. godine. Za prikupljanje podataka je korišten upitnik o općim karakteristikama i upitnik Test znanja o starenju i starosti. Uzorak ispitanika čine 80 zaposlenih fizioterapeuta iz Bosne i Hercegovine. Obrada podataka izvršena je pomoću Google Forms-a i Microsoft Office Excel-a.

Rezultati: Prosječno, ispitanici su ispravno odgovorili na 70,31 % pitanja. Imali su približno jednak broj točnih odgovora bez obzira imaju li poteškoće u radu s pacijentima u starijoj životnoj dobi i bez obzira jesu li upoznati s programima aktivnog starenja. Većina fizioterapeuta smatra da bi se trebalo više govoriti o gerontologiji u sklopu obrazovanja (96,30 %) i da bi jednodnevna radionica iz područja gerontologije unaprijedila kvalitetu njihovog rada s pacijentima starije životne dobi (90,00 %).

Zaključak: Fizioterapeuti koji su sudjelovali u istraživanju su pokazali prosječno relativno dobar nivo poznavanja područja gerontologije, no postoji prostor za poboljšanje putem radionice iz ovog područja, za koju većina ispitanika se slaže da bi unaprijedila njihov rad.

**Ključne riječi:** gerijatrija, znanje, stavovi, fizioterapeuti

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## THE LENGTH OF BREASTFEEDING: THE ROLE OF PRENATAL EDUCATION AND LISTENING TO CLASSICAL MUSIC

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### ABSTRACT

**Introduction:** The use of music in midwifery is a new research field and further studies and clear evidence are needed to make it a valuable element of midwifery care. The aim of the study was to prove the influence of education of pregnant women and listening to classical music on the frequency and length of breastfeeding at discharge from the maternity hospital and 6 weeks after delivery.

**Subjects and methods:** A prospective randomized controlled study was conducted in 2019. The sample consisted of pregnant women from the area of Hercegbosna County, 198 of them (N=198).

**Results:** No significant difference was found in the frequency of exclusive breastfeeding and feeding with supplementation between the experimental and control groups at discharge (88.9% vs 92.2%). A significantly larger number of subjects in the experimental group were exclusively breastfed compared to the control group after 6 weeks ( $\chi^2=4.541$ ;  $df=1$ ;  $p=0.033$ ).

**Conclusion:** The results indicate that investments in the development of the competencies of pregnant women and the creation of conditions in maternity hospitals can significantly affect the duration of exclusive breastfeeding.

**Keywords:** midwifery education, music therapy, exclusive breastfeeding, puerperium

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## INTRODUCTION

Protection, promotion and support of breastfeeding are public health priorities worldwide (1). Breastfeeding promotion has a strong influence on the initiation and length of breastfeeding (2). During the period from 1930 to 1960, a decrease in the frequency of breastfeeding was observed, and such a tendency was especially pronounced in the USA (The United States of America), where a drop from 80% to 20% of breastfed children discharged from maternity hospitals was recorded (3). According to a UNICEF (United Nations Children's Fund) report published in 2018, global breastfeeding rates vary from 35% in the Middle East and North Africa to 65% in Southern Africa. Only two out of five infants were exclusively breastfed in the first 6 months of life (4). A globally organized action to return to breastfeeding was initiated by the World Health Organization (WHO) and UNICEF (5). The perception of breastfeeding in public is often not stimulating for mothers who want to breastfeed their children, so the discomfort of breastfeeding in public is one of the reasons for avoiding breastfeeding or planning a shorter duration of breastfeeding (6). Research results in the Republic of Croatia show that as many as 50% of mothers give up breastfeeding after the first

month of their child's life, and only 13.4% of children are exclusively breastfed (3). Data on breastfeeding practices in Bosnia and Herzegovina are generally unsatisfying. Only 51.5% of newborns were breastfed for the first time within one hour after birth, while 87.3% of newborns started breastfeeding within one day after birth. A total of 15.1% of children under 6 months of age are exclusively breastfed. With the development of the "Baby Friendly Hospital" accreditation standard by the Federal Agency for Quality and Safety in Healthcare and their application in maternity hospitals, the frequency of exclusive breastfeeding in the Federation of Bosnia and Herzegovina has increased (7, 8). The results of a meta-analysis from 2018 (Mahesh et al.) proved that exclusive breastfeeding is more significant in groups that undergo education, also a lower risk of introducing formula supplementation compared to groups that did not undergo any education. Fathers who are educated provide significant support to their partners during breastfeeding compared to fathers without education (9). A systematic review from 2016 on the topic of breastfeeding education in the period from 1980 to 2015 concluded that health professionals play a key role in educating and informing pregnant women about breastfeeding, and that the education of doctors and midwives



who participate in the education of women should be an obligation of the health system (10). The majority of midwives express a need for a different approach to breastfeeding mothers in which, in addition to technical support, they would have time build a relationship of trust and be more focused on the mother and the child (11). The results of a research conducted by Palac et al. among breastfeeding mothers in the area of the city of Mostar indicate that a small percentage of breastfeeding mothers find support from doctors and nurses/midwives. There is no continuous training of healthcare professionals on breastfeeding (those who provide these services), and the results of the lack of education on breastfeeding are also evident. They found that significantly more breastfeeding mothers have a higher education than non-breastfeeding mothers. The difference in the practice of breastfeeding between employed and unemployed women has not been proven, and women who gave birth by caesarean section also breastfed less. The authors conclude that quality preparation and education before childbirth with support after childbirth would greatly contribute to increasing the prevalence of breastfeeding (12). A research review published from 1883 to 2014 on the topic of group or individual breastfeeding education does not

offer evidence of which type of education is more effective, primarily due to methodological differences and the lack of high-quality studies (13). According to Karaçam, parents in Turkey also experience difficulties with breastfeeding. Of the 6,736 respondents, 24.5% of them believed that there was not enough milk, and damaged and painful nipples were a big problem (14). Breastfeeding rates are also low in Greece, but according to research on primiparous women (N=203) divided into the test and control group (the test group had 4 hours of midwifery education on breastfeeding) proved the effectiveness of education on the length of exclusive breastfeeding (15). In a study on a sample of 522 women with a lower socioeconomic status after randomization, the experimental group was exposed to educational video content about breastfeeding through the third trimester of pregnancy. There was no statistically significant difference between the experimental and control groups when starting the first breastfeeding, nor in the rate of exclusive breastfeeding. It was concluded that women with lower socioeconomic status need to invest more effort and start education earlier (16).

Despite the majority's positive attitude towards the benefits of courses for pregnant women and the often present fear of childbirth, only 20% of pregnant women in

Croatian maternity hospitals decide to attend them (17, 18).

The interaction of music and the psyche has been a phenomenon since ancient times and has been used for healing purposes ever since (19). Although from a historical perspective, science and music represent two completely separate entities, the digital revolution changes that relationship by uniting biology, science and music (20). The potential of music to influence the levels of dopamine, serotonin and oxytocin can lead to positive emotional reactions that are directly related to the strengthening of the psychological status (21). It is to be expected that an emotionally stable breastfeeding mother will have stronger capacities for overcoming difficulties related to breastfeeding and parenting, and will breastfeed longer. The therapeutic effects of listening to music on the health of mother and child have been proven in numerous studies (22, 23). A lower incidence of anxiety and depression in women, a lower perception of pain during childbirth and a higher oxygen saturation in the newborn child were found. Mothers report a better emotional connection with their children, a calming effect and longer breastfeeding. A unique package with selected music is not defined, but the selection is left to the creativity and knowledge of health professionals (22).

A research in Bosnia and Herzegovina on the influence of midwifery education and listening to classical music on the experience of labor pain and psychological health in puerperium found significant differences in measures of psychological health and labor pain between the experimental group (exposed to education and listening to music) and the control group, and points to the conclusion that the combination of music and health sciences represents an open research area, which, by connecting art and the midwifery profession, creates an alternative to the current standard midwifery care (24).

In order for music to be imposed as a valuable element of midwifery care, further research and clear evidence are necessary, and then the introduction of related content into teaching programs. This is confirmed by research from Turkey, in which highly educated midwives (N=142; bachelor's degree 51.2% and master's degree 18.2%) mostly support new forms of midwifery care and consider them important as a form of support for a woman giving birth, but also in puerperium. However, 15.0% of them have never heard of music therapy, 47.1% know the concept of music therapy, while only 16.5% think they have enough information, and it is devastating that no midwives used this method in care (25).

The aim of this research was to prove the influence of education of pregnant women and listening to classical music on the frequency of breastfeeding at the discharge of the mother and 6 weeks after discharge.

## SUBJECTS AND METHODS

### Structure and description of the study

A prospective randomized controlled study was conducted in: County Hospital "Dr fra Mihovil Sučić" Livno, Women's Dispensary of Livno Health Center and Private Gynecology Practice Vrdoljak in Livno, Bosnia and Herzegovina. The time of the research was from January 1, 2019 to October 1, 2019. The research was registered in the clinical trial registry ClinicalTrials.gov under the number NCT04104009.

### Participants

The sample consisted of 198 respondents (N=198), pregnant women from the area of Herceg-Bosnia County. Type of sample: random, pregnant women in the second and third trimesters of pregnancy who gave birth in the maternity ward of the "Dr fra Mihovil Sučić" County Hospital in Livno in the period from mid-February 2019 to mid-August 2019. By randomization, the respondents were divided into: an experimental group in which group education and listening to classical music

was carried out, and a control group that spent the pregnancy without education and listening to classical music. After the end of the training program with the experimental group, there was a break of 5 weeks, during which a new experimental and control group was formed. The procedure was carried out until the expected sample size was met (99 subjects per group).

The inclusion criteria in the research were: all pregnant women from the area of Herceg-Bosnia County who had their pregnancy checked in the competent Health Centers and private gynecology practice.

Exclusion criteria from the research were: minor pregnant women, pregnant women in the first trimester of pregnancy, pregnant women after the 34th week of pregnancy, multiple pregnancies, pregnant women with a history of cesarean section, pregnant women with a psychiatric diagnosis, high-risk pregnancies, incompletely and/or illegibly filled out questionnaires, pregnant women who did not listen to classical music in the agreed way, childbirth with a stillborn child.

### Materials and questionnaire

*Discharge letter of the newborn* - data on the feeding pattern of the newborn on discharge from the maternity hospital were used.

### **A self-structured questionnaire about the infant's diet**

The questionnaire was constructed for research purposes. It contains questions about the method of feeding the infant after 6 weeks, support during breastfeeding, the length of breastfeeding of the previous child, the reason for possible interruption of breastfeeding and the influence on the attitude towards breastfeeding.

The main input data were: age, place of residence, employment status, number of previous births, number of live births, number of spontaneous / intentional abortions, marital status, breastfeeding status in previous pregnancies, educational status, education in previous pregnancies, complications in the current pregnancy and mode of delivery.

Main outcome measures: infant feeding pattern at discharge and infant feeding pattern 6 weeks after discharge.

### **Intervention**

After the randomization procedure, group education of pregnant women was carried out through four meetings. The education program included: psychophysical preparation for childbirth and motherhood, application of listening to classical music that continued until the end of pregnancy every day (in the evening hours before bedtime, for 15 minutes), and teaching and

application of techniques for successful breastfeeding. At the end of the program, the educator arranged a weekly check-up by phone with the test subjects (for the sake of communication quality) with the aim of informing them about compliance with the agreed upon listening to classical music. Any (non) compliance was reported in a record specifically intended for the needs of the research. Pregnant women who did not fulfill the agreed plan were excluded from the research. The respondents agreed to send a self-structured questionnaire about the infant's diet to the given email addresses after 6 weeks of discharge from the maternity hospital. All vagueness are further clarified in special emails or by exchanging messages via the free messaging applications Viber Messenger/WhatsApp Messenger. Each respondent who did not respond to the questionnaire within a week was asked again via email. The waiting time for a response has been extended from one to two weeks. If no answer was received even then, the respondents were excluded from the research.

### **Statistical data processing**

Data were collected in an MS Excel database (version 11. Microsoft Corporation, Redmond, WA, USA), and SPSS 20.0 statistical program (IBM Corp.,

Armonk, NY, USA) was used for statistical analysis. Data were processed using descriptive statistics methods, categorical variables were presented as frequency and percentage, while continuous variables were presented as arithmetic mean and standard deviation. Chi-square test was used to analyze differences between categorical variables, while t-test for independent samples was used to analyze differences between continuous variables. The association between risk factors was examined by Pearson's correlation coefficient. A probability level of  $p < 0.05$  was taken as statistically significant.

### Research ethics approval

The research was reported to the competent Ethics Commissions of the County Hospital "Dr Fra Mihovil Sučić" Livno (the Ethics Commission is shared by the County Hospital "Dr Fra Mihovil Sučić", The Livno Health Center and the Institute of Public Health of Hereceg - Bosnian County) and the Faculty of Health Studies in Mostar.

## RESULTS

### The Sample

The final sample included in the data analysis consisted of 175 respondents ( $N=175$ ). Of these, there were 85 subjects of the experimental group (48.6%) who underwent group education and listened to

classical music until the end of pregnancy, and subjects of the control group who had usual care, a total of 90 of them (51.4%), average age 31,1 year (min=20; max=47;  $SD=5.262$ ). No significant difference in age was found between the subjects of the control group ( $M=30.9$ ;  $SD=5.374$ ) and the experimental group ( $M=31.4$ ;  $SD=5.160$ ), ( $t=-0.627$ ;  $df=173$ ;  $p=0.531$ ). No significant differences were found in the number of examined women from the control and experimental groups who live in the city or in the village ( $\chi^2=0.455$ ;  $df=1$ ;  $p=0.500$ ). Most of the respondents were married (94.9%), while in the total sample there were 6 (3.4%) unmarried and 3 (1.7%) divorced pregnant women. No significant differences were found in the number of married women in the control and experimental groups, nor in the distribution of respondents in the groups with regard to work status ( $\chi^2=1.996$ ;  $df=1$ ;  $p=0.158$ ). There was no significant difference in terms of educational status between the observed groups. The largest number of respondents in both groups were primiparous women ( $N=66$ ;  $M=28.92$ ;  $SD=5.124$ ) and they were significantly younger than the other respondents ( $F=9.312$ ;  $df=4$ ;  $p<0.001$ ). The lowest percentage of mothers in both groups had four live births. The largest percentage of mothers who exclusively breastfeed have completed high school, while the largest

percentage of mothers who breastfeed with formula supplementation have completed a university degree. In the group of mothers who do not breastfeed, not a single mother has completed a university degree, nor has she completed only elementary school.

The majority of mothers in all three groups with regard to breastfeeding were employed. Most of the mothers in all three groups were primiparous women. The majority of women in the exclusively breastfeeding or non-breastfeeding groups gave birth vaginally, while the majority of women in the supplemental breastfeeding group gave birth by caesarean section.

