



## Comparison of Knowledge and Opinions of Students of the Medical University of Lodz and the University of Lodz about Vaccinations

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## Abstract

**Introduction:** *The use of vaccines and the introduction of mandatory preventive vaccinations over the past two centuries has helped to control, and in some cases completely eliminate, serious infectious diseases and significantly improve the epidemiological situation.*

**Objectives:** *The aim of the study was to learn and compare the knowledge and opinions of students of the Medical University of Lodz and the University of Lodz about preventive vaccinations.*

**Material and methods:** *The study was conducted from February to May 2018 among first-year students of selected MA studies at the Medical University of Lodz and the University of Lodz. When collecting empirical material, the author's survey questionnaire was used, intended for students to fill in individually.*

**Results:** *In the group of all respondents, more than half of the respondents, i.e. 52.5% (105 people) thought that vaccinations are definitely safe for the body. In the group of students of the University of Medical Sciences such persons constituted 56.0%, while among those studying at the University of Lodz this percentage was smaller and amounted to 49.0%. In the group of students of the University of Lodz, 11.0% of respondents (11 people) were of the opinion that protective vaccinations are unlikely to be safe for humans.*

**Conclusions:** *The level of knowledge of students about preventive vaccinations is insufficient. Medical students have a higher level of knowledge compared to non-medical students. Lack of knowledge and misconceptions about preventive vaccinations among young people may lead to increased prevalence of lack of child vaccination in the future.*

**Key words:** *vaccinations, students, knowledge, health behaviours*

## Introduction

The concept of “vaccine” in the sense of a biological preparation that enhances immunity to a given disease, as well as the concept of vaccination were introduced in 1796 by Edward Jenner. Jenner conducted a medical experiment in which he used the infectious vaccinia pox material to vaccinate an eight-year-old boy, which resulted in an effective immunisation against smallpox virus. It should be emphasised, however, that the advances in vaccines initiated the discoveries of Louis Pasteur and Robert Koch. In 1885 L. Pasteur made the first effective vaccinations that protected against rabies virus. He also developed a method for rapid virus propagation by breeding it in rabbit organisms and its attenuation by draining the cerebrospinal fluid. R. Koch, however, during his research on the cholera vibrio proved that a single infection protects against subsequent infections during the same epidemic. The first attempts to use killed *V. cholerae* cells for immunisation were made at the end of the 19th century by Jaime Ferrán [1].

Immunisations are a way of immunising the body, which is based on giving a person a preparation called a vaccine. It is a cheap and effective form of preventing infectious diseases. The vaccine is a biological product that contains substances capable of causing immunological processes conditioning the acquisition of immunity without causing toxic effects [2].

Very often the terms “vaccination” and “immunisation” are used interchangeably. However, there is a difference between them, because the first concept means active prevention and the second means intervention that can be both active and passive. The task of vaccination is to elicit an immune response like that arising from reinfection after infection with a natural microorganism. Post-vaccination long-term immunity is associated with the emergence of antigen-specific “effectors” and memory cells. The first group includes antibodies capable of binding toxins or microorganisms and cytotoxic T lymphocytes that recognise and destroy the pathogen [3].

Undergoing vaccination, a person is slightly exposed to the occurrence of adverse reactions of the body to the preparation, i.e. reactions or vaccination complications. Although the use of preventive vaccinations carries a very small risk of these complications, it should be remembered that in no way does it counterbalance the threat to which a non-immunised person is exposed. Vaccination is the most effective tool in combating and preventing infectious diseases and prepares the human body to confront pathogens [4]. Preventive vaccinations reduce the incidence, number of complications and deaths, and ultimately, as in the case of smallpox, they allow to completely eliminate the disease [5,6].

The use of vaccines and the introduction of mandatory preventive vaccinations over the past two centuries has helped to control, and in some cases completely eliminate, serious infectious diseases and significantly improve the epidemiological situation. In the US and Western Europe, the incidence of infectious diseases and related mortality compared to the time before the introduction of mandatory vaccination decreased by 95-99%. Thanks to the use of vaccines, the incidence of diseases such as diphtheria, tetanus, mumps, measles, rubella and poliomyelitis has decreased by over 90% [7,8,9].

According to data from the World Health Organization (WHO), vaccinations save lives of about 2-3 million people every year.

## **Objectives**

The aim of the study was to learn and compare the knowledge and opinions of students of the Medical University of Lodz and the University of Lodz about preventive vaccinations.

