

KNOWLEDGE AND ATTITUDES ON MANDATORY VACCINATION AMONG STUDENTS OF THE FACULTY OF HEALTH STUDIES OF THE UNIVERSITY OF MOSTAR

Marija Leko¹, Ivan Vasilj¹, Roberta Perković¹, Jurica Arapović²

¹Faculty of Health Studies of the University of Mostar

² Faculty of Medicine of the University of Mostar

88000 Mostar, Bosnia and Herzegovina

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ABSTRACT

Introduction: Vaccination against infectious diseases is the most effective, cost-effective, often unavoidable, or the only possible way to protect individuals and the population from infectious diseases. In the last ten years, a lack of understanding and knowledge about the benefits of vaccination has led to a decline in the number of vaccinated children and the danger of the reappearance of already eradicated infectious diseases.

Objective: To examine the knowledge and attitudes about mandatory vaccination of children among students of the Faculty of Health Studies and the Faculty of Medicine of the University of Mostar.

Respondents and methods: A cross-sectional survey was conducted, which included 150 respondents in the third and fourth year of study, 50 respondents from the Faculty of Medicine, and 100 respondents from the Nursing and Sanitary Engineering study tracks at the Faculty of Health Studies. Data were collected through a self-assessment questionnaire. **Results:** Over 90% of respondents have a positive attitude towards vaccination and would vaccinate their children. The results show that respondents form their attitudes about vaccination based on academic activities. Students with a positive attitude about vaccination also showed greater knowledge about it. Nursing students have the weakest knowledge, followed by showing a greater aversion to vaccines than other respondents. More than a quarter of respondents are convinced of the connection between autism and vaccines, and this is also the case for autoimmune diseases.

Conclusion: Although students of biomedical studies have positive attitudes about vaccination, the level of knowledge was more significant among students of the Faculty of Medicine compared to the study tracks of the Faculty of Health Studies.

Keywords: knowledge, attitudes, students, vaccination, education

Contact person: Marija Leko, MA Sanitary Engineering, PhD student

E-mail: marija.santic93@gmail.com

INTRODUCTION

Through systematic vaccination, which began to be implemented in the second half of the 20 century, many infectious diseases worldwide and in our country have disappeared in medical practice (1). Global vaccination coverage has stalled at 86.0%. Although the world is developing day by day, around 19.5 million children are still not sufficiently vaccinated (2). Vaccine use aims to protect the non-vaccinating population, which is achieved by high vaccination coverage and the creation of collective immunity (3). The tremendous success of vaccination is the eradication of smallpox on a global scale and poliomyelitis in Western European countries. Despite this, it is necessary to continue consistently implementing vaccination programs due to the possibility of spreading infection from countries where these diseases are still present. This fact is significant in a modern and globalized world where the high mobility of the population increases the possibility of the spread of such infectious diseases (4, 5).

In recent years, the Federation of Bosnia and Herzegovina (*FBiH*) has recorded a systematic decline in vaccination coverage below 70.0%, which increases the possibility of the appearance of infectious diseases among the population (6). There are several reasons for this: parental refusal of vaccination, non-objective contraindications, media that do not promote vaccination, intimidation of parents by individual's media appearances, but also poor education of health workers. This is also visible in Herzeg-Bosnia

County, where health professionals do not recommend vaccination, and only 13.0% of the respondents attended vaccination - related education (7). Health workers have more positive attitudes about vaccination than the general population. And the results show that the abolition of mandatory vaccination would negatively impact the population's vaccination rate (8). A study conducted in Zagreb showed an unrealistic self-assessment of knowledge related to their negative attitudes about vaccination. As many as 82.0% of participants self-initiated information about vaccination, and the source of information is most often Internet portals and forums. Poor knowledge led to the conclusion that 70.0% of respondents believed that vaccines cause, for example, autism (9). Also, the vaccination rate is falling due to the increasing distrust in the pharmaceutical industry (10). Such findings are not aligned with the results of research conducted in other European countries, which showed that parents are mostly not against vaccination and have positive attitudes about its application (11). The research conducted in Varaždin gave interesting results where 62.0% of parents believed that the media and other parents' experiences did not influence their final decision on vaccination (12). Since the lack of education is the most important factor in ignorance and making wrong decisions, it is evident that an additional effort by health professionals in education is needed (13). This paper aimed to examine the knowledge and attitudes of students of the Faculty of Health Studies and the Faculty

of Medicine in Mostar about mandatory vaccination of children.