Statistically significant differences weren't found between the control and experimental

group in the number of respondents who used formula supplementation or exclusively breastfed in the earlier pregnancies ( $\chi^2=1.11$ ;  $df=2$ ;  $p=0.574$ ). In those cases, a significant percentage of the childbearing mothers that didn't breastfed were primiparas. Of the 70 respondents who reported not breastfeeding, 66 were primiparas, while four respondents from the experimental group (multiparas) didn't breastfeed in earlier pregnancies. A statistically significant difference wasn't found between the control and experimental group in the number of respondents regarding breastfeeding length in earlier pregnancies ( $\chi^2=8.087$ ;  $df=4$ ;  $p=0.088$ ) (Table 1).

Table 1. *Number of live births of mothers who (do not) breastfeed their children or breastfeed them with formula supplementation*

	exclusive breastfeeding		breastfeeding with formula supplementation		do not breastfeed at all	
	N	%	N	%	N	%
0	45	31,3	19	73.1	2	40.0
1	43	29,9	4	15.4	1	20.0
2	40	27,8	3	11.5	1	20.0
3	12	8,3				
4	4	2,8			1	20.0

### Frequency of exclusive breastfeeding

There was no statistically significant difference in the frequency of exclusive breastfeeding and feeding with supplementation in the control and

experimental group during the release from the hospital. In both groups, a higher percentage of respondents exclusively breastfed while leaving the hospital (Table 2).

Table 2. *The frequency of exclusive breastfeeding and breastfeeding with supplementation in the control and experimental group during the release from the hospital*

	control		experimental		$\chi^2$	df	P
	N	%	N	%			
exclusive	80	88.9	79	92.9	0.1	1	0.705
supplement	7	7.8	5	5.9	3		
no breastfeeding	3	3.3	1	1.2			

There were statistically significant differences in the frequency of exclusive breastfeeding and feeding with supplementation in the control and experimental group six weeks after giving birth. A statistically higher number of

respondents in the experimental group breastfed exclusively, while a higher number of respondents in the control group breastfed and used supplements compared with the experimental group (Table 3).

Table 3. *The frequency of exclusive breastfeeding and breastfeeding with supplementation in the control and experimental group, six weeks after giving birth*

	control		experimental		$\chi^2$	df	P
	N	%	N	%			
exclusive	67	74.4	77	90.6	4.541	1	0.033*
supplement	19	21.1	7	8.2			
no breastfeeding	4	4.5	1	1.2			

### The reason for breastfeeding termination

There wasn't a statistically significant difference between the control and experimental group regarding their most frequent support person for breastfeeding ( $\chi^2=8.217$ ;  $df=5$ ;  $p=0.147$ ).

A statistically higher number of respondents in the experimental group

exclusively breastfed their babies ( $\chi^2=7.816$ ;  $p=0.005$ ), while a statistically higher number of respondents in the control group reported the reason for breastfeeding termination was the lack of milk ( $\chi^2=10.212$ ;  $p=0.001$ ). Because some expected frequencies are lower than 5, it wasn't justifiable to inspect differences in the number of other reported breastfeeding termination reasons (Table 4).

Table 4. *The most frequent reasons for breastfeeding termination in the control and experimental groups*

	control		experimental		$\chi^2$	Df	p
	N	%	N	%			
I'm breastfeeding.	67	74.4	77	90.6	10.583	1	0.001*
I had believed I didn't have enough milk.	15	16.7	2	2.4			
Painful and damaged nipples	5	5.6	3	3.5			
I felt restless and exhausted.	3	3.3	2	2.4			
I didn't have enough support during breastfeeding.			1	1.2			

Respondents in the experimental group more frequently reported that nurses/midwives had a greatest influence on their breastfeeding attitudes ( $\chi^2=17.371$ ;  $p<0.001$ ), while respondents from the control group more frequently reported that partners ( $\chi^2=3.874$ ;  $p=0.049$ ) and personal experiences ( $\chi^2=4.28$ ;  $p=0.039$ ) had the greatest influence of their breastfeeding

attitude (Table 5). There were no statistically significant differences between the control and experimental group in the number of respondents who reported that their greatest influence on breastfeeding attitudes was a physician ( $\chi^2=2.155$ ;  $p=0.146$ ), mothers ( $\chi^2=0.175$ ;  $p=0.676$ ), and friends ( $\chi^2=1.405$ ;  $p=0.236$ ).



Table 5. *The biggest influence on attitudes toward breastfeeding in the control and experimental group*

	control		Experimental		$\chi^2$	Df	p
	N	%	N	%			
nurse/midwife	9	10.0	31	36.5	23.476	5	<0.001
physician	11	12.2	5	5.9			
media	3	3.3					
partner	18	20.0	8	9.4			
mother	17	18.9	14	16.5			
personal experience	20	22.2	9	10.6			
friend	12	13.3	17	20.0			
other			1	1.2			

## DISCUSSION

The results of this research show that there is an influence of midwifery education and listening to classical music during pregnancy on the length of breastfeeding in the midwifery, but the intervention had no significant impact on the frequency of breastfeeding at discharge from the maternity hospital. The high frequency of exclusive breastfeeding in both groups during the release is probably a consequence of a focused accreditation of the maternity ward in which the study was conducted. The implementation of the standards needed to gain the status of an accredited maternity hospital assumes the following: the presence of educational materials in places available to pregnant women and mothers, the joint stay of mother and child from birth to discharge

from the hospital (unless medically indicated differently), the „skin to skin“ contact after birth, the first feeding achieved during the first hour after birth or as soon as possible, not using the bottles and pacifiers. Similar findings come from the study that examined midwife practices in the hospital in South London from 1997 to 2009, in which 2568 women were taken care of, including women with risk pregnancies (26). Statistically significant differences were found between the control and experimental group in the frequency of breastfeeding, six weeks after giving birth. Breastfeeding with supplementation was significantly more frequent in the control group compared to the experimental group. After 6 weeks, respondents with a completed higher education gave up exclusive breastfeeding somewhat more often compared to other respondents, but no

significant difference was found. Contrary to our results, studies that included breastfeeding women from Mostar (12) and Split (27) found that more women who breastfed exclusively had a higher degree of education. The fear of losing a job in the group of women with higher degrees of education and who were employed could be a possible factor in giving up on breastfeeding. Giving birth through Cesarean section didn't appear to be a significant predictor of giving up on exclusive breastfeeding six weeks after birthing. There was an equal frequency of giving up on exclusive breastfeeding in both groups - respondents who had a vaginal birth and those who had a Cesarean section. In a Canadian study (N=3021, singleton pregnancies), significant roles of educational status and the method of birth were found. More breastfeeding difficulties had women who delivered via Cesarean section; more women who asked for a Cesarean section and those with lower educational degrees gave up on breastfeeding earlier. Isik Y et al., in a sample of 169 women, found that a Cesarean section was a significant factor related to breastfeeding termination.

Six weeks after giving birth, one-third of the primiparas breastfed exclusively. Being a primipara could be regarded as a risk factor for breastfeeding termination. A study

conducted in Jordanian health centers showed that primiparas also gave up on breastfeeding faster than multiparas. Antenatal education implementation for primiparas wasn't successful because only 36 of 107 women finished their education. Their absence was justified by the transportation impossibilities, husbands' disapproval, and their dissatisfaction with education. The real problem was the indifference to education (30).

Being a multipara in this study was a factor that was connected to exclusive breastfeeding in the puerperium. Primiparas in our study were significantly younger than other respondents, and they had the highest rate of breastfeeding termination after six weeks. That leads to conclusion that being a primipara and the age of respondents were a significant factors for exclusive breastfeeding termination.

For the respondents in the control group, primary support systems for breastfeeding were husbands and friends; for the respondents in the experimental group, primary support systems were husbands, family, and friends, but there wasn't a statistically significant difference between the groups. Given the high rate of giving up on exclusive breastfeeding in the control group, it is questionable if the impact of husbands and friends can be regarded as

support. The need to include fathers in future programs of pregnancy education is evident. Also, a more active public health promotion of breastfeeding is needed to support future mothers. A systematic review of research from 1990 to 2005, which examined breastfeeding support, concluded that women were more satisfied with their social support than their professional support and regarded it as more important. Also, they expressed dissatisfaction with the health system (unavailability of medical workers, opposite advice, the experience of a hospital as a public place, and time pressure) (31).

The biggest influences on breastfeeding attitudes in the control group in this study were partners and own experience. That certifies the belief that including partners is significant because their opinion can shape a partner's opinion, and inclusion leads to acquiring the necessary knowledge. In two parallel studies, conducted on 97 pairs, the impact of the mother's perception of the quality of partners' support on the length of breastfeeding and the intention to breastfeed was confirmed. In the experimental group, more than one-third of respondents stated that significant support in shaping their attitudes about breastfeeding was a midwife, unlike the respondents in the control group, who most frequently reported that partners and

personal experience were a major influence. Knowledge acquired through education impacted the respondents' habit of seeking advice - they asked for help from health professionals. It also impacted their self-confidence to persist in exclusive breastfeeding. Most respondents from the control group that gave up on exclusive breastfeeding reported that the reason for giving up was their belief that they didn't have enough milk. That finding supports the need for educating the entire community, given that the respondents' attitudes in the control study were shaped by partners, family, and friends more than by midwives, compared to the experimental group, where respondents' attitudes were mostly shaped by midwives. Besides the education, the experimental group listened to classical music till the end of pregnancy. The impact of classical music was evident even in the milk composition. The milk of mothers who listened to classical music during breast milk expression expressed more milk that contained a higher proportion of fat compared to the milk of mothers who breast pumped without listening to classical music. Evidence comes from a study that examined 162 mothers of prematurely born babies (33). A study of 94 mothers divided into two groups also showed a higher frequency of breastfeeding during the hospital leave in the group that listened to

classical music. The difference was clinically but not statistically significant 60 days after leaving the hospital (34). The potential of listening to music in midwifery care is a field that hasn't been well researched. That is evident in a systematic review (2016) about different methods for milk production, which doesn't even mention the use of music (35). Nevertheless, there are reasonable expectations that music will impose a simple, efficient part of midwifery care. Another proof of that point comes from Duzgun and Ozer's systematic review from 2021 (that includes a 2081 randomized study), which shows that music significantly improves milk production. During this study, most respondents reported they listened to Mozart, while the smaller group reported listening to various musicians (Beethoven, Mozart, and Christian instrumental music). For now, there isn't much research on the musical impact on human behavior, but it is known that music impacts animals – it lowers the cortisol level and increases oxytocin levels. Oxytocin is a significant factor in establishing mutual connectedness (36). There are 2 shortcomings in the methodology of this research. Forming several groups, each of which would listen to different artists, would provide better evidence on the influence of a certain type

of music on the length of breastfeeding. By separating the interventions (music and education), it would be possible to conclude which one brings more benefits in midwifery care and which would be a significant professional and scientific contribution of the research.

## CONCLUSION

This research proved the impact of midwifery education and listening to classical music in pregnancy on the length of breastfeeding. A statistically significant difference was found in the frequency of exclusive breastfeeding six weeks after giving birth between the experimental (90.6%) and the control group (74.4%). Statistically significant differences weren't found between the control and experimental group in the frequency of exclusive breastfeeding and feeding with supplementation during the release from the hospital. A higher rate of giving up on exclusive breastfeeding was among respondents with a higher degree of education. Being a primipara and the lower age of respondents were important factors in giving up on exclusive breastfeeding. A method of birth wasn't a statistically significant factor for breastfeeding in this research. Respondents from the experimental group reported that nurses/midwives had the highest impact on

their attitude about breastfeeding, while respondents from the control study more often reported that their partner and their own experience had the highest impact on their breastfeeding attitudes.

Results indicate that the investment in mothers' competencies and making conditions for implementing those competencies in their work can significantly influence the length of exclusive breastfeeding, and, consequently the motherhood experience. The implementation of music in midwifery is a new research field, but further studies and clear evidence are needed for it to become a valuable element of midwifery care.

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## DULJINA DOJENJA: ULOGA PRENATALNE EDUKACIJE I SLUŠANJA KLASIČNE GLAZBE

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### SAŽETAK

Uvod: Primjena glazbe u primaljstvu je novo istraživačko polje i potrebne su daljnje studije i jasni dokazi kako bi postala vrijedan element primaljske skrbi. Cilj rada je bio dokazati utjecaj edukacije trudnica i slušanja klasične glazbe na učestalost i duljinu dojenja na otpustu iz rodilišta i 6 tjedana nakon porođaja.

Ispitanici i metode: Prospektivno randomizirano kontrolirano istraživanje je provedeno 2019. Godine. Uzorak su sačinjavale trudnice s područja Hercegbosanske županije, njih 198 (N=198). Rezultati: Nije utvrđena značajna razlika u učestalosti isključivog dojenja i nadohrane između ispitivane i kontrolne skupine pri otpustu (88.9 % vs 92.2 %). Značajno veći broj ispitanica u ispitivanoj skupini su isključivo dojile u odnosu na kontrolnu skupinu nakon 6 tjedana od ( $\chi^2=4,541$ ;  $df=1$ ;  $p=0,033$ ).

Zaključak: Rezultati upućuju kako ulaganja u razvoj kompetencija trudnica i stvaranje uvjeta u rodilištima mogu značajno utjecati na duljinu trajanja isključivog dojenja.

**Ključne riječi:** primaljska edukacija, muzikoterapija, isključivo dojenje, babinje

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## A REVIEW OF TEACHING STRATEGIES FOR ENGLISH AS A FOREIGN LANGUAGE IN HEALTHCARE STUDIES

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### ABSTRACT

Teachers of English as a foreign language are faced with difficulties in selecting the proper teaching strategy for students learning English for academic and professional purposes. Fifteen research studies were included in the current study on teaching strategies for students with English as a foreign language in healthcare studies. The objective is to determine the most useful and effective teaching strategies for healthcare students learning English as a foreign language. The review study was conducted using Noblit and Hare metathesis and Dearholt and Dang's Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines for evaluation, selection and analysis. Language teaching strategies play an important role in teaching English as a foreign language especially in specific professional environments such as healthcare and medicine. The study divides language teaching strategies for English in healthcare into two perspectives; those concerned with improving students' language learning performance and those examining specific instruction strategies and their effects on students' knowledge. Further it gives an outline of four general English language skills and most commonly used teaching strategies. The results of the study may be used by English language teachers and content creators for developing new teaching materials and courses to help students succeed. For healthcare as a profession, a future with newly educated professional who have skills in English and other foreign languages will be beneficial in helping their target population.

**Key words:** teaching strategies, healthcare studies, EFL, nursing, medical English

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## BACKGROUND

English has become the central language of medicine and healthcare, both in academia and work environments. The need for speaking English as a foreign language is an indispensable skill in today's education of medical professionals but also in everyday communication with patients. Due to the content and degree of knowledge these students acquire during their studies, keeping their focus on learning English for professional purposes is challenging. The teacher has to find new and innovative teaching strategies to motivate and aid students in learning the target language.