## **Material and methods**

The study was conducted from February to May 2018 among first-year students of selected MA studies at the Medical University of Lodz and the University of Lodz. When collecting empirical material, the author's

survey questionnaire was used, intended for students to fill in individually. The survey consisted of 28 multiple-choice questions and a metric consisting of 5 questions. The survey was voluntary and anonymous. Respondents were asked to complete the questionnaire after the classes. The study involved 100 students of the University of Lodz studying in the following fields: cosmetic chemistry, pedagogy, psychology, accounting and Slavic philology, and 100 students of the Medical University studying nursing, dietetics and public health. The data contained in the surveys were entered in the MS Excel spreadsheet. To develop the collected empirical material, descriptive methods and statistical inference methods were used. For the description of the whole examined group and subgroups distinguished on the basis of qualitative features, structure indicators were calculated, which were expressed as a percentage [%]. To compare the incidence of particular categories of quantitative features in the analysed groups, the chi-square independence test or chi-square independence test with Yates's correction was used. The results for which the values of the statistics obtained in the conducted tests belonged to the critical area of the relevant distribution at the significance level  $p=0.05$  were considered significant. For statistical analysis, STATISTICA version 10.1 was used.

## Results

Among all students (200 people), the clear majority were women, i.e. 84.0% (168 people). Among the students of the Medical University, women constituted 89.0% (89 people), while among those studying at the University of Lodz 79.0% (79 people) ( $p>0.05$ ) (Tab. 1).

Among all respondents, most respondents were aged 23-24 (85.0%, 170 people). In the group of students of the Medical University, people aged 23-24 constituted 82.0% of the respondents, and at the University of Lodz 88.0% ( $p>0.05$ ) (Tab. 1).

In the group of all students, the largest group, i.e. 42.0% of respondents (84 people) were residents of cities with a population of over

100,000. The largest number of students at the Medical University, i.e. 32.0% of the respondents (32 persons) lived in cities with a population of up to 50,000, while among students of the University of Lodz the largest number were residents of cities with a population of over 100,000 (59.0%, 59 people). The observed differences turned out to be statistically significant -  $p < 0.05$ ,  $\text{Chi}^2 = 25.505$  (Tab. 1).

Among all students, the majority, i.e. 86.0% (172 persons) believed preventive vaccinations are definitely effective in protecting children against infectious diseases. This opinion was shared by all students at the Medical University and 72.0% of respondents studying at the University of Lodz (Tab. 2).

In the group of all respondents, more than half of them, i.e. 52.5% (105 people) thought that vaccinations are definitely safe for the body. In the group of students of the University of Medical Sciences such persons constituted 56.0%, while among those studying at the University of Lodz this percentage was smaller and amounted to 49.0%. In the group of students of the University of Lodz, 11.0% of respondents (11 people) believed protective vaccinations are unlikely to be safe for humans. The observed differences in the responses of students of the Medical University and the University of Lodz turned out to be statistically significant -  $p < 0.05$ ,  $\text{Chi}^2 = 14.479$  (Tab. 3).

In the group of all respondents, the most of them, i.e. 41.5% (83 people) had no opinion on the legitimacy of protective vaccination against influenza. Among the students of the Medical University, the largest group, 57.0%, were people who considered flu vaccination to be quite legitimate. Among students at the University of Lodz, most respondents (60.0%) had no opinion on this subject. The observed differences turned out to be statistically significant -  $p < 0.05$ ,  $\text{Chi}^2 = 78.542$  (Tab. 4).

Table 1. Respondents' characteristics

Gender	Medical University		University of Lodz		Total		p
	N	%	N	%	N	%	
Female	89	89.0	79	79.0	168	84.0	>0.05
Male	11	11.0	21	21.0	32	16.0	
Total	100	100.0	100	100.0	200	100.0	
<b>Age</b>	N	%	N	%	N	%	p
23-24	82	82.0	88	88.0	170	85.0	
25-26	17	17.0	9	9.0	26	13.0	>0.05
27 and more	1	1.0	3	3.0	4	2.0	
Total	100	100.0	100	100.0	200	100.0	
<b>Place of residence</b>	N	%	N	%	N	%	p
Village	26	26.0	17	17.0	43	21.5	
City to 50,000 residents	32	32.0	19	19.0	51	25.5	<0.05 Chi <sup>2</sup> =25.505
City over 50 to 100,000 residents	17	17.0	5	5.0	22	11.0	
City over 100,000 residents	25	25.0	59	59.0	84	42.0	
Total	100	100.0	100	100.0	200	100.0	

Table 2. Comparison of opinions of students of the Medical University and the University of Lodz about the effectiveness of vaccination in protecting children against infectious diseases

Opinions on vaccination effectiveness	Medical University		University of Lodz		Total	
	N	%	N	%	N	%
They are definitely effective	100	100.0	72	72.0	172	86.0
They are rather effective	0	0	27	27.0	27	13.5
No opinion	0	0	1	1.0	1	0.5
Total	100	100.0	100	100.0	200	100.0

Table 3. Comparison of opinions of students of the Medical University and the University of Lodz about the safety of vaccination in protecting children against infectious diseases