RESPONDENTS AND METHODS

Respondents

The conducted research is a cross-sectional study on a sample of 150 respondents. The sample consisted of a test group (N=100) and a control group (N=50). The test group included students in the third and fourth year of the Faculty of Health Studies in Mostar; the study tracks Nursing (N=49) and Sanitary Engineering (N=51). The control group included students of the third (N=25) and fourth year (N=25) of the Faculty of Medicine of the University of Mostar. The research was conducted in March 2018.

Methods

Respondents participated in the research voluntarily after being informed about the purpose and goals of the research. All data were collected using an anonymous survey questionnaire, which the respondents filled out independently. Data were collected through a self-assessment questionnaire. The first part of the questionnaire was sociodemographic variables (gender, age, year of study, study track). They then followed a set of seven questions that tested the students' knowledge about vaccines, vaccination calendars, contraindications, and possible side effects. And with eight questions, opinions on the safety and benefits of vaccines used in BiH, vaccination as the most important and best method of preventing infectious diseases, views on mandatory vaccination of children, and

the quality and scope of study content on vaccination were examined.

Ethical principles

Before filling out the survey, the respondents were informed about the purpose of the research, and the collected data were used exclusively for research purposes. The research on subjects - volunteers were carried out following all applicable guidelines, the aim of which was to ensure the proper implementation and safety of the people who participated in this scientific research.

Statistical processing of the data

Collected data were processed using descriptive and inferential statistics methods. The distribution of data was processed with the Kolmogorov-Smirnov test. Quantitative parametric data are presented with the arithmetic mean and standard deviation, and quantitative non-parametric data with the median and range. Categorical variables are presented with absolute and relative frequencies. Student t-test was used to compare quantitative data between two groups. In the comparison of categorical data, the Chi-square test was used. The significance level for all tests is $p < 0.05$. The software system IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, N.Y., USA) and Microsoft Excel (version 14.0, Microsoft Corporation, Redmond, WA, USA) were used for data processing and analysis.

RESULTS

In the total sample of respondents, the female gender was statistically more significant, 112 (74.7%) compared to the male gender, 38 (25.3%) (χ^2 36,507; $df=1$; $p<0.001$). In the context of study tracks, the representation of the female gender is significant among respondents from the Nursing and Sanitary Engineering tracks ($p<0.001$).

Out of a total of 50 students of Medicine, 46 of them (92.0%) and out of a total of 51 Sanitary

Engineering students, 46 of them (90.2%), supported the mandatory vaccination program in FBiH, while among Nursing students out of a total of 50 respondents, 24 of them (49.0%) supported the mandatory vaccination program ($p<0.001$) (Table 1). The least number of those who believed that the knowledge about vaccination acquired at the faculties was sufficient were students of Sanitary Engineering, that is, 24 of them (47.1%) ($p<0.001$).

Table 1. Attitudes of respondents about vaccines and vaccination shown by study tracks.

		Medicine	Nursing	Sanitary engrg.	Total		
		N (%)	N (%)	N (%)	N (%)	χ^2	P
Recommended, not mandatory vaccine	Yes	4 (8.0)	25 (51.0)	5 (9.8)	34 (22.7)	33.423	0.001
	No	46 (92.0)	24 (49.0)	46 (90.2)	116 (77.3)		
Influence on attitudes about vaccination							
- University lectures		27 (54.0)	16 (32.7)	37 (72.5)	80 (53.3)	25.390	0.001
- professional literature and scientific databases		23 (46.0)	24 (49.0)	11 (21.6)	58 (38.7)		
- TV, magazines, newspapers		- (-)	6 (12.2)	1 (2.0)	7 (4.7)		
- Internet and social networks		- (-)	3 (6.1)	2 (3.9)	5 (3.3)		
	Yes	32 (64.0)	17 (34.7)	24 (47.1)	73 (48.7)	8.588	0.014