English language skills are divided into four categories: reading, listening, speaking, and writing. In order to succeed in a healthcare environment, students must be competent in each of these categories. It is even more difficult in the medical field, since the students not only must be proficient in general English, but they also must learn medical terminology, almost a second language in itself (1). It has been reported that the level of medical English used in lectures, textbooks and journal articles has been increasing steadily (2). There is an increasing growth in the development of English for Specific Purposes (ESP) courses worldwide. The content and aims of these types of courses are oriented towards

learners' professional needs, they address the language, skills, and genres applicable to the specific tasks learners need to fulfil in English (3). A major focus in ESP are medical/healthcare professionals, due to their professional and educational need to read, write and communicate in English. ESP courses prepare students for reading academic papers, accessing the latest health information delivered in English, attending international conferences, collaborating with international colleagues, and treating international patients (4). So far, most of the research on teaching strategies in English for Specific Purposes, such as healthcare and medicine, has been focused on English as a Second Language (ESL) learners, and not on English as a Foreign Language (EFL) learners.

The purpose of this literature review is to establish which strategies are most effective in teaching English as a foreign language for healthcare students at the Faculty of Health Studies. This review will examine the strategies for teaching English as a foreign language at bachelor studies at the Faculty of Health Studies in Mostar. The Faculty of Health Studies offers bachelor degrees in nursing, physiotherapy, radiologic technology, sanitary engineering, and midwifery. According to the study curricula, all of the above mentioned studies have English as a

compulsory course for two or three years of the bachelor programme. The review study will draw suggestions on teaching strategies for English language teachers in this specific field, but also become a useful resource for textbook developers and educational institutions in the advancement of their current study programmes. Another motivation for this type of study is the challenges foreign language teachers meet at university studies where students are thought English for Specific Purposes. Professional medical English consists of terminology and constructions specific for this field of study and it is something most students have not encountered before during their previous education. This is an additional burden for foreign language teachers who have not been educated for work in these specific environments, and are in need of proper and clear recommendations in terms of teaching strategies.

The review of literature will include the following, we will conduct a comprehensive search of databases PubMed, Science Direct, and Google Scholar. These databases were searched for the period of the 21<sup>st</sup> century, from 2000 to 2023. This range was chosen because it allowed for a sufficient number of articles to be reviewed. The search for keywords included the following: medical English,

teaching strategies, instruction strategies, EFL (English as a Foreign Language), ESOL (English for speakers of other languages), and ESP (English for Specific Purposes). In addition to EFL and ESP we have included another term with synonymous meaning, ESOL. English for speakers of other languages (ESOL) is designed for students whose native language is not English and who want to increase their English language skills for a specific career.

#### **Criteria for evaluating and selecting research studies**

The following criteria was used for evaluating and selecting research studies:

1. An adapted meta-ethnographic approach of Noblit and Hare
2. Dearholt and Dang's Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines

An adapted Noblit and Hare's seven-step process for conducting a meta ethnography was employed: getting started; deciding what is relevant to the initial interest; reading the studies; determining how the studies are related; translating the studies into one another; synthesising translations; and expressing the synthesis (5). According to Britten and associates this is perhaps the most well-developed method for

synthesising qualitative data, and one that clearly has origins in the interpretive paradigm from which most methods of primary qualitative research evolved (6). Dearholt and Dang's Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines was used to evaluate the level of evidence associated with each study selected. The level indicated how strong the evidence was based on the chosen research method, and quality indicated how well the individual study was conducted. The model lists three levels of strength of evidence. It labels randomized control studies as level I evidence, quasi-experimental studies as

level II, and non-experimental studies as level III (7).

#### **Number and types of studies included in the review**

A total of fourteen studies were included in the current review. The range of retrieved studies is from 2011 to 2023, there were no studies found before 2011 which shows that there is a lack of research on teaching strategies in EFL, and this now contemporary subject needs further study. According to the Evidence-Based Practice rating system, there were four level I studies and ten level II studies retrieved from the comprehensive search.

*Table 1. – General characteristics of studies*

<i>Authors</i>	<i>Study design</i>	<i>Data collection</i>	<i>Sample size</i>
<i>Suliman &amp; Tadros (2011)</i>	descriptive repeated-measure	questionnaire	78 participants
<i>Chang, Chan, &amp; Siren (2013)</i>	quasi-experimental approach	intervention, role-play	101 participants
<i>Tai, Pan, &amp; Lee (2015)</i>	single-group experimental study	Demographic variables, The SRCT, The CSQ, TD, Ethical Considerations	51 participants
<i>Hashemi &amp; Hadavi (2015)</i>	quasi-experimental	questionnaire	185 participants
<i>Zhang, Zhang, Cao, Zhu, &amp; Yang (2023)</i>	quasi-experimental	The Course Interest Survey, the Utrecht Work Engagement Scale, midterm and final examination scores	229 participants
<i>Riahipour &amp; Saba (2012)</i>	single-group experimental study	Nelson test, 2 test, questionnaire	40 participants
<i>Rachayon &amp; Soontornwipast (2019)</i>	single-group experimental study	pre-test, post-test	23 participants
<i>Atai &amp; Taherkhani (2018)</i>	experimental research	questionnaire, observations, semi-structured interviews, and field notes	308 participants
<i>Su, Tsai, &amp; Tai (2022)</i>	action research	pre-, mid-, and post-tests, course satisfaction questionnaire	49 participants
<i>Kadoyama (2015)</i>	experiment, pilot study	teaching sessions, listening test, questionnaire	29 participants
<i>Chan (2014)</i>	quasi-experimental	questionnaires, group interviews, diaries, pre- and post-tests, class observations	59 participants
<i>Moradimokhles &amp; Hwang (2020)</i>	experimental research	pre-test, post-test	60 participants
<i>Huertas &amp; Rojas (2014)</i>	qualitative, mixed-methods research	pre-post course writing task, self-evaluation, self-efficacy, pre-post course interview, video recordings, online repository	38 participants
<i>Brown (2013)</i>	experimental research	survey, tests	78 participants

## ANALYSIS

Table 1 shows general information on retrieved studies and it mostly assisted during rating within the Evidence-Based Practice system. The fourteen selected studies were labelled as directly comparable as they all consisted of themes and questions of similar interest, as listed in Table 2. According to the analysis, articles

in this review can be divided into two general categories. Studies that focus on teaching strategies that improve learning performance, and those focusing on examining specific instruction strategies and their effects. Within these two general categories we can further divide the studies according to language skill; writing, listening, reading, and speaking (communicative skills).

*Table 2 – Results, themes and limitations of studies*

<i>Authors</i>	<i>Themes</i>	<i>Results</i>	<i>Limitations</i>
<i>Suliman &amp; Tadros (2011)</i>	instruction strategies, coping strategies	positive reappraisal, problem-solving, social support, self-control	convenience sample within one college, all female students
<i>Chang, Chan, &amp; Siren (2013)</i>	teaching strategy, simulation based learning	improvement of reading strategies, higher self-efficacy in reading strategies, lifelong learning skills	inclusive bias of the convenience sample
<i>Tai, Pan, &amp; Lee (2015)</i>	TPACK, writing course, teaching approach	improvement of writing competence, did not like indirect feedback	no control group, convenience sampling, small sample
<i>Hashemi &amp; Hadavi (2015)</i>	vocabulary learning strategies	social strategies, preference strategies, least used note taking and autonomy	not generalizable
<i>Zhang, Zhang, Cao, Zhu, &amp; Yang (2023)</i>	motivation-based teaching, ARCS model, traditional lecture	motivation-based teaching improved learning motivation, learning engagement, and learning performance	one setting
<i>Riahipour &amp; Saba (2012)</i>	task-based language teaching, flipped learning, digital game-based language learning	task-based language teaching, digital game-based language learning, and flipped learning improve English oral skills	small number of participants, only one study group, only collected quantitative results
<i>Rachayon &amp; Soontornwipast (2019)</i>	task-based instruction, speaking skills, flipped learning environment	task-based language teaching, digital game-based language learning, and flipped learning improve English oral skills	small number of participants, only quantitative results
<i>Atai &amp; Taherkhani (2018)</i>	reading, speaking, writing, and listening skills, teacher cognitions	more emphasis on reading comprehension by EAP teachers, different teaching approaches for reading and listening	only one context
<i>Su, Tsai, &amp; Tai (2022)</i>	TPACK, writing skills, note writing, process writing approach	effective in improving writing performance, demanding tasks and peer review	convenience sampling strategy, no control group, female students, small sample
<i>Kadoyama (2015)</i>	medical-themed film, EFL, development of materials	no significant improvement in listening ability, highly effective in motivating, developed film-based teaching materials	no control group, examined only the effects on listening abilities
<i>Chan (2014)</i>	strategy instruction, language learning strategies,	strategy instruction improved language learning strategies	one setting, more comprehensive tests
<i>Moradimokhles &amp; Hwang (2020)</i>	online learning, blended learning, learning management system, blended learning	online learning and blended learning have a positive effect on English skills	one setting
<i>Huertas &amp; Rojas (2014)</i>	task-based learning, video and online learning	implemented methods have a positive impact on English communicative skills	small number of participants, one setting
<i>Brown (2013)</i>	language integrated learning, vocabulary learning strategies, content and language integrated learning	the course was very useful, raised awareness on how to learn words	small scale, classroom-based

### Findings and synthesis of key objectives

There were fewer studies that examined teaching strategies for improving learning performance among students, more exactly

only four of the overall fourteen studies reviewed. All of the studies in this group examined all four general English language skills by applying different teaching

strategies. Suliman & Tadros examined student coping strategies in order to facilitate meaningful learning in English. The participants used six coping strategies for all general English language skills. The results suggest that teacher must install these strategies through EFL teaching (8). Hashemi & Hadavi used a student centred approach to see what vocabulary strategies were used by medical sciences students in order to help teachers in the selection of which strategies to teach during vocabulary acquisition. Social strategies and guessing had the highest rates while note taking and autonomy were the least used strategies (9). Zhang, Zhang, Cao, Zhu, & Yang implemented motivation based teaching through an online course. The conclusion was that motivation-based teaching effectively improved learning, motivation, engagement, and performance of nursing students (10). Chan investigated the effect of Strategy-Based Instruction on students' learning process. The strategies used were: memory-related, cognitive, compensatory, metacognitive, affective, and social. The highest improvements were on listening skills. Through this instructional process and learning strategy, students were able to more actively participate in classes and accomplish various tasks, and more aware of their own learning (11).

Another category, and the majority of revised studies fall into this group, examined the type of teaching strategy and its positive or negative effects. In testing a particular teaching strategy most authors focused on speaking or communicative English language skills. Rachayon & Soontornwipast used task-based teaching, digital-game based learning and flipped learning to develop and improve speaking skills of nursing students. The integration of these three approaches had positive impact on communication skills and reduced language anxiety in speaking tasks (12). Huertas & Rojas used Task-Based Learning through use of digital tools to improve speaking skills of EFL students within a course project focused on nursing and physiotherapy students. The final outcome of the course project suggests an improvement in students' English communicative skills (13). Brown developed a course for Medical English with emphasis on vocabulary strategies and communicative skills using Content and Language Integrated Learning and Content-Based Learning. According to student feedback the course and implemented teaching strategies were very useful for students (14). It is no surprise that speaking abilities were the focus of the majority of studies since speaking is considered to be the most important of four language skills.



According to Bueno, Madrid, and McLaren, speaking is one of the most difficult skills language learners have to face. English language learners and teachers should understand the importance of speaking skills and try to acquire them as they need them to be recognized in today's world (15).

The second most investigated English language skills and teaching strategies were writing and reading. Chang, Chan, & Siren evaluated simulation-based as a teaching strategy for improving reading in nursing students. The intervention students showed more improvement in their English reading ability of nursing journals (16). Atai & Taherkhani investigated four language skills and teaching practices among two groups of teacher, language instructors and content teachers, the focus was mainly of reading practices. The results show that both groups did not use pre-reading strategies, and only a few of them used during-reading and post-reading strategies (17). Su, Tsai & Tai developed a writing course for EFP nursing majors using Technological Pedagogical Content knowledge with various teaching strategies such as process pedagogy writing, multiple revisions, intra-group peer review, teacher indirect feedback, and teacher indirect feedback. The course results suggest significant improvements in nursing note writing after completing the EFL writing

course (18). Tai, Pan, & Lee also created a similar online course using the Technological Pedagogical Content knowledge to see the effects on EFL nursing students' writing performance. In this case, the TPACK also proved to be an effecting teaching strategy that improved students' English writing performance (19).

Listening skills and their teaching strategies were examined by Kadoyama. This particular study implemented film-based English language classes in order to improve listening abilities. The represented results show how film successfully motivates students and has a positive effect on their attitude toward English but does not improve their listening abilities (20). Moradimokhles & Hwang used blended face to face and online instructional activities in terms of all four general English skills. The results showed that both online and blended learning have a positive effect on students' language skills, but blended learning yields significantly better general skills than the same amount of time to teaching general skills by online learning (21). Riahipour & Saba applied game oriented teaching to EFL nursing students. The findings show that vocabulary teaching through game affects the interest and motivation of EFL learners in a positive way (22).

## DISCUSSION, CONCLUSIONS AND IMPLICATIONS

Being aware of the best and most commonly used teaching strategies and using them in EFL classes contributes to English language learners' success. The study suggests some solutions to help teachers acknowledge new teaching strategies in English for medical and healthcare purposes, and in these terms design relevant and efficient course contents. The majority of studies included nursing student participants and most of them were females due to the specificity of their major.

Based on findings regarding teaching strategies that can be used to teach English as a foreign language, several effective strategies that can be used by language teachers include: content-based teaching, task-based instruction, online/digital tools for teaching, strategy-based instruction, and simulation-based instruction.

The largest number of studies focused on speaking as a skill of their choice for the testing of a particular teaching strategy (8, 10, 12, 13, 14, 17, 21). Reading and writing were the second set of skills examined by the studies (8, 16, 17, 18, 19, 21). Reading, in general, is considered to be a key nursing skill. The skill is relevant for reading medical references, adding patient notes, or even possible participation in research

studies. With English being the international language of medicine it is important for ELF teachers to focus on improving this skill and implementing the right teaching strategies. Reading and writing are "paired" skills and need to develop simultaneously.

Content-based instruction (CBI) is the one of recommended teaching strategies found. CBI is an approach in which students acquire the target language through content. Content is usually the subject matter which we learn using language. The principles of CBI are heavily rooted on the principles of communicative language teaching since they involve an active participation of students in the exchange of content (23). According to Brown, CBI uses motivating content to promote foreign language learning, particularly in students with limited English proficiency. This teaching method is often associated with ESP, and healthcare students can benefit from developing both new medical knowledge and language skills through studying relevant, interesting and motivating content (14).