Opinions on the safety of preventive vaccinations for children	Medical University		University of Lodz		Total		p
	N	%	N	%	N	%	
They are definitely safe	56	56.0	49	49.0	105	52.5	<0.05 Chi <sup>2</sup> = 14.479
They are rather safe	41	41.0	40	40.0	81	41.2	
They are rather unsafe	0	0	11	11.0	11	5.5	
They are definitely unsafe	0	0	0	0	0	0.0	
No opinion	3	3.0	0	0	3	1.5	
Total	100	100.0	100	100.0	200	100.0	



Table 4. Comparison of opinions of students of the Medical University and the University of Lodz on the legitimacy of vaccination against influenza

Opinions on the legitimacy of influenza vaccination	Medical University		University of Lodz		Total		p
	N	%	N	%	N	%	
They are definitely legitimate	12	12.0	23	23.0	35	17.5	<0.05 Chi <sup>2</sup> =78.542
They are rather legitimate	57	57.0	1	1.0	58	29.0	
They are rather not legitimate	7	7.0	16	16.0	23	11.5	
They are definitely not legitimate	1	1.0	0	0	1	0.5	
No opinion	23	23.0	60	60.0	83	41.5	
Total	100	100.0	100	100.0	200	100.0	

Among all respondents, more than half of them, i.e. 53.0% (106 people), when asked whether vaccinations should be mandatory, answered that they definitely should. In the group of students at the Medical University, people claiming so constituted 69.0%, while among students of the University of Lodz the percentage of people who had the same opinion was significantly lower and amounted to 37.0% ( $p < 0.05$ ,  $\text{Chi}^2 = 48.303$ ) (Tab. 5).

Among the total number of respondents, the largest group, i.e. 45.5% of students (91 people) were people who disagreed with the views and activities of anti-vaccination movements. In the group of students of the Medical University such opinion was expressed by 74.0% of respondents (74 people), while among those studying at the University of Lodz the percentage of such was significantly lower and amounted to 17.0%. In the group of students of the University of Lodz, the largest number of people, i.e. 42.0%, claimed that they had never encountered anti-vaccination movements. The observed differences in the responses of students of the Medical University and the University of Lodz turned out to be statistically significant –  $p < 0.05$ ,  $\text{Chi}^2 = 78.012$  (Tab. 6).

Among all respondents, the largest number of people, i.e. 42.0% (84 people) indicated health care workers (e.g. a doctor) as the main source of knowledge about preventive vaccinations. In the group of students of the Medical University, the most frequently indicated source of knowledge about protective vaccinations were classes at the university (74.0% of respondents), while among those studying at the University of Lodz – healthcare workers; this was the answer given by 60.0% of respondents ( $p < 0.05$ ,  $\text{Chi}^2 = 116.242$ ) (Tab. 7).

Table 5. Comparison of opinions of students of the Medical University and the University of Lodz on whether preventive vaccination should be mandatory

Opinions on whether preventive vaccination should be mandatory	Medical University		University of Lodz		Total		p
	N	%	N	%	N	%	
Definitely yes	69	69.0	37	37.0	106	53.0	<0.05 Chi <sup>2</sup> =48.303
Rather yes	31	31.0	25	25.0	56	28.0	
Rather no	0	0	16	16.0	16	8.0	
Definitely yes	0	0	0	0	0	0.0	
No opinion	0	0	22	22.0	22	11.0	
Total	100	100.0	100	100.0	200	100.0	

Table 6. Comparison of opinions of students of the Medical University and the University of Lodz on anti-vaccination movements in Poland

Opinions on anti-vaccination movements in Poland	Medical University		University of Lodz		Total		p
	N	%	N	%	N	%	
Fully support their activity	0	0	0	0	0	0.0	<0.05 Chi <sup>2</sup> =78.012
Partially support their activity	2	2.0	18	18.0	20	10.0	
They disagree with their views and activities	74	74.0	17	17.0	91	45.5	
They have no opinion because they do not know the details of the activities of such movements	19	19.0	23	23.0	42	21.0	
They have not encountered such movements	5	5.0	42	42.0	47	23.5	
Total	100	100.0	100	100.0	200	100.0	

Among all respondents, the most numerous group was people who assessed their knowledge about preventive vaccinations as average (42.5% of respondents, 85 people).

Most students of the Medical University rated their knowledge in the area as average (54.0% of respondents), while those studying at the University of Lodz as poor (69.0% of respondents). The observed differences turned out to be statistically significant –  $p < 0,05$ ,  $\text{Chi}^2 = 117,281$  (Tab. 7).