Vaccination knowledge adequacy	No	18 (36.0)	32 (65.3)	27 (52.9)	77 (51.3)		
Addition of study tracks	Yes	46 (92.0)	44 (89.8)	49 (96.1)	139 (92.7)	1.501	0.472
	No	4 (8.0)	5 (10.2)	2 (3.9)	11 (7.3)		
Vaccine Safety in FBiH [°]	Yes	45 (90.0)	37 (75.5)	37 (72.5)	119 (79.3)	5.338	0.069
	No	5 (10.0)	12 (24.5)	14 (27.5)	31 (20.7)		
Infect. Dis. ^{°°} prevention	Yes	49 (98.0)	42 (85.7)	49 (96.1)	140 (93.3)	6.939	0.031
	No	1 (2.0)	7 (14.3)	2 (3.9)	10 (6.7)		
Vaccination of children	Yes	50 (100.0)	46 (93.9)	49 (96.1)	145 (96.7)	2.962	0.227
	No	- (-)	3 (6.1)	2 (3.9)	5 (3.3)		
Vaccine education	Yes	50 (100.0)	43 (87.8)	51 (100.0)	144 (96.0)	12.883	0.002
	No	- (-)	6 (12.2)	- (-)	6 (4.0)		

[°]Federation of Bosnia and Herzegovina; ^{°°}Infectious Diseases

Most respondents (79.3 %) consider vaccines in FBiH to be safe. All Medicine students and Sanitary Engineering students believe that by educating people about vaccination, it is possible to reduce the anti-vaccination movement. In contrast, among Nursing students, a smaller number of respondents, six of them (12.2 %), believed that education has no effect ($p < 0.002$). There is a significant difference in the answers to the question of the effect of vaccines on the occurrence of autism and autoimmune diseases. Nursing students, 22 of them (44.9 %), consider autism as a consequence of vaccination, while

only four (8.0 %) Medicine students believe that autism is a consequence of vaccination ($p < 0.001$). Similar results were recorded regarding autoimmune diseases, where 18 (36.7 %) Nursing students considered the occurrence of autoimmune diseases to be related to vaccination. In contrast, in the group of medical students, only one student (1.0 %) associated the occurrence of these diseases with vaccination ($p < 0.001$). (Table 2).

Table 2. Analysis results of the respondents' test answers on vaccines and vaccination.

		Medicine (n=50) N (%)	Nursing (n=49) N (%)	Sanitary engrg. (n=51) N (%)	Total (n=150) N (%)	χ^2	P
Vaccination against Hepatitis B is carried out with 3 doses of the vaccine (in months)	0,1,3	7 (14.0)	13 (26.5)	6 (11.8)	26 (17.3)	6.403	0.171
	0,1,6	40 (80.0)	35 (71.4)	40 (78.4)	115 (76.7)		
	0,6	3 (6.0)	1 (2.0)	5 (9.8)	9 (6.0)		
Anaphylaxis to a vaccine ingredient is an absolute and permanent contraindication to vaccination?	Yes	28 (56.0)	26 (53.1)	35 (68.6)	89 (59.3)	2.855	0.240
	No	22 (44.0)	23 (46.9)	16 (31.4)	61 (40.7)		
A vaccine that is not included in the mandatory vaccination calendar in BiH	- (-)		4 (8.2)	2 (3.9)	6 (4.0)	9.988	0.125
	P ^{oo}	1 (2.0)	4 (8.2)	3 (5.9)	8 (5.3)		
	D ^{oo}	- (-)	3 (6.1)	2 (3.9)	5 (3.3)		
	G ^{oo}	49 (98.0)	38 (77.6)	44 (86.3)	131 (87.3)		
Poliomyelitis has been eradicated worldwide.	Yes	14 (28.0)	19 (38.8)	23 (45.1)	56 (37.3)	3.220	0.200
	No	36 (72.0)	30 (61.2)	28 (54.9)	94 (62.7)		
Vaccines cause autism.	Yes	4 (8.0)	22 (44.9)	13 (25.5)	39 (26.0)	17.522	0.001
	No	46 (92.0)	27 (55.1)	38 (74.5)	111 (74.0)		
Vaccination protects the	Yes	45 (90.0)	45 (91.8)	43 (84.3)	133 (88.7)		

recipient and those who cannot be vaccinated.	No	5 (10.0)	4 (8.2)	8 (15.7)	17 (11.3)	1.540	0.463
Vaccination increases the risk of the autoimmune diseases occurrence.	Yes	1 (2.0)	18 (36.7)	9 (17.6)	28 (18.7)	19.719	0.001
	No	49 (98.0)	31 (63.3)	42 (82.4)	122 (81.3)		