The use and application of digital/online tools was one the most investigated teaching strategies (12, 13, 18, 19, 21, 22). Following the trend of globalization and the advancement of information and

communication technology (ICT), English as foreign language (EFL) and ICT competence have become two necessary skills in the clinical settings for the nursing students as well as practitioners (19). Students performed slightly better in most online course as compared to face to face teaching, but significantly better in blended face to face and online course (21). This is a good recommendation since the majority of English language classes at the Faculty of Health Studies have the opportunity to be organized in this blended form. Two studies (12, 13) focused specifically on the application of digital game in language learning, and indicate positive effects of this teaching strategy on English vocabulary recognition and retention.

Task-based language teaching has become a significant topic in the field of language acquisition in terms of fostering process-focused on syllabi and devising communicative tasks to enhance learners' real language use (24). The task-based approach provides a meaningful environment for students to practice the target language in a more authentic classroom situation. Students need to accomplish the task with personal experience by sharing with others in an academic context. Since they need to communicate in the target language, the objective is not only on learning language

but also sharing meaning (13). As a means to overcome English oral communication difficulties of nursing students, the task-based instruction using a digital game in a flipped learning environment (TGF) was developed by integrating three language learning approaches, namely task-based language teaching, flipped learning, and digital game-based language learning. The findings of this study showed that the students had improved their English oral communication ability after receiving the TGF. The reason might lie in the fact that the integration of these three learning approaches could create effective language learning opportunities for the students. Based on these findings, it is recommended that language teachers should let students practice the target language before coming to class since it facilitates their language learning in two main ways. First, it allows the students to learn at their own pace and in their own preferred ways. Second, it helps students reduce their language anxiety and increase their self-perceived oral communication ability, making them feel more willing to communicate with others in English when performing the speaking tasks (12). In the blended learning the use of educational tools can ensure that learners are not considered only passive audiences but active participants in the learning process (25). A combination of several

teaching strategies has proven to have good results on students' communication skills, lowering anxiety of public speaking to its minimum.

Simulation-based learning is known to be one of most effective teaching strategies in the healthcare professional curricula, which brings a clinical setting into the classroom. Simulation-based learning and teaching offer real life setting closely resembling professional environment. Role-play is one of the common techniques used in simulation-based teaching, it enables students to actively be involved in the learning experience and develop proper language skills (16).

There has been a re-emergence of interest in the area of language learning strategies and in particular vocabulary learning strategies. Use of vocabulary and retention of it varies among the learners, therefore, it is generally accepted that students can be trained to use strategies. It is prudent to suggest that language teachers reconsider their teaching styles and consider different techniques to promote vocabulary learning. Some of the proposed strategies are: selective attention, note taking, study preference, and autonomy (9), as well as, positive reappraisal, planful problem-solving, self-control, and social support (8).

Strategy-based instruction shifts the focus of language instruction towards the needs of individual learners. This teaching strategy is beneficial in helping students expand their language repertoire in all four English skills qualitatively. With this learning process students were more active in participating in language classes and accomplishing various tasks, they were also aware of their own learning through writing diaries and reflections (11).

While language instructors implemented routine practices of teaching reading, speaking, and listening, content teachers' patterns of activities were mainly limited to bottom-up reading activities and word-by-word translation of academic texts. Also, unlike content teachers, language instructors practiced routine classroom activities which were based on eight out of the thirteen reading principles proposed by Grabe. Emphasizing writing was found as a non-routine practice for both groups of EAP teachers (17). Which points to the importance of implementing suggested reading strategies for EFL students. The following reading strategies were used: vocabulary development, main idea comprehension, discourse structure awareness, strategic reading, reading fluency, and reading motivation (17).

Language teaching strategies play an important role in teaching English as a foreign language especially in specific professional environments like healthcare and medicine. Although this review covered the majority of contemporary teaching strategies for English as a foreign language in healthcare studies, there is no easy solution to language teaching and learning challenges faced by both teachers and students. They are faced with learning two new languages simultaneously; medical terminology and the English language.

Educators need to be willing to expand their teaching perspective and incorporate strategies into the classroom that will enhance the learning effectiveness for students (26). Numerous studies were devoted to language teaching strategies, covering a wider and more general area of research. This study conducts a small-scale review of studies concerning language teaching strategies for English in healthcare studies and generally divides them into several perspectives; concerned with improving students' language learning performance and examining specific instruction strategies and their effects on students' knowledge. Further it gives an outline of four general English language skills and most commonly used teaching strategies.

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## PREGLED STRATEGIJA POUČAVANJA ENGLSKOG KAO STRANOG JEZIKA NA ZDRAVSTVENIM STUDIJIMA

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### SAŽETAK

Predavači engleskog kao stranog jezika suočeni su s poteškoćama pri odabiru odgovarajuće strategije poučavanja za učenike koji uče engleski u akademske i profesionalne svrhe. Petnaest istraživanja uključeno je u ovu preglednu studiju o strategijama poučavanja engleskog kao stranog jezikom na zdravstvenim studijima. Cilj je utvrditi najkorisnije i najučinkovitije strategije poučavanja za studente zdravstvenih studija koji uče engleski kao strani jezik. Pregledna studija provedena je koristeći Noblit i Hare meta-sintezu i Dearholt i Dang Johns Hopkins modela prakse temeljene na dokazima u sestrinstvu za evaluaciju, odabir i analizu odabranih istraživanja. Strategije poučavanja jezika igraju važnu ulogu u poučavanju engleskog kao stranog jezika, posebno u profesionalnim okruženjima kao što su zdravstvo i medicina. Ovo istraživanje strategije poučavanja engleskog jezika u zdravstvu svrstava u dvije perspektive: one koje se bave poboljšanjem uspješnosti studenata u učenju stranog jezika i one koje ispituju posebne strategije poučavanja i njihove učinke na znanje studenata. Nadalje daje pregled četiriju općih vještina engleskog jezika i najčešće korištenih strategija poučavanja. Rezultate istraživanja mogu koristiti predavači engleskog jezika i tvorci sadržaja za razvoj novih nastavnih materijala i tečajeva u navedenom polju. Budućnost s novo obrazovanim stručnjacima koji poznaju engleski i druge strane jezike bit će korisna za zdravstvo kao profesiju i njihovu ciljanu populaciju.

**Ključne riječi:** strategije poučavanja, zdravstveni studiji, EFL, sestrinstvo, medicinski engleski

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## THE RELATIONSHIP BETWEEN RESILIENCE AND BREAST CANCER

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### ABSTRACT

Resilience can be changed and modified over time, it is affected by many different situations and difficulties that a person overcomes during life. Resilience is a newer concept, which should be applied to the patient from the beginning of life with cancer. Clinicians should invest more time and effort in creating interventions that enable patients to foster their resilience. The term resilience or the ability to recover refers to the process of overcoming adverse events, including stress, trauma and illness. Considering the ability to recover as a personality trait imposes the assumption that the ability to recover represents a constellation of personal characteristics that enable individuals to adapt to different circumstances they encounter. Resilience as a complex phenomenon changes over time and circumstances. Understanding resilience as a complex, multidimensional and dynamic process is very important for understanding therapeutic mechanisms and healing mechanisms. Psychological factors are the most important factors that contribute to the development of resilience. It is necessary to work on the development of psychosocial interventions that will target the psychological resilience of cancer patients. Breast cancer is the most common malignant disease in women. In women with breast cancer who manage to develop the ability to resist and accept life's crisis, greater resilience and personal growth is created, thereby reducing the negative impact associated with the disease. The aim of this work is to explain the relationship between resilience and breast cancer.

**Key words:** connection, resilience, cancer, breast

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## INTRODUCTION

The most common definition of resilience is that it is a positive adaptation in the context of significant adversity. Resilience situations are characterized as a "successful outcome" and not the negative consequences that would otherwise be expected, and this implies exposure to threats or accidents and achieving positive adaptation despite significant challenges of the development path (1).

Resilience can also be understood as a product of mitigating processes that do not eliminate risk and stress but enable the individual to deal with it effectively. Resilience is the positive pole of a ubiquitous phenomenon that demonstrates individual differences in people's responses to stress and adversity. The phenomenon of maintaining adaptive functioning despite serious dangerous risks is called resilience that is resilience represents protective factor that modify, improve or change an individual's response to environmental hazards that predispose the individual to a maladaptive outcome (2).

Breast cancer is the most common malignant disease in women, which often has very serious consequences for health. Women with breast cancer have greater resilience, greater resistance and personal growth is created, which reduces the

negative effect associated with the disease. The aim of this paper is to explain the relationship between resilience and breast cancer.

### Resilience

A person's ability to successfully cope with developmental tasks despite adverse circumstances is also thought to indicate resilience. In fact, resilience consists of personal qualities that enable an individual to progress in the face of adversity (3).

Resilience is also the ability to progress, mature and increase competence in the face of adverse circumstances, which include both biological abnormalities and various obstacles from the environment that can be serious and infrequent or chronic and consistent. Reaching for all resources (biological, psychological and environmental resources), a person can progress, mature and increase his own competence. It is a process of successful adaptation to difficult or threatening situations, that is, resilience is a dynamic process that includes positive adaptation within the context of significant adversity (4).

In the context of exposure to significant adversity, resilience is also the individual's capacity to navigate the journey to psychological, social, cultural and physical resources that maintain the well-being and

psychological well-being of the individual, and the capacity to individually and collectively negotiate so that the said resources are secured and experienced culturally meaningful ways. Understood in this way, resilience is a quality of both the individual and his environment that potentiates positive development (5).

According to the opinion of many theoreticians and scientists, resilience refers to achieving positive outcomes despite challenging or frightening circumstances, but successfully dealing with traumatic experiences and avoiding negative developmental trajectories associated with risks (6).

Different operational definitions of resilience have resulted in disparate results. It is precisely for this reason that many theoretical and researchers in this field believe that additional theoretical refinement will improve the precision of definition and resilience research and thus improve the necessary communication between experts. In this sense, the first steps should be aimed at the development of the concept of resilience itself, that is, at understanding the reasons for its appearance and acceptance by scientists and theoreticians (7).

The term resilience or the ability to recover refers to the process of overcoming adverse events, including stress, trauma and illness

and resilience to the personality traits associated with this process. Considering the ability to recover as a personality trait imposes the assumption that the ability to recover as a personality trait imposes the assumption that the ability to recover represents a constellation of personal characteristics that enable individuals to adapt to the different circumstances they encounter (8).

Resilience as a complex phenomenon changes over time and circumstances. Understanding resilience as a complex, multidimensional and dynamic process is very important for understanding the therapeutic mechanisms of healing. Primary resilience is considered a protective factor in the development of mental disorders, while its lack is interpreted as a risk factor for the occurrence of mental disorders. Secondary resilience refers to an individual's ability to face and cope with illness, and to achieve healing and recovery. Tertiary resilience enables patients to develop a healthy and productive lifestyle with their disease, helps them adapt to the life limitations associated with the disease, and creates positive life attitudes. Symptoms and neuropsychobiological dysfunctions often overlap with each other in mental disorders, it is of great importance to recognize mechanisms of recovery ability specific to individual disorders.

Transdiagnostic studies of general and specific recovery ability could significantly contribute to strengthening the concept of holistic medicine (9).

Resilience is an important trait that contributes to a person's mental and physical well-being. Evidence suggests that resilience is related to motivation. This motivation to recover from physical or psychological traumatic events after learning about an oncological disease reduces the impact of risk factors, thus increasing a person's ability to cope with the many challenges that this disease brings. In this way, resilience protects oncology patients from psychosocial health problems, such as depression, anxiety, fear and helplessness, and helps reduce related negative effects (10).

In the context of cancer, resilience refers to an individual's protective attributes and/or personal traits, which are thought to be modifiable and to promote successful adaptation to cancer, including, but not limited to, meaning and purpose in life, sense of coherence, optimism, positive emotions, self-esteem, self-efficacy, cognitive flexibility, coping, social support and spirituality (11).

Oncology patients with a higher level of resilience had a higher level of quality of life. The strongest positive connection was found between resilience and psychological

health of oncology patients. The stage of the disease was negatively related to the quality of life of oncology patients. Psychological interventions to strengthen resilience should be an integral part of a multidisciplinary and holistic approach to the treatment of cancer patients (12).

### Breast cancer

Breast cancer is the most common malignant tumor in women in the world, which occurs when normal glandular cells of the breast change their properties and begin to grow uncontrollably, multiply and destroy the surrounding healthy tissue. Breast cancer most often affects women over 50 years of age, but younger women can also get it. Men can also get breast cancer, but breast cancer is a hundred times more common in women than in men (13). Breast cancer develops due to DNA damage and gene mutations that can be affected by estrogen exposure. Sometimes there will be inheritance of DNA defects or pro-cancer genes such as Breast Cancer 1 (BRCA1) and Breast Cancer 2 (BRCA2). Therefore, a family history of ovarian or breast cancer increases the risk of developing breast cancer. In a normal person, the immune system attacks cells with abnormal DNA or abnormal growth. This fails in those with breast cancer, which leads to tumor growth and spread (14).

Ductal carcinoma in situ (DCIS) is recognized as discrete spaces filled with malignant cells, usually with a recognizable basal cell layer composed of presumably normal myoepithelial cells. Papillary and cribriform types of DCIS are generally lower-grade lesions and may take longer to develop into invasive carcinoma. Solid and comedo types of DCIS are generally higher-grade lesions. DCIS, if left untreated, usually transforms into invasive cancer. Invasive breast cancers are recognized by the lack of overall architecture, random infiltration of cells into different amounts of stroma, or the formation of layers of continuous and monotonous cells, regardless of the shape and function of the glandular organ. Pathologists generally divide invasive breast cancer into ductal and lobular histological types (15).

Invasive ductal carcinoma tends to grow as a cohesive mass; it appears as discrete abnormalities on mammograms and can often be felt as a discrete lump in the breast smaller than lobular carcinomas. Invasive lobular carcinoma tends to invade the breast in one unit, which explains why it remains clinically occult and often escapes detection on mammography or physical examination until the disease becomes extensive. Invasive ductal carcinoma, also known as infiltrating ductal carcinoma, is the most common form of breast cancer; it accounts

for 50% to 70% of invasive breast cancers (16).

Invasive lobular carcinoma accounts for 10% of breast cancers, and mixed ductal and lobular carcinomas are increasingly recognized and described in pathology reports. When invasive ductal carcinomas take on differentiated features, they are named according to the features they exhibit. If the infiltrating cells form small glands lined with a single row of smooth epithelium, they are called infiltrating tubular carcinoma. Infiltrating cells may secrete copious amounts of mucin and appear to float in this material. These lesions are called mucinous or colloid tumors (17).