Table 7. Comparison of sources and self-assessment of knowledge of students of the Medical University and the University of Lodz about preventive vaccinations

Main sources of knowledge about preventive vaccinations	Medical University		University of Lodz		Total	p
	N	%	N	%		
Health care worker (e.g. doctor)	24	24.0	60	60.0	84	42.0
Classes at the university	74	74.0	0	0	74	37.0
Family/friends	5	5.0	34	34.0	39	19.5
Internet	35	35.0	40	40.0	75	37.5
Press	15	15.0	18	18.0	33	16.5
Specialist literature	7	7.0	18	18.0	25	12.5
Self-assessment of knowledge about preventive vaccinations	N	%	N	%	N	%
Very good	0	0	0	0	0	0.0
Good	45	45.0	0	0	45	22.5
Average	54	54.0	31	31.0	85	42.5
Poor	1	1.0	69	69.0	70	35.0
Very poor	0	0	0	0	0	0
Total	100	100.0	100	100.0	200	100.0

<0.05  
Chi<sup>2</sup>=117.281

<0.05  
Chi<sup>2</sup>=116.242

p

## Discussion

In Poland, according to the preventive vaccination program, free (i.e. mandatory) vaccines are available, which provide the narrowest scope of protection, as well as paid (i.e. recommended) vaccinations, broadening the spectrum of protection against infectious diseases [10,11,12]. The implementation of the vaccination program is mandatory, while the decision to carry out the recommended vaccinations depends on the parents. The decision to purchase additional vaccinations is often conditioned by financial possibilities, but above all reliable information about the possibilities of using these vaccinations and about the benefits resulting from them can help make a decision, which is undoubtedly an investment in the child's health [13]. Therefore, it is necessary to educate parents to understand the great importance of preventive measures and to obtain social support for activities promoting protective vaccination [14].

Analysis of the results of the collected empirical material showed that knowledge about preventive vaccinations among students is insufficient. Students of the Medical University due to the specifics of their studies presented greater knowledge, which in effect translated into correct opinions on preventive vaccinations. In the group of students of the University of Lodz, the prevalence of disturbing opinions about preventive vaccinations, such as: uncertainty as to their safety, opposition to the obligation of preventive vaccinations or support for the activities of anti-vaccination movements was significantly higher than in the group of students of the Medical University. Lack of knowledge and misconceptions about preventive vaccinations among young people may escalate the phenomenon of not vaccinating children in the future.

Students of the University of Lodz pointed to healthcare professionals (e.g. doctors, nurses) as the main source of knowledge about preventive vaccinations. Therefore, it is particularly important to properly prepare medical staff to perform the functions of health educators in the field of protective vaccination.

Health education in the field of preventive vaccinations, carried out by a doctor and a nurse, mainly concerns their promotion also as a component of a healthy lifestyle. Constantly introduced new, more improved vaccines make this method effective and safe. However, some parents are reluctant to vaccinate their children, even if they are mandatory, among other things because they cause iatrogenic stress and pain. The unpleasant sensations associated with a visit to the vaccination room and vaccine preparations are eliminated by the efforts of medical staff, professional and good care and a pleasant atmosphere [15].

Another reason for parents' fear of vaccination is the possibility of adverse vaccination reactions. For a parent, the purpose of vaccinating their child is first and foremost to protect them against an infectious disease that they may or may not have. In this situation, the acceptance of adverse vaccination reactions is difficult, especially since healthy children come to be vaccinated, and most vaccinations are carried out in infancy and early childhood. Therefore, the knowledge provided to parents about preventive vaccinations must be reliable and supported by facts. Parents should be aware of the possibility of adverse vaccination reactions, but at the same time comparing this risk with the potential risks arising from contracting an infectious disease [16,17].

The dynamic situation observed in recent years in the implementation of effective immunoprophylaxis in Poland, which aims to further develop the preventive vaccination program in line with trends that are observed in other European countries, creates the need for reliable and permanent education about preventive vaccination. This requires from medical staff – a doctor and a nurse – not only extensive and up-to-date medical knowledge about vaccinations, but also the ability to communicate effectively with the patient or their parents and to build the atmosphere of trust in their relations with them. As shown by the results of research conducted in Poland in the field of decisions regarding vaccinations, medical staff is the most reliable source of information about them [18,19,20].

## Conclusions

1. The level of knowledge of students about preventive vaccinations is insufficient. Medical students have a higher level of knowledge compared to non-medical students.
2. Allowing students to participate in additional, optional classes devoted to the issue of preventive vaccinations, especially in non-medical fields, can effectively increase young people's knowledge in the area. Students were aware of their gaps in knowledge about preventive vaccinations. Most students of the Medical University rated their knowledge about vaccinations as average, while those studying at the University of Lodz as poor.
3. Lack of knowledge and misconceptions about preventive vaccinations among young people may lead to increased prevalence of lack of child vaccination in the future.
4. There is a need to conduct further, systematic research into the knowledge, attitudes and opinions of students about preventive vaccinations in order to implement effective educational programs targeted at young people.



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