^oHepatitis B; ^{oo}Poliomyelitis; ^{oooo}Diphtheria; ^{oooo}Influenza

Medicine students showed the greatest knowledge about vaccines and vaccinations, 83.7 % of them, followed by Sanitary Engineering students (75.7 %) while nursing students showed the least knowledge, where 67.7 % answered the questions correctly.

DISCUSSION

This research showed uneven attitudes and knowledge among students of biomedical study tracks at the University of Mostar. Sanitary engineering and medicine students had a positive attitude about mandatory vaccination, while nursing students' opinions were divided. In a study among Polish students, attitudes about vaccination at medical and non-medical universities differed significantly (14). Through the survey, it was determined that Polish students have significant gaps in knowledge regarding vaccination, while in Croatia, all students had a positive attitude about vaccination, which is a good result considering that all study tracks are from the biomedicine field and that their education about vaccination is at a high level (15).

A cross-sectional survey conducted on a sample of 509 students of the University of Belgrade also showed positive attitudes towards vaccination. Differences in the knowledge of the Faculty of Medicine students compared to respondents from other faculties were identified. All of the above indicates that future health workers are an essential link in future public health programs (16). Nursing students showed the slightest knowledge but also the most dissatisfaction due to insufficient education at the university, which can significantly affect attitudes about vaccination and vaccination promotion. Negative attitudes and lack of knowledge regarding vaccination among nursing students have been proven in other countries (17). A significant difference concerning gender was found in the additional expansion of vaccine and vaccination education at faculties, where women support the growth of education more than men. Educating can be done as early as adolescence because vaccine experiences (e.g., pain or education) can potentially create future attitudes toward vaccination. It may influence future vaccine

behavior, including their participation in adolescent vaccine decision-making, their decisions to vaccinate as adults, and their decisions to vaccinate their children (18). Health professionals must find the necessary information about vaccination in valid and verified sources. Students' attitudes about vaccines and vaccinations in this research were influenced mainly by lectures at the college and professional literature and scientific databases, while a smaller part of Nursing and Sanitary Engineering students mentioned other sources, such as TV, magazines, newspapers, and the Internet. The views of parents and other participants who oppose vaccination are most often based on wrong, distorted information. Therefore, the role of all health professionals in this matter is immeasurable to correct the wrong attitudes of parents and lead them towards a positive attitude toward vaccination. In a representative study, Weigel et al. found a significant correlation between doctors' attitudes toward vaccination and the vaccination rate (19). Most pediatricians in Italy support vaccination; however, targeted interventions are needed to increase parents' trust in pediatricians (20). Parents of children often equate the role of pediatricians (5.4%) and information they find on the Internet (63.8%) since they can get information from various sources and not necessarily from people who have the necessary qualifications and knowledge to inform the public about such topics (7). The students assessed the acquired knowledge at the university as insufficient for their future work, and a large percentage believed that educating the

population about the benefits of vaccination would reduce the impact of the anti-vaccination movement. 92.7% of students said they favored the expansion of vaccination study content. For example, in similar surveys, 29.0% of students from the USA and 21.0% from Canada pointed out the need for additional vaccination content at faculties (19, 20). These results imply the importance of improving education at the University of Mostar and FBiH. In this research, 26.0% of nursing students stated that the use of vaccines could cause autism, and 18.07% of them have autoimmune diseases. In a Spanish study, medical and nursing students, in more than half of the responses, believed there is a link between vaccinations and autism or even allergies (23). Also, it was shown that American adults think they know as much or more than doctors (36.0%) and scientists (34.0%) about the causes of autism, and the analysis showed that overconfidence is highest among those with a low level of knowledge about the causes of autism and among those with a high degree of acceptance of misinformation (24). This fact is particularly worrisome because health professionals play a significant role in reducing misconceptions and misinformation regarding vaccines and vaccinations, and almost half of the nursing students in our research associated vaccination with autism and were in favor of the recommended vaccination program. A study conducted among medical students at a major university in Saudi Arabia indicates a significant linear relationship between vaccination knowledge and attitudes (25). We believe that this