Most patients with early breast cancer are asymptomatic and are detected during screening mammography. As it increases in size, the patient may detect the cancer as a lump that is accidentally felt, mostly while showering. Breast pain is an unusual symptom that occurs in 5% of cases. Locally advanced disease can manifest as peau d'orange, pronounced ulceration or fixation to the chest wall. Inflammatory breast cancer, advanced breast cancer, often resembles a breast abscess and is manifested by swelling, redness and other local signs of inflammation. Paget's disease of the nipple usually presents with nipple

changes that can be distinguished from nipple eczema (18).

Malignant breast tumors most often, and in 90% of cases, arise from ductal epithelium, and less often 10%, from lobular epithelium. They are divided into two large groups, with regard to the basement membrane, into non-infiltrating, in situ carcinomas that have not penetrated the basement membrane and infiltrating carcinomas that have penetrated the basement membrane, i.e. invasive carcinoma (19).

#### **The relationship of resilience and breast carcinoma**

Resilience has an important impact on the quality of life of cancer patients. There are several positive and negative factors that can affect the resistance and quality of life of cancer patients. These are: disease-related risk including perceived disease, ambiguity and complexity, symptom stress, disease severity; family protective factors, which include perceived social support from family and socioeconomic variables; social protection factors, which include perceived social support from friends, influence from others with similar conditions, and perceived support from service providers; individual risk factors including avoidant, emotional and fatalistic coping measures/strategies; individual

protective factors, which include confrontational, optimistic, and supportive coping, along with hope and spiritual factors. Studies have examined the impact of psychological resilience on cancer patients. These studies indicate that resilience is a protective factor against stress among cancer survivors, suggesting that cancer patients with high resilience require less psychosocial support to manage their stressful situations, compared to those with low resilience (20).

Resilience mediates between cancer symptoms and distress and quality of life among survivors, and plays an important role in protecting them from the harmful effects of cancer symptoms (21).

Resilience is a critical component for quality of life at all stages; during diagnosis, treatment, survival and palliative care. This is an important trait for promoting positive psychosocial well-being. Early identification of psychological factors related to quality of life after treatment is important among patients as increased risk of worse outcomes, as it can help them develop interventions to improve quality of life (22).

Despite the increase in the survival rate, it is well known that the diagnosis of breast cancer, as well as the treatment resulting from the disease, affects many vital aspects (work ability, interpersonal relationship,

body image or daily habits), assuming an important impact on the physical and psychological health of a being (23).

Research in the positive psychology approach has focused on psychological adaptation, suggesting that breast cancer survivors can cope with extremely adverse situations and adapt to them (24).

Although a cancer diagnosis involves personal suffering, many women with breast cancer can develop the ability to resist and accept a life crisis, resulting in greater resilience and personal growth, which in turn reduces the negative affect associated with the disease (25).

Although these women adapt adequately to the illness process through resilience, it is thought that a useful skill or appropriate levels of emotion management can improve the process of adaptation to the illness. In this sense, the concept of "co-vitality" appears in opposition to "comorbidity", where it refers to a set of personal factors, mainly socio-emotional competencies, which can increase people's psychosocial adaptation (26).

Therefore, Deshields et al (24) understand resilience as a dynamic process under the influence of emotional intelligence, among other personal and social factors of risk and protection. Resilience is an important trait that contributes to a person's mental and physical well-being. Evidence indicates that

it is associated with motivation to recover from physical or psychological traumatic events, which reduces the impact of risk factors, thus increasing a person's ability to cope with life's challenges. In this way, it protects against psychosocial health problems, such as depression, anxiety, fear and helplessness, and helps reduce related negative effects (27).

Understanding the factors that influence a higher level of resistance can have important clinical implications and can represent a guiding principle for designing psychological interventions that would accelerate recovery and improve the quality of life of cancer patients (28).

On the topic of resilience in our environment, more research has been conducted and more papers have been published. In the paper, Babić R. and colleagues conclude that the greater the resistance, the lower the vulnerability and risk of disease. Resilient people tend to be optimistic, tend to see everything as a useful experience, focus on personal strengths and qualities, use constructive criticism, develop close relationships with others, have developed social skills and are emotionally aware. Good resistance worsens and prevents the occurrence of diseases, ensures good health, facilitates and accelerates healing, and provides a

productive life and a sense of well-being despite chronic diseases (29).

In the work of Bošnjak M. And colleagues, it was determined that higher levels of resistance predict a better quality of life in patients with inflammatory bowel disease. Higher levels of resilience predicted higher levels of ostomy adjustment; in particular, persistence- defined as a resilience trait- was the most reliable predictor (30). Franjić D. And colleagues conclude that resilience is positively related to the quality of life and self-confidence of healthcare workers suffering from COVID-19 in the University Clinical hospital Mostar (31) and that a higher level of resilience statistically significantly contributes to a higher level of quality of life in colon cancer patients (32) and that people who have a higher level of resilience are more ready to face the disease, and a faster process of recovery and healing from colon cancer has been recorded in such people (33).

In his book *Psychology in Medicine and Healthcare*, Babić D. et al. devotes an entire

chapter to resilience. Its main characteristics and its significance for health and disease are described (34).

## CONCLUSION

Breast cancer is the most common malignant disease in women. Contemporary research tries to investigate the relationship between psychoemotional parameters and the length of survival of breast cancer patients. A diagnosis of breast cancer involves personal suffering. In women suffering from breast cancer who manage to develop the ability to resist and accept a life crisis, greater resistance and personal growth is created, thereby reducing the negative impact associated with the disease. Resilience is a personality characteristic that mitigates the negative effects of stress or adverse situations, thus encouraging the adaptability, and among the characteristics are perseverance, purpose in life, self-belief.

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## POVEZANOST REZILIJENCIJE I KARCINOMA DOJKE

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### SAŽETAK

Rezilijencija se može mijenjati i modificirati tijekom vremena, na nju utječu mnoge različite situacije i nevolje koje osoba svlada tijekom života. Rezilijencija predstavlja noviji koncept, koji treba biti primijenjen u pacijenta od početka života s rakom. Kliničari bi trebali uložiti više vremena i truda u stvaranje intervencija koje omogućuju pacijentima da potaknu svoju otpornost. Termin rezilijencija ili sposobnost oporavka odnosi se na proces prevladavanja nepovoljnih događaja, uključujući stres, traumu i bolest. Razmatranje sposobnosti oporavka kao osobine ličnosti nameće pretpostavku da sposobnost oporavka predstavlja konstelaciju osobnih karakteristika koje omogućavaju pojedincima da se prilagode različitim okolnostima s kojima se susreću. Rezilijencija se kao kompleksan fenomen mijenja kroz vrijeme i okolnosti. Shvaćanje rezilijencije kao složenog, višedimenzionalnog i dinamičnog procesa vrlo je važno za razumijevanje terapijskih mehanizama te mehanizama izlječenja i iscjeljenja. Psihološki čimbenici najvažniji su čimbenici koji doprinose razvoju otpornosti. Potrebno je raditi na razvoju psihosocijalnih intervencija koje će ciljati na psihološku otpornost pacijenata oboljelih od raka. Karcinom dojke najčešća je maligna bolest u žena. Kod žena oboljelih od karcinoma dojke koje uspiju razviti sposobnost odupiranja i prihvatanja životne krize, stvara se veća otpornost i osobni rast, čime se smanjuje negativan učinak povezan s bolešću. Cilj ovog rada je objasniti povezanost rezilencije i karcinoma dojke.

**Ključne riječi:** povezanost, rezilencija, karcinom, dojka

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## HANTAVIRUS INFECTION - EPIDEMIOLOGICAL CHARACTERISTICS IN THE AREA OF THE REPUBLIC OF CROATIA DURING THE COVID-19 PANDEMIC

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### ABSTRACT

**Introduction:** Hantaviruses are the causative agents of hemorrhagic fever with renal syndrome (HGBS). People are most often infected by inhaling a contaminated aerosol, but infection can also occur through contaminated food or water. On average, eighteen people fall ill with HGBS per year outside of epidemics. Men between the ages of 20 and 40, especially farmers, soldiers, foresters and hikers, are most often affected. Famous hotspots in Croatia are Lika, Gorski kotar and Medvednica. **Objective:** To analyze the frequency and epidemiological characteristics of hantavirus infections in the Republic of Croatia during the COVID-19 pandemic. **Materials and methods:** Data on the incidence of HGBS according to counties, seasonal occurrence, age groups and gender were analyzed, as well as the connection of recommendations for being in nature as part of the suppression of the Covid-19 pandemic to a potential increase in the number of HGBS patients. Retrospective analysis was used to process the data collected at the Croatian Institute of Public Health, and descriptive methods were used to perform statistical analyzes in the Microsoft Excel software system. **Results:** In the period from 2019 to 2021, there were 547 patients with HGBS, with men suffering more often than women (78.0% vs. 22.0%). The highest activity was recorded in Primorje-Gorski Kotar and Lika-Senj counties from March to August in the age groups of 30 to 39 years. In 2021, 332 patients were reported, which is more than the average, and this can be connected to the more frequent stay of people in nature due to recommendations to reduce the number of patients with the COVID-19 disease. **Conclusion:** The study of the epidemiological features of hantavirus infections is important for public health because it enables the identification of areas with a higher risk of infection, the recognition of epidemics and the adoption of appropriate control and prevention measures.

**Keywords:** Hantavirus, Epidemiology, COVID-19, Croatia

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## INTRODUCTION

Hantaviruses are a group of serologically and phylogenetically related RNA viruses of the genus *Hantavirus*, family *Bunyaviridae* (1). So far, 40 species have been described, 20 of which cause disease in humans. Hantaviruses are the causative agents of two important syndromes: hemorrhagic fever with renal syndrome (HGBS) caused by Dobrava (DOBV), Hantaan (HTNV), Puumala (PUUV) and Seoul viruses (SEOV) and hantavirus pulmonary syndrome (HPS) whose most common causes are: Sin Nombre virus (SNV), Andes virus (ANDV), Bayou virus, Black Creek Canal virus, Laguna Negra virus and New York virus. In nature, they are maintained in chronically infected rodents and small mammals (2).

Hantavirus reservoirs are small rodents: wood vole (*Clethrionomys glareolus*), yellow-throated mouse (*Apodemus flavicollis*), striped field mouse (*Apodemus agrarius*) and common wood mouse (*Apodemus sylvaticus*). After infection, rodents excrete the virus with saliva, feces and urine. Infection in humans most often occurs by inhalation of a contaminated aerosol, but the virus cannot be introduced into the body of a new host either through food or water, i.e. through contaminated food or water. Interhuman transmission of HGBS has not been proven. The disease

occurs in groups of people aged 20 to 40, and the most frequently affected professional groups are farmers, soldiers, foresters, and hikers. The disease occurs sporadically, most often in rural areas where there are suitable places for small rodents that transmit the virus (3). The first signs of the disease appear after an incubation period of an average of 2 weeks (5-40 days). HGBS most often begins with a general infectious syndrome and renal symptoms dominate. About 100,000 cases of HGBS are reported annually in the world, of which 70-90% (40,000 - 60,000 cases) on the territory of China. In Europe, approximately 9,000 cases of HGBS occur annually, and the most common proven type of hantavirus is PUUV (4). Croatia, as a country with diverse ecosystems, offers a favorable habitat for rodents, which are natural reservoirs of hantaviruses (5). In Croatia, the areas of Lika, Gorski Kotar and Medvednica are known to be endemic natural foci of hantavirus (6). Hemorrhagic fever with renal syndrome is an endemic disease in Croatia and was first described in 1952, after which sporadic cases were continuously recorded (7). In 1995, only two smaller epidemics were registered: in 1967 at the Plitvice Lakes, when 14 forest workers fell ill, and in 1989, near the Pleso airport, when 14 soldiers fell ill (8). The first major epidemic was recorded in 1995

simultaneously in several localities (Mala Kapela, Dinara, Slavonia) with 125 cases reported (9). Then, in 2002, the largest HGBS epidemic broke out so far, with more than 300 patients in almost the entire the territory of Croatia (10). The last epidemic was in 2012 in Sljemen with 152 reported cases (11). In the inter-epidemic period, about 10-20 cases of HGBS are registered annually, according to the register of infectious diseases of the Croatian Institute of Public Health since 2000, the average number of patients per year is 18.

In the period from 2019 to 2022 years, isolation measures and recommendations for people to stay in mountains, forests and solitude were applied in order to suppress the COVID-19 pandemic. However, as a possible consequence of such measures, an increase in the number of people suffering from hantavirus infections was recorded, with a total of 332 cases in 2021. The study of the epidemiological characteristics of hantavirus infections in Croatia is of great importance for public health, as it enables the identification of areas with a higher risk of infection, the timely recognition of epidemics and the adoption of appropriate control and prevention measures.

## OBJECTIVE

The aim of the study is to analyze the frequency and epidemiological

characteristics of hantavirus infections in the Republic of Croatia during the COVID-19 pandemic.

## MATERIALS AND METHODS

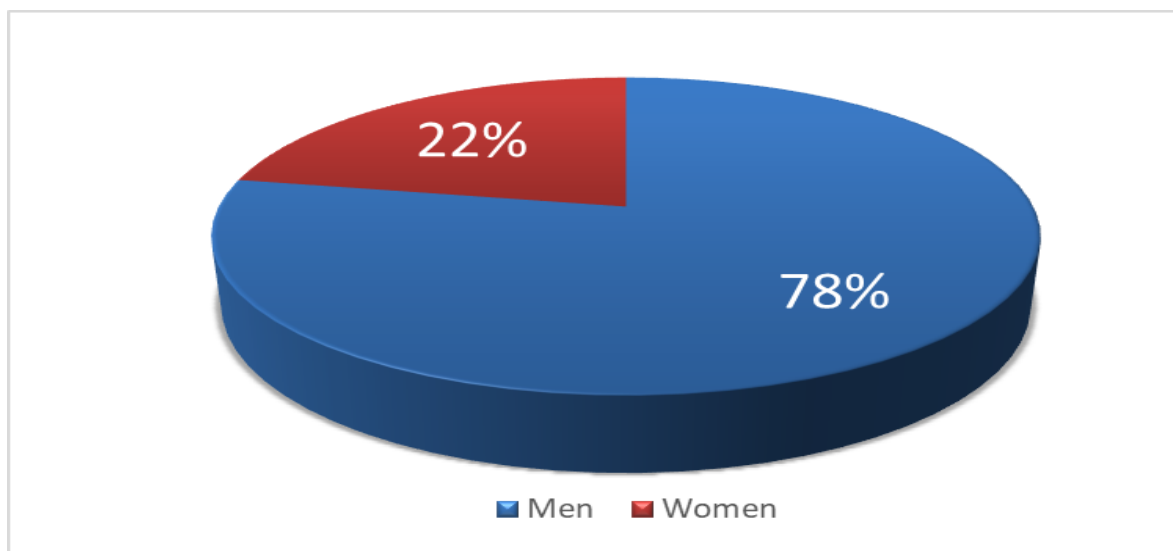
Data on the incidence of HGBS from 2019 to 2022 years were analyzed according to counties, seasonal occurrence, age groups and gender, and the connection of recommendations for spending time in nature as part of the fight against the Covid-19 pandemic to a potential increase in the number of HGBS patients. Retrospective analysis was used to process the data collected at the Croatian Institute of Public Health. Registration of patients and verification of applications is conducted in the National Public Health Information System, from which the data is transferred to the Register of Infectious Diseases of the Republic of Croatia, which is coordinated by the Croatian Institute for Public Health. Data from the Registry of Infectious Diseases collected by the Epidemiology Service of Infectious Diseases were used to investigate the incidence of HGBS.

Descriptive methods in the Microsoft Excel software system were used for statistical analysis, and in this way a complete insight into the epidemiological features of hantavirus infection in Croatia was obtained

over a period of four years.

The study included a total of 547 subjects between the ages of 7 and 65 years old. There were 426 (78%) men and 124 (22%) women. (Picture 1)

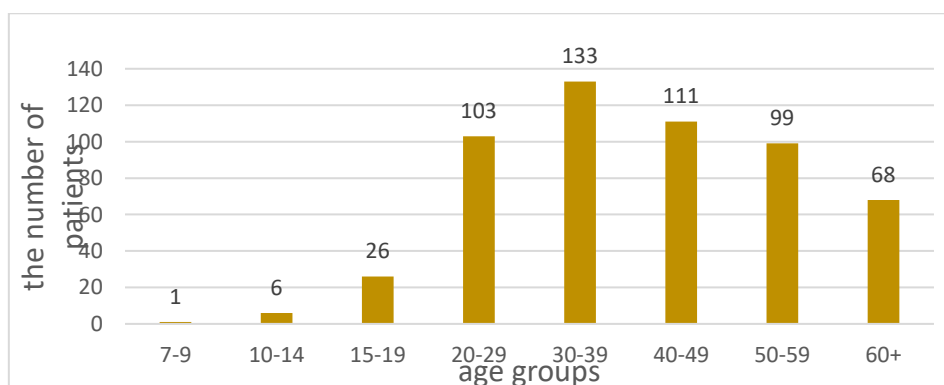
## RESULTS



*Picture 1. Distribution of respondents by gender*

Regarding age, the respondents were divided into the following age groups: 7-9 years (1/0%), 10-14 years (6/1%), 15-19 years (26/5%), 20-29 years (103/19%), 30-

39 years (133/24%), 40-49 years (111/20%), 50-59 years (99/18%) and 60+ years (68/13%). (Picture 2)



*Picture 2. Distribution of patients with hemorrhagic fever with renal syndrome according to age*

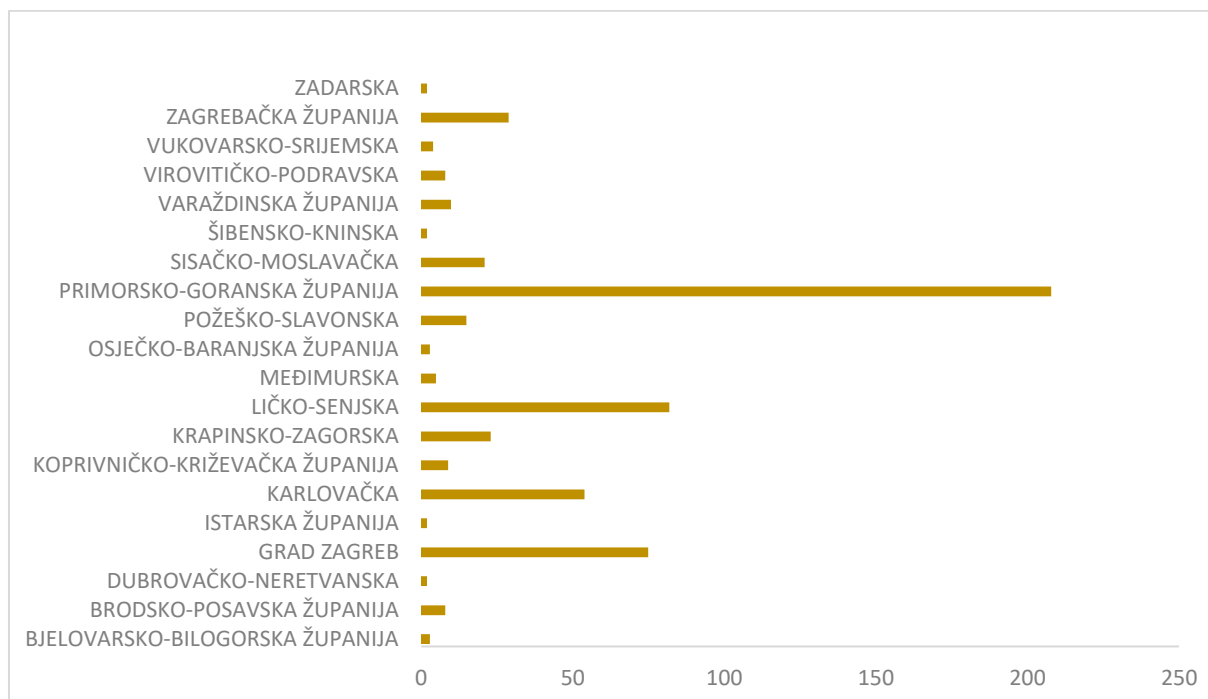
The largest number of patients was in the age group of 30-39 years of age, and the

average age of the patients was 37.9 years. According to the geographical distribution,



the highest number of patients was from the Primorje-Gorski Kotar County (207), followed by the Ličko-Senjska County (81),

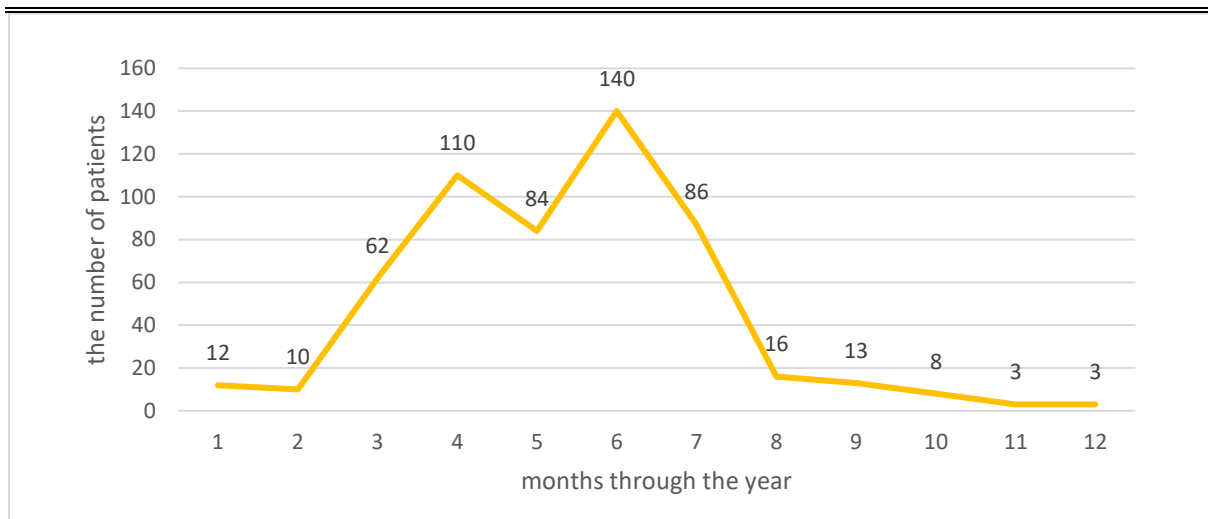
the City of Zagreb (74), the Karlovac County (53) and the Zagreb County (28). (Picture 3)



*Picture 3. Distribution of hemorrhagic fever patients with renal syndrome by county in the Republic of Croatia*

When we study the incidence of the number of patients with regard to seasons and months of the year, we see that the largest number of patients was recorded in June

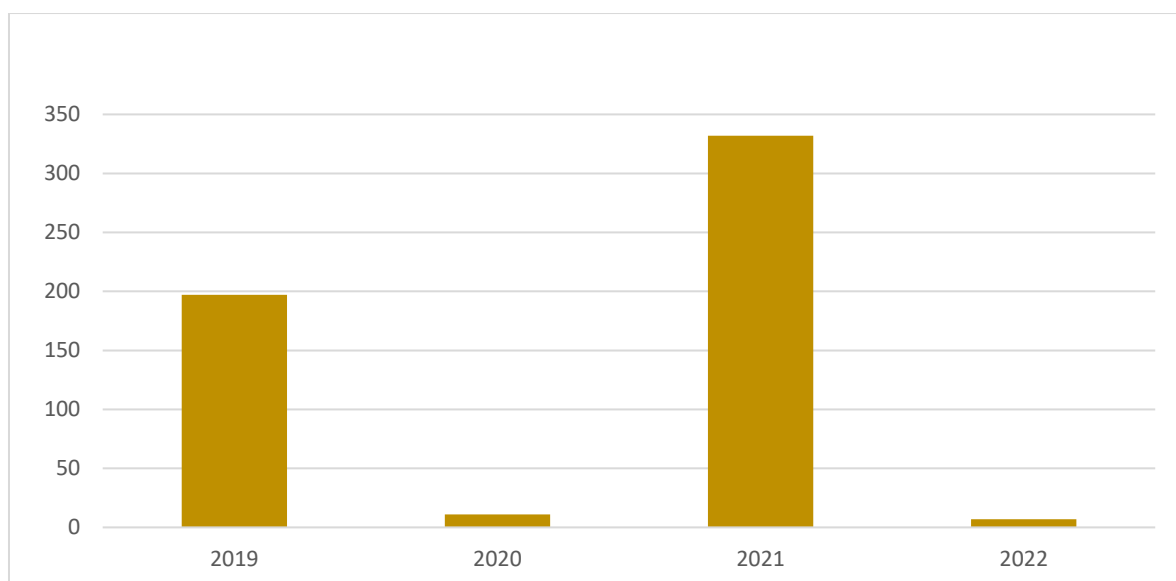
(140 persons), followed by April (110 persons), July (86) and May (84). The largest number of patients is in spring and summer (Picture 4).



*Picture 4. Number of patients with hemorrhagic fever with renal syndrome by month, from 2019 to 2022 years*

In the period from 2019 to 2022, which is also marked by the COVID-19 pandemic, the largest number of patients was in 2021, when 332 patients with HGBS were

reported, then in 2019, 197 patients were reported, while in 2020, 11 patients and 7 patients in 2022. (Picture 5)



*Picture 5. Number of patients with hemorrhagic fever with renal syndrome from 2019 to 2022 years*

## DISCUSSION

The study results indicate a significant number of HGBS patients in Croatia during

the observed period from 2019 to 2022 years. A total of 547 people were infected during the period of four years. Next, the

data show differences in the incidence of HGBS between the sexes. Men made up the majority of patients (78%), while the proportion of women was smaller (22%). The age group of 30-39 years was the most affected by HGBS, with 133 patients (24%). These results are expected and similar to the researches published in Slovenia, Germany, America and Southeast Europe (12-19) and earlier epidemics in Croatia (men 76.6%-79%; average age 36.6-40 years) (7-10). According to previous studies, men are more likely to suffer from HGBS due to occupational exposure to rodents, as many as 40% of hospitalized patients cited occupational exposure as a risk factor (8-10). These data point to the need for a targeted approach to prevention, to strengthen protection and education for that specific profession and excursionists. Analyzing the geographical distribution of the sick, we notice that the most cases were recorded in Primorje-Gorski Kotar County (207), Lika-Senj County (81), the City of Zagreb (74), Karlovac County (53) and Zagreb County (28), which was expected since that precisely these are endemic hotspots (8-10). It is also interesting to note that the disease occurs throughout the year, but the highest number of cases is recorded from March to August, when rodent activity is at its highest. This information is certainly useful for planning surveillance

interventions aimed at reducing the number of patients. Furthermore, the analysis of the time period from 2019 to 2022 years shows a significant increase in the number of cases in 2021, with 332 cases of HGBS reported, indicating a potential link between the measures to control the pandemic of COVID-19, which included isolation and recommendations that people living in mountains, forests and solitude and the increased number of people suffering from hantavirus infections in 2021. Although the suppression of the COVID-19 pandemic was necessary to protect public health, it is possible that certain consequences of such measures affected the risk of hantavirus infection.

## CONCLUSION

In the period from 2019 to 2021 years, there were 547 patients with HGBS in the Republic of Croatia, with men suffering from it more often than women (78.0% vs. 22.0%). The highest activity was recorded in Primorje-Gorski Kotar and Lika-Senj counties from March to August in the age groups of 30 to 39 years. In 2021, 332 patients were reported, which is more than the average, and this can be connected to the more frequent stay of people in nature due to recommendations to reduce the number of patients with the COVID-19 disease. The conducted analysis emphasizes the

importance of studying the epidemiological characteristics of hantavirus infections for public health, enabling the identification of high-risk areas, the recognition of epidemics and the adoption of appropriate control and prevention measures.

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## INFEKCIJA HANTAVIRUSOM - EPIDEMIOLOŠKE ZNAČAJKE NA PODRUČJU REPUBLIKE HRVATSKE U VRIJEME PANDEMIJE COVID-19

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### SAŽETAK

Hantavirusi su uzročnici hemoragijske groznice s bubrežnim sindromom (HGBS). Ljudi se najčešće zaraze udisanjem kontaminiranog aerosola, no do infekcije može doći i putem kontaminirane hrane ili vode. Od HGBS-a godišnje u prosjeku oboli osamnaest osoba izvan epidemija. Najčešće obolijevaju muškarci u dobi od 20 do 40 godina, osobito poljoprivrednici, vojnici, šumari i planinari. Poznata žarišta u Hrvatskoj su Lika, Gorski kotar i Medvednica. Cilj: Analizirati učestalost i epidemiološka obilježja hantavirusnih infekcija u Republici Hrvatskoj tijekom pandemije COVID-19. Materijali i metode: Analizirani su podaci o incidenciji HGBS-a po županijama, sezonskoj pojavnosti, dobnim skupinama i spolu, te povezanost preporuka za boravak u prirodi u sklopu suzbijanja pandemije Covid-19 s potencijalnim porastom u broju pacijenata s HGBS. Retrospektivnom analizom obrađeni su podaci prikupljeni u Hrvatskom zavodu za javno zdravstvo, a deskriptivnim metodama statističke analize u programskom sustavu Microsoft Excel. Rezultati: U razdoblju od 2019. do 2021. godine bilo je 547 pacijenata s HGBS-om, pri čemu su češće obolijevali muškarci nego žene (78,0% naspram 22,0%). Najveća aktivnost zabilježena je u Primorsko-goranskoj i Ličko-senjskoj županiji od ožujka do kolovoza u dobnim skupinama od 30 do 39 godina. U 2021. godini prijavljeno je 332 oboljelih, što je više od prosjeka, a to se može povezati s češćim boravkom ljudi u prirodi zbog preporuka za smanjenje broja oboljelih od bolesti COVID-19. Zaključak: Proučavanje epidemioloških obilježja hantavirusnih infekcija važno je za javno zdravstvo jer omogućuje prepoznavanje područja s povećanim rizikom od infekcije, prepoznavanje epidemija i donošenje odgovarajućih mjera kontrole i prevencije.