is also a considerable number of future healthcare professionals who could cause additional damage to children's vaccination levels due to their erroneous beliefs. This especially applies to nursing students, the most numerous staff among health professionals. Vaccination has become an extremely topical topic in recent decades due to the increase in parents who oppose it, even though they do not provide adequate arguments. Future healthcare workers should be educated in a timely and accurate manner about vaccines and vaccinations to scientifically form correct attitudes and contribute to parents' safety when deciding to vaccinate their children.

CONCLUSION

The attitudes and knowledge of the Faculty of Health Studies students are not at the adequate level of future health workers who should advocate vaccination as a safe and effective measure of prevention of infectious diseases. It is a positive fact that medical and sanitary engineering students supported vaccination more than nursing students, considering the widespread impact of these study tracks on public health. The need to strengthen educational capacities regarding biomedical courses at the University of Mostar is obvious. The introduction of courses that would deal more with communication in healthcare, evidence-based medicine, and the benefits of vaccination would contribute to a better understanding of the entire issue related to the continuity of the vaccination program in FBiH.

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ZNANJE I STAVOVI O OBVEZONOM CIJEPLJENJU MEĐU STUDENATIMA FAKULTETA ZDRAVSTVENIH STUDIJA SVEUČILIŠTA U MOSTARU

Marija Leko¹, Ivan Vasilj¹, Roberta Perković¹, Jurica Arapović²

¹Fakultet zdravstvenih studija Sveučilišta u Mostaru

²Medicinski fakultet Sveučilišta u Mostaru

88000 Mostar, Bosna i Hercegovina

SAŽETAK

UVOD Cijepljenje protiv zaraznih bolesti najdjelotvorniji je, najisplativiji i, nerijetko, nezaobilazni ili jedini mogući način zaštite pojedinca i stanovništva od zaraznih bolesti. Nerazumijevanje i nepoznavanje dobrobiti cijepljenja zadnjih 10 godina je dovelo do pada procijepljenosti djece te opasnosti od ponovne pojave već iskorištenih zaraznih bolesti. **CILJ** Ispitati znanje i stavove o obveznom cijepljenju djece među studentima Fakulteta zdravstvenih studija i Medicinskog fakulteta Sveučilišta u Mostaru. **ISPITANICI I METODE** Provedeno je presječno istraživanje u koje je bilo uključeno 150 ispitanika treće i četvrte godine studija, 50 ispitanika s Medicinskog fakulteta i 100 ispitanika s Fakulteta zdravstvenih studija, studij sestrinstva i sanitarnog inženjerstva. Podatci su prikupljeni putem samo-ocjenjujućeg anketnog upitnika. **REZULTATI** Preko 90 % ispitanika ima pozitivan stav prema cijepljenju te bi cijepilo svoje dijete. Rezultati pokazuju da ispitanici svoje stavove o cijepljenju stvaraju na temelju akademskih aktivnosti. Studenti koji imaju pozitivan stav o cijepljenju pokazali su i veće znanje o istom. Studenti sestrinstva imaju najslabije znanje što je praćeno činjenicom da su pokazali veću averziju prema cjepivima u odnosu na druge ispitanike. Više od četvrtine ispitanika je pozitivnog stava u povezanosti autizma sa cjepivima, što prati i stav za autoimune bolesti. **ZAKLJUČAK** Iako studenti biomedicinskih studija imaju pozitivne stavove o cijepljenju, razina znanja je bila značajnija u studenata Medicinskog fakulteta u odnosu na studijske programe Fakulteta zdravstvenih studija.

Ključne riječi: znanje, stavovi, studenti, cijepljenje, edukacija

Osoba za razmjenu informacija: Marija Leko, magistar sanitarnog inženjerstva, PhD student

E-mail: marija.santic93@gmail.com