**Ključne riječi:** Hantavirus, Epidemiologija, COVID-19, Hrvatska

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## THE ROLE OF SOCIAL MEDIA IN SCIENCE

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### ABSTRACT

Social media platforms provide direct access to a vast amount of information, enabling the promotion of various content. It has become a new way of disseminating news worldwide and often influence social perception and public discourse development. Even scientists are not oblivious to the trend of using social media. Social media allows them to quickly and effectively share their research results with the global audience. Numerous studies indicate that scientists are increasingly participating in public discussions and activities on social media, with nearly half of academic researchers being a part of at least one social network. Media professionals have traditionally been the guardians of scientific information, but new media technologies grant scientists more power than ever to proactively engage in public communication. Many studies also suggest that most scientists consider media visibility important and see responding to journalists as a professional obligation, a stance endorsed by many universities and scientific organizations.

**Keywords:** role, social media, science

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## INTRODUCTION

Social media platforms provide direct access to a vast amount of information, thereby facilitating the promotion of diverse content. They have become a new means of disseminating news worldwide and often have a significant impact on shaping social perceptions and fostering public discourse (1). Users of social media platforms tend to seek information that aligns with their beliefs and often disregard information that contradicts their views. Various studies have shown that false news and inaccurate information can spread even faster than fact-based news (2). As the importance of social media for acquiring scientific information continues to rise, questions arise regarding whether online platforms enhance or diminish public trust in science. Moreover, even for scientists, the trend of using social media is not unfamiliar. Social media platforms have enabled them to swiftly and efficiently disseminate the results of their research worldwide. Thus, not only do scientists want to utilize social media for presenting their research, but in many cases, they must do so if they wish their research to gain recognition (3).

### Academic Social Networks

In recent years, the use of social media for professional purposes has become increasingly common, serving as a tool for

communication and information sharing. Among the most prominent platforms is LinkedIn, with its primary aim of enhancing business relationships, advancing careers, and facilitating employee recruitment, among other functions. Additionally, there are significant academic social networks such as Academia.edu and ResearchGate. These platforms encompass the typical features of social networks, including personal profiles, and they offer the opportunity for interaction with colleagues. Furthermore, they provide specific tools tailored to academic needs, such as article publication and citation tracking.

Academic social network platforms also offer various capabilities, including:

- Sharing ideas, suggestions, and professional experiences
- Publishing scientific and professional articles
- Receiving direct notifications via email when a relevant article is published
- Comparing influence in the scientific community, as it is gauged by the number of citations of scientific papers and the quality of journals in which the work is published. Academic social networks also incorporate data on



the number of downloads, readings, or shares of scientific work (4).

### Use of Social Media by Scientists

Social media provide innovative communication channels and formats and, in the long term, can fundamentally transform the relationship between science and society (5). Numerous studies on this topic indicate that scientists are increasingly participating in public debates and activities on social media, with almost half of academic researchers being part of at least one social network. On the other hand, research conducted at the University of Michigan points to the fact that 60% of scientists use traditional channels, such as television programs, radio shows, and the like, to disseminate information. Additionally, nearly 40% of respondents stated that they would never use social media platforms like Twitter, Facebook, or Instagram for academic or professional work and development. In Wilkinson's study, scientists were surveyed, of which 73% had never used Twitter, 64% had never used blogs, and 51% had never used online news forums. In the age of the internet, social media offer scientists a powerful means to enhance their professional profiles and serve as voices for science (6). The types of online discussions can vary significantly, with scientists increasingly

using social media to share articles from journals, promote scientific opinions, and spread information about professional opportunities and upcoming scientific events. A growing body of evidence suggests that public visibility and constructive discussions on social media can be highly beneficial for scientists (7). Many scientists and scientific institutions aim to inform the public about potentially dangerous misconceptions and counteract the spread of misinformation, which is often prevalent on social media (8). In fact, research shows alarming deficiencies in the general public's understanding of basic scientific facts, as highlighted in one study this year. For example, the results indicate that only 9% of respondents understand the meaning of antibiotic resistance, while 31% believe that their own bodies have become resistant to antibiotics. This data underscores the significant need for public education on important scientific concepts, raising the question of whether the issue lies with scientists, journalists, or the public itself (9). The relationship between scientists and journalists has evolved in recent years with the emergence of numerous sociocultural changes and significant shifts within the media ecosystem (10). Media professionals have traditionally been the custodians of scientific information, but new media

technologies empower scientists more than ever to be proactive in their public communication (11). Additionally, numerous studies indicate that the majority of scientists consider media visibility to be highly important, and responding to journalists is a professional obligation – a view supported by a significant number of universities and other scientific organizations (12). As for the Republic of Croatia, the popularization of science, spreading scientific knowledge among the broader public, is not prevalent enough. In other countries, such as the United Kingdom, state funds that finance scientific research allocate additional resources (up to 3% of the total amount) for projects if researchers document their efforts to communicate the results of their research to the general public. The popularization of science should be recognized as a national interest and an obligation of institutions, and it should involve the mandatory sharing of scientific information that is essential for the general public. However, there has been an increasing effort in recent times to popularize science in the Republic of Croatia. Institutes are more frequently organizing "open days," the media reports on scientific news, and various scientific events are held. From the above, several issues arise. The primary issue is the insufficient support from state institutions

for the popularization of science (13). On the other hand, responsibility also lies with researchers and scientists, who should actively work to convey their research findings to the broader public through accessible reports and communication (14). Social media serves as a platform for virtually connecting a large number of people from different countries. This enables researchers to access a diverse and global population that can participate in research and accelerates the collection of scientific data. It also facilitates international collaboration among scientists (15). Social media allows the monitoring of global trends, moods, and events worldwide, which is a benefit for researching and analyzing social changes (16).

#### **Social Media as an Educational Platform**

Social media enhances communication and interaction among people in general, particularly between teachers and students. It has been confirmed that social media is an effective way to promote student engagement because it allows introverted individuals to share their ideas and opinions more comfortably. An additional educational benefit of social media is that it facilitates easier communication and provides teachers and students with a centralized hub to unite their ideas and

opinions, share educational content, and more (16). On the other hand, there are negative aspects to using social media. Students can easily develop an addiction to social media, which can lead to reduced social interaction. If this happens, it often results in psychological disorders in individuals, as well as potential concentration and memory issues and reduced attachment (17). Social media has become an indispensable part of today's work and leisure world to the extent that its effective potential for collaboration has become a science in itself. Nevertheless, at least when it comes to external communication, many scientists still hesitate to accept different channels, either out of fear of negative media attention or due to a lack of time. Some researchers have even withdrawn from social media, not necessarily because they had negative experiences, but due to disappointment with some of the negative aspects that are prevalent. However, a clear example of how social media has enabled and facilitated collaborative research is undoubtedly the COVID-19 pandemic and its lockdowns, which further spurred the acceptance and use of social media (18). It is considered that digital infrastructure in Europe is highly advanced, with households, schools, and universities generally having access to the internet. It is estimated that around the

world, as many as 826 million young people do not have access to a computer in their households during their education, and 56 million do not have access to a 3G or 4G network. Particularly during the COVID-19 pandemic, these students found it very difficult, even impossible, to participate in classes without internet access. Furthermore, as much as 82.2% of the population in Africa lacks access to the internet altogether (19).

## CONCLUSION

Social media is treated as a significant addition to the modern world, with a greater impact on bringing people together and providing information. It is increasingly clear that social media is not going away and will continue to connect people. For these reasons, the scientific community should embrace social media. Science is often intertwined with key public issues facing the world. Furthermore, communication among scientists is considered as necessary as active participation on social platforms so that the public can make informed decisions that are in the best interest of society. Given that an increasing number of people spend time on social media every day, scientists can use these platforms to encourage new generations to engage in scientific activities. This will promote education and

learning, allowing them to become scientists themselves one day.

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## ULOGA DRUŠTVENIH MEDIJA U ZNANOSTI

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### SAŽETAK

Platforme društvenih medija pružaju izravan pristup velikoj količini informacija, a samim time omogućavaju i olakšavaju promociju različitog sadržaja. Novi su način prijenosa vijesti širom svijeta te vrlo često utječe na izgradnju društvene percepcije kao i na razvoj javne rasprave. Čak ni znanstvenicima trend uporabe društvenih medija nije nepoznat. Društveni mediji omogućili su im brzo i učinkovito prenošenje rezultata svojih istraživanja diljem svijeta. Mnoga istraživanja na ovu tematiku govore da znanstvenici sve češće sudjeluju u javnim raspravama i aktivnostima na društvenim mrežama te da je gotovo polovica akademskih znanstvenika dio barem jedne društvene mreže. Medijski profesionalci tradicionalno su bili čuvari znanstvenih informacija, ali nove medijske tehnologije daju znanstvenicima veću moć nego ikada prije da budu proaktivni u svojoj javnoj komunikaciji. Također, mnoga istraživanja govore da većina znanstvenika smatra da je prepoznatljivost u medijima jako važna te da je odgovaranje novinarima profesionalna dužnost – stav koji zastupa veliki broj sveučilišta i drugih znanstvenih organizacija.

**Ključne riječi:** uloga, društveni mediji, znanost

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## THORACIC LONGUS NERVE LESION IN A PATIENT WITH ANKYLOSING SPONDYLITIS

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### ABSTRACT

The paper presents a 33 - year - old patient who has been suffering from ankylosing spondylitis since the age of 28. Pain in his right shoulder and weakness in his right arm developed after more hours of walking with a backpack. The performed procedure diagnosed a lesion of the long thoracic nerve without of sensory damage. Peripheral nerve injuries long thoracic nerve lead to weakness of the muscles -serratus anterior muscle and result in a protrusion of the medial side of the scapula (scapula alata). It is difficult to raise the arm in the shoulder joint above the horizontal line, that is to raise the shoulder from the chest when the arm is extended and pressed against a fixed object in front of the patient. Due to its long, relatively superficial course, long thoracic nerve is susceptible to injury, either through direct trauma or stretching. The long thoracic nerve, also called Charles Bell's external respiratory nerve, is a rare isolated nerve damage. The nerve is often injured from carrying a load on his shoulder, with supraclavicular and axillary injuries, blows in the neck area. Injury has been reported in almost all sports, usually occurring from a blow to the ribs with an outstretched arm. Long thoracic nerve can be damaged during breast cancer surgery, especially radical mastectomy that involve the removal of axillary lymph nodes. It is a common lesion in spinal surgeries.

**Key words:** Lesion, long thoracic nerve, ankylosing spondylitis

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## INTRODUCTION

Nervus thoracicus longus (C5 to C7), isolated nerve damage is rare. Due to its long, relatively superficial course, n. thoracicus longus is sensitive to injury. Possible mechanisms of injury are trauma from supraclavicular and axillary blows (injury), (1), heavy loads on the shoulder such as carrying heavy loads in construction workers (2), constant maximum extension from the shoulder with lifting of the upper limb as in many sports: weight lifting (3), golf, tennis, archery (4-6). Nervus thoracicus longus can be damaged during many operations, after breast amputation (especially radical mastectomy that includes the removal of axillary lymph nodes), after thoracotomy (7), during surgery of the front part of the spine that caused an external compressive force on the nerve (8).. Until nerve lesions can occur as a complication of parvovirus infection (9), with compression of the C7 spinal root (10) and idiopathically (11). Damage to the n. thoracicus longus and n. phrenicus after neck chiropractic manipulation (12).

Lesion n. thoracicus longus is manifested by paresis of the serratus anterior muscle and the appearance of a winged scapula - scapula alata (the medial edge of the scapula on the paretic side is located closer to the spine and protrudes from the chest like a

wing). In paresis of the serratus anterior muscle, the scapula moves away from the back. It is difficult to raise the arm in the shoulder joint above the horizontal line, that is, to raise the scapula from the chest when the arm is stretched out and pressed against a fixed object in front of the patient. In the case of an isolated lesion of the thoracic longus nerve, there is no loss of sensation. Paresis is more common on the right side of the body (13).

Ankylosing spondylitis is a chronic, progressive inflammatory rheumatic disease, which affects the sacroiliac joints and the spine with all associated connective structures, costovertebral and costotransverse joints. It often affects the hips and shoulders, less often peripheral joints, and some visceral organs.

Neurological complications are common in inflammatory rheumatic diseases, and peripheral neuropathies are one of the neurological manifestations. Peripheral neuropathies represent a heterogeneous complex of diseases that arise as a result of damage to the peripheral nervous system.

The aim of this work is to present a patient who, after physical load and effort, had an isolated lesion of the n. thoracicus longus and the patient also has an inflammatory rheumatic disease, ankylosing spondylitis.



## CASE REPORT

A 33-year-old patient was diagnosed with ankylosing spondylitis (B 27 positive) when he was 28 years old. The mother is being treated for seronegative spondyloarthropathiae (HLA B 27 positive) and the father is a carrier of the positive HLA B 27 antigen. The patient has no comorbidities.

After several hours of walking on uneven and hilly terrain with a backpack weighing about 10 kg, which he carried over his right shoulder, a patient with a medium osteomuscular build developed pain in his right shoulder, with difficulty in mobility in the shoulder joint with a protrusion of the scapula. The patient works as a merchant and was lifting heavy loads at work.



*Picture 1. Scapula alata – winged scapula in lesion of n. thoracicus longus*

During the clinical examination, the patient complained of difficulty in raising the right

arm above the horizontal line, during which the scapula protruded from the thoracic wall (winged scapula - scapula alata).

An X-ray examination of the cervical and thoracic spine and the right hemithorax was performed, the findings were normal. X-ray and ultrasound of the right shoulder were also normal. MR findings of the cervical spine were normal.

In our patient, electromyoneurography (EMNG) of n. thoracic longus, which showed that it was a severe neurogenic lesion of the nerve, and electromyography (EMG) showed paralysis of the n. serratus anterior. Treatment was carried out using physical therapy: individual kinesiotherapy (shoulder range of motion exercises, exercises to strengthen the serratus anterior muscle and other muscles that stabilize the scapula: rhomboideus major and minor, levator scapulae and trapezius muscles).

We also used electrostimulation to strengthen the mentioned muscles. From electroanalgesic therapy to reduce pain we used TENS - transcutaneous electrical nerve stimulation.

Due to his rheumatic disease of ankylosing spondylitis, which affected the axial skeleton (the entire spine and sacroiliac joints), the patient was treated with the antirheumatic drug ibuprofen in doses that

depended on the inflammation and pain. After the lesion of n. thoracicus longus, in addition to ibuprofen, he also took the opiate tramadol for pain.

Physical therapy procedures are repeated several times over a period of up to 2 years, during which a possible recovery of the nerve is expected.

Electroneuromyography n. thoracicus longus was performed several times in a period of up to 2 years and showed that there was no recovery of the nerve n. thoracicus longus, because it was a more serious nerve injury - neurotmesis, which has a worse prognosis.

The patient worked as a merchant, and since he could no longer do his job as a merchant, he completed his education and continued to work on a computer.

## DISCUSSION

N.thoracicus longus (NTL), long thoracic nerve, so named because of its length of up to 25 cm. It was first described and called the external respiratory nerve by the Scottish surgeon Charles Bell (1774-1842). The nerve starts from the anterior ramus of three spinal nerves of the cervical spine, C5, C6 and C7. The long thoracic nerve is formed as the upper part originates from the C5 and C6 roots, and the lower part comes from the C7 root. The roots from C5 and C6

pass through the scalenus medius muscle, while the C7 root passes in front of the muscle. The joining of these two parts takes place in the axilla. The nerve descends behind the brachial plexus and the axillary artery and vein, lying on the outer surface of the serratus anterior muscle. It runs along the side of the chest to the lower border of this muscle, supplying fibers to each of its branches. The long thoracic nerve descends downward and passes anterior to the scalenus muscle, descends distally and laterally deep to the clavicle and superficial to the first and second ribs, and then descends down the chest wall along the mid-axillary line on the outer surface of the serratus anterior muscle (14, 15). The long thoracic nerve is a motor nerve and innervates the serratus anterior muscle. The name serratus comes from the Latin term serrare (saw) because it resembles a saw, as it consists of 8 to 10 separate slides that connect the lower surface of the inner edge of the scapula with each of the ribs. Serratus anterior connects the lower surface of the inner edge of the scapula with the rib cage.

M. serratus anterior, the "serrated muscle", starts from the first 8 to 10 ribs and attaches to the medial edge of the scapula. From an



*Picture 2. Scapula alata – The protrusion of the scapula is best seen when the arm is extended forward*

anatomical point of view, the muscle can be divided into the upper part, which is supplied with C5 and C6 fibers, and the lower part, which is supplied with C7 root fibers. The upper part is responsible for scapular protraction (moving the scapula forward along the thoracic wall), and the lower part for scapular stabilization (15, 16).

M. serratus anterior, known as the "boxer's muscle", acts to pull the scapula forward towards the chest, enabling anteversion of the arm and raising the ribs, helping in breathing, so it is also responsible for the anterolateral movement of the scapula, which enables raising the arms. Weakness or paralysis of the serratus anterior muscle results in a "wing" or bulging "fluttering" of the scapula (scapula alata). As the serratus anterior muscle under normal

circumstances pulls the scapula forward, the weakness of the muscles results in the movement of the lower edge of the scapula closer to the spine, resulting in protrusion of the medial side of the scapula (16, 17).

The first description of the scapular wing was published by Dr. M. Winslow in 1723 from France (18). N.thoracicus longus and its blood supply are sensitive to both compression and stretching of the anterior part of the lower segment of the scapula. The subscapular artery through the inferior angle of the scapula supplies blood to the greater part of the anterior serratus muscle, as well as to the peripheral part of the thoracic nerve longus.

Nerve damage can occur after poor epineuria blood flow as a result of compression or stretching of the subscapular artery. N.thoracicus longus and its blood supply are anchored in the serratus



*Picture 3. Scapula alata - it is less visible when the hand is held at the side*

anterior muscle, and together with the muscle participate in the movement of the muscle. With arm adduction, the scapula moves forward, simultaneously bringing the nerves and blood vessels forward, out of the way of the scapula. During arm extension, the serratus anterior muscle prevents the winging of the scapula, preventing stretching of the nerves and blood vessels (17). The anterior serratus muscle is innervated exclusively from the thoracic longus nerve, which after damage results in muscle paralysis, a phenomenon known as the winged scapula. The serratus anterior is primarily responsible for adducting the scapula, a movement that occurs when executing a kick. The serratus anterior works together with the trapezius muscles to allow the continuous upward rotation of the scapula, which is necessary to raise the arm overhead (19).

Compared with other nerves of the brachial plexus, the long thoracic nerve has a relatively smaller diameter which, together with its minimal connective tissue and superficial course along the surface of the serratus anterior muscle, increases its susceptibility to operative or nonoperative damage with subsequent development of the scapular wing. The long thoracic nerve travels to the level of the eighth or ninth rib and is relatively unprotected from the axilla downward. As such, the nerve can suffer

exposure to external injuries, through direct external trauma or compression (carrying loads on the shoulders such as a backpack, heavy wood...). and arm-raising shoulder extension caused by athletics, golf, tennis, weightlifting (20, 21).

Passive arm extension and uncoordinated scapular movements during sports, such as a sudden shoulder snatch, can stretch the long thoracic nerve and its blood vessels, resulting in a winged scapula. It has been observed that with increasing proximity of the thoracic longus nerve to the lower corner of the scapula, less scapular movement is required to compress or stretch the nerve (17, 21).

Procedures in the thoracic region, including radical mastectomy, transthoracic sympathectomy, transaxillary thoracotomy, misplaced intercostal drain, axillary lymph node dissections, thoracic catheter placement, first rib resection, increase the risk for proximal injury to the long thoracic nerve. Understanding the anatomical course of the thoracic longus nerve is important for reducing the risk of unintentional nerve damage and the success of the surgical procedure (21).

Physiological variations in the course of the long thoracic nerve are positioned on the median scalene muscle and can lead to iatrogenic nerve injuries and the formation

of "wings" of the scapula, because the nerve roots can be located anteriorly, posteriorly, or across the median scalene muscle. With the formation of the winged scapula, the serratus anterior muscle does not function synchronously with the other muscles of the shoulder girdle (22).

In our patient, electromyoneurography (EMNG) was performed, which showed that it was a more severe neurogenic lesion of the thoracic longus nerve, and electromyography (EMG) showed paralysis of the n. serratus anterior.

In case of damage to the n. thoracic longus, abnormalities are limited to m. serratus anterior. Other muscles of the upper extremity were also examined, which receive the same innervation from the C5, C6, C7 roots (m.biceps, m.deltoideus, m.supraspinatus, m.infraspinatus, m.triceps, m.pronator teres) cervical radiculopathy was excluded, brachial plexopathy and affection of other proximal nerves. The cervical paraspinal muscles were also examined, a proximal lesion of the cervical roots was excluded (23, 24).

Peripheral nerves are divided into three groups according to the severity of the damage: neuropraxia, axonotmesis and neurotmesis.

Neuropraxia is a disorder of the peripheral nervous system in which there is a temporary loss of motor and sensory function due to blocked nerve conduction, usually lasting six to eight weeks before full recovery. This condition is caused by blunt nerve injury due to external blows or impact injuries to the muscle fibers and nerve fibers leading to repeated or long-term accumulation of pressure on the nerve. As a result of this pressure, ischemia occurs, neural lesions occur, and the human body naturally reacts with edema that extends in all directions of the pressure source. Microscopic evidence shows damage to the myelin sheath but not to the axon. Therefore, distal nerve fibers do not degenerate, and myelin damage can be repaired (23, 24).

Almost all cases of neuropraxia can be completely treated by non-operative means. In cases of neuropraxia, nerve function is temporarily impaired. Recovery begins within two to three weeks after the injury and ends within six to eight weeks. (23, 25).

Axonotmesis is characterized by the interruption of the axon, but the sheath is preserved, the surrounding connective tissue around the axon is preserved. The distal part of the axon degenerates and sometimes it is possible to achieve recovery with conservative treatment, which requires

treatment for up to 18 months, depending on the height of the lesion. These injuries heal about 1 mm/day, slower than neurapraxia, but recovery is possible.

Neurotmesa (greek tmesis means "cutting") is the most serious nerve injury. In this type of injury, both the nerve and the nerve sheath are damaged. Although partial recovery may occur, full recovery is impossible. Neurotmesa occurs in the peripheral nerves and most often in the upper extremities, and accounts for 73.5% of all cases of peripheral nerve injuries (25).

Injuries resulting from repetitive activity or carrying heavy loads are incomplete and generally resolve spontaneously within 6 to 24 months (25). In these cases, physical therapy and exercise are crucial for maintaining the range of motion and strengthening the surrounding muscles (26).

Therapeutic procedures are to strengthen the serratus anterior muscle and other muscles that stabilize the scapula (m. rhomboideus major et minor, m. levator scapulae and m. trapezius), thereby reducing muscle atrophy and shoulder progression towards shoulder instability. Electrostimulation is used to improve muscle strength. From electroanalgesic therapy to reduce pain, we used TENS - transcutaneous electrical nerve stimulation.

Patients who have nerve damage, neurotmesis, often face a poor prognosis, and the damaged nerve never fully recovers. If the recovery is weak, a surgical procedure can be applied, transplanting nerves from another part of the body. Surgical operations give people a better chance of regaining certain body functions. (27).

In the last few years, successful surgical procedures have begun to be performed, which perform endoscopic minimally invasive neurolysis of the thoracic segment of the long thoracic nerve, with the assistance of a robot (28).

In our patient suffering from inflammatory rheumatic disease, ankylosing spondylitis, the lesion of the n. thoracic longus in the period of 2 years, by which time it is expected that the nerve could recover. Electroneuromyography showed that our patient had a severe nerve injury - neurotmesis.

Neurological complications are common in inflammatory rheumatic diseases, and peripheral neuropathies are one of the neurological manifestations. Peripheral neuropathies represent a heterogeneous complex of diseases that arise as a result of damage to the peripheral nervous system.

The general clinical classification of neuropathy is polyneuropathies (when several nerves are affected),

mononeuropathies (when one nerve is affected) and mononeuritis multiplex or multifocal mononeuropathy when two or more isolated nerves in different parts of the body are affected. Of all forms of peripheral neuropathies, mononeuritis multiplex is considered a specificity of inflammatory rheumatic diseases because according to some analyses, 31% of patients with this form of PN were diagnosed with rheumatic disease (29).

Peripheral neuropathies are most often found in systemic lupus erythematosus (SLE), systemic vasculitis, rheumatoid arthritis (RA), and primary Sjögren's syndrome (pSS) (26, 28). They can also be found in systemic sclerosis, a mixed connective tissue disease (29, 30).

The nervous system is most often affected in vasculitis of medium-sized blood vessels (for example, polyarteritis nodosa), but it often appears in other vasculitis as well. The frequency of peripheral neuropathies in patients with polyarteritis nodosum is up to 70%. The disease can initially be presented with peripheral neuropathy, which most often affects the legs. The onset is very acute, pain and paresthesias appear in the area of the affected nerve in a very short time (several hours), motor disturbances develop up to the complete loss of nerve function. Nerve damage is the result of involvement of the vasa venorum and

consequent ischemia and nerve infarction. (30).

According to a retrospective analysis of 1533 patients with SLE, damage to the peripheral nervous system is present in about 14% of patients (31). The most common diagnoses are sensorimotor and pure sensory polyneuropathy (56%), as well as motoneuritis multiplex (9%), where asymmetric manifestations predominate and the distal (sural and peroneal) nerves of the lower extremities are affected (31).

Damage to the peripheral nervous system is best studied in primary Sjögren's syndrome, where sensory polyneuropathy dominates, but sensorimotor polyneuropathy and mononeuritis multiplex are also present (32). In 25% of patients with Sjögren's syndrome, polyneuropathy is the leading or first clinical manifestation of the disease (33).

In rheumatoid arthritis, PNs are usually associated with nerve compression by rheumatoid nodules, swollen synovium, aponeurosis, bony exostoses or vasculitis. Peripheral neuropathies are manifested in RA as entrapment neuropathies, motoneuritis multiplex, sensory-motor and sensory neuropathy, and motor neuropathy is not rare either (34).

Peripheral neuropathies are found in many inflammatory rheumatic diseases, even in

ankylosing spondylitis (35). Gündüz and associates conducted a study on the frequency of peripheral neuropathy in patients with ankylosing spondylitis, without a single symptom of neuropathy, but it was shown that peripheral neuropathy can also be present in asymptomatic patients with this disease (36).

## CONCLUSION

A lesion of the n. thoracicus longus occurred in our patient with inflammatory rheumatic disease, ankylosing spondylitis, after carrying a load on the right shoulder. As it was a case of severe nerve damage - neurotmesis, even after two years of treatment, the nerve did not recover.

In patients with ankylosing spondylitis, there are several studies in the literature that have investigated the relationship between peripheral neuropathy and ankylosing spondylitis, but further studies with larger samples and longer disease duration are awaited to confirm the results and unravel its clinical relevance. We cannot speak with certainty about the connection of the lesion n. thoracicus longus with ankylosing spondylitis, but our patient could have a predisposition for the development of peripheral neuropathy through his inflammatory rheumatic disease, considering that PN are found in many inflammatory rheumatic diseases.

In severe nerve damage, as in our patient with a lesion of n. thoracicus longus the current treatment is focused on new ways of nerve regeneration and new surgical techniques that have been successfully performed in recent years with the help of robots.

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## LEZIJA NERVUS THORACICUS LONGUSA KOD BOLESNIKA S ANKILOZANTNIM SPONDILITISOM

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### SAŽETAK

U radu je prikazan bolesnik star 33 godine, koji od 28 godine života boluje od ankiлоzantnog spondilitisa. Bol u desnom ramenu i slabost desne ruke razvio je nakon više sati hodanja s naprtnjačom. Učinjenom obradom dijagnosticirana je lezija nervusa thoracicus longusa bez ispada osjeta. Periferne ozljede živca n. thoracicus longusa dovode do slabost mišića seratus anteriora a za posljedicu imaju izbočenje medijalne strane skapule (scapula alata). Otežano je podizanje ruke u ramenom zglobu iznad horizontalne linije, odnosno podizanje lopatice od grudnog koša kada je ruka ispružena i pritisnuta o fiksirani objekt ispred bolesnika. Zbog svog dugog, relativno površinskog tijeka, n. toracikus longus osjetljiv je na ozljede, bilo kroz izravnu traumu ili istežanje. Nervus thoracicus longus, koji se naziva i vanjski respiratorni živac Charlesa Bella, rijetko je izolirano oštećenje živca. Često je povređen pri nošenju tereta na ramenu, kod supraklavikularnih i aksilarnih povreda, udaraca u području vrata. Ozljeda je zabilježena u gotovo svim sportovima, obično se pojavljuju od udarca u rebra pri ispruženoj ruci. Dugi torakalni živac može biti oštećen tijekom operacije raka dojke, posebno radikalne mastectomije koje uključuju uklanjanje aksilarnih limfnih čvorova. Česta je lezija kod operacija kralješnice.

**Ključne riječi:** lezija, nervus thoracicus longus, spondylitis ankilosans

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