



Perceptions of recommended vaccinations before and during pregnancy among women – analysis of the influence of health locus of control and coronavirus anxiety

Postrzeganie przez kobiety szczepień ochronnych zalecanych przed i w trakcie ciąży: analiza wpływu umiejscowienia kontroli zdrowia i lęku przed koronawirusem

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■ Abstract

Introduction and Objective. There is a growing number of people who are negative towards vaccination. Opponents of vaccination uptake can also be found in the group of pregnant women. In order to properly prepare for pregnancy and to protect her offspring from the negative effects of certain diseases, a woman should receive the vaccinations. The aim of this study was to investigate women's perceptions of recommended immunizations before and during pregnancy, focusing on the impact of their health locus of control and apprehensions regarding COVID-19.

Materials and Method. The study was conducted among 144 patients of the Department of Obstetrics, Pregnancy Pathology and Gynaecology. A self-administered questionnaire, the Multidimensional Health Locus of Control Scale (MHLC) version A and the Coronavirus Anxiety Scale (CAS) were used.

Results. Women's attitudes towards immunization turned out to be mostly positive. When deciding to vaccinate during the planning period of pregnancy and during pregnancy, respondents were primarily motivated by the safety of the child, and declined mainly due to lack of knowledge/information about vaccination possibilities. The level of perceived fear of coronavirus influenced the decision to vaccinate against COVID-19 during the preconception period, while it did not influence the decision to vaccinate during pregnancy.

Conclusions. Despite the many proven advantages of vaccinating pregnant women, fears related to insufficient research on vaccine safety lead many pregnant women to refrain from

vaccination. It is advisable to increase the emphasis on the dissemination of knowledge on recommended vaccinations during the preconception period and during pregnancy. Doctors and midwives who care for women should play a central role in this regard.

■ Key words

pregnancy, vaccination, COVID-19, preconception, Health Locus of Control

■ Streszczenie

Wprowadzenie i cel pracy. Rośnie liczba osób negatywnie nastawionych do szczepień. Przeciwników szczepień można znaleźć również w grupie kobiet w ciąży. Aby odpowiednio przygotować się do ciąży i uchronić swoje potomstwo przed negatywnymi skutkami niektórych chorób, kobieta powinna poddać się szczepieniom. Celem pracy było zbadanie poglądów kobiet na temat szczepień ochronnych zalecanych przed i w czasie ciąży w aspekcie umiejscowienia kontroli zdrowia i lęku przed koronawirusem.

Materiał i metody. Badanie przeprowadzono w zakładzie opieki zdrowotnej wśród 144 pacjentek oddziału położnictwa, patologii ciąży i ginekologii. Wykorzystano w nim kwestionariusz ankiety własnej, MHLC wersję A oraz CAS.

Wyniki. Nastawienie kobiet do szczepień ochronnych okazało się w większości przypadków pozytywne. Decydując się na zaszczepienie w okresie planowania ciąży oraz w czasie jej trwania, ankietowane kierowały się przede wszystkim bezpieczeństwem dziecka, a rezygnowały z niego głównie z powodu braku wiedzy/informacji o możliwości zaszczepienia. Kobiety z wysokim poziomem umiejscowienia kontroli zdrowia zależnego od przypadku cechowało negatywne nastawienie do szczepień ochronnych. Poziom odczuwanego lęku przed koronawirusem miał wpływ na decyzję o zaszczepieniu się przeciw COVID-19 w okresie przedkoncepcyjnym, natomiast

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nie miał wpływu na decyzję o zaszczepieniu się w trakcie ciąży.

Wnioski. Pomimo licznych udowodnionych korzyści wynikających ze szczepienia kobiet w ciąży obawy związane z niewystarczającą liczbą badań dotyczących bezpieczeństwa szczepionek powodują, że wiele kobiet w ciąży nie poddaje się szczepieniom. Wskazane jest zwiększenie nacisku na popularyzację wiedzy na temat szczepień zalecanych

w okresie przedkoncepcyjnym oraz w czasie ciąży. Główną rolę w tym zakresie powinni pełnić lekarze i położne, którzy sprawują opiekę nad kobietami.

Słowa kluczowe

ciąża, umiejscowienie kontroli zdrowia, szczepienia, COVID-19, okres przedkoncepcyjny

INTRODUCTION

Immunization prevents many infectious diseases and complications that can follow infection. However, receiving a vaccine can also be associated with the occurrence of complications, although in most cases, only a natural reaction occurs, which is harmless to the human body. The vast minority of people experience a Vaccine Adverse Reaction. Nevertheless, the pros of receiving the vaccination outweigh the cons.

The preconception period and the time of pregnancy represent the moments when a woman prepares her body for conception and the subsequent birth of a healthy child. In order to properly prepare for pregnancy and to protect her offspring from the negative effects of certain diseases, a woman should receive the vaccinations recommended during these periods. Although she has the right to refuse vaccines, she should bear in mind that she is responsible not only for herself but also for her child. Unfortunately, there is a phenomenon of misinformation among women regarding recommended vaccinations which adversely affects vaccination rates. In order to increase the number of vaccinated women, it is considered crucial to inform them about the existence of recommended immunizations and educate them about the benefits. This is the responsibility of health care personnel, primarily the pregnancy practitioner and the midwife.

Immunization is a sensitive topic causing much controversy, having advocates as well as opponents. Everyone has the right to decide whether to accept vaccination, to postpone or to reject it. There is a growing number of people who are negative towards vaccination. Anti-vaccination movements became even more popular after the outbreak of the COVID-19 pandemic [1] and represent a group of people who question the sense and effectiveness of immunizations, rising arguments of their harmful effects on human health [2]. The phenomenon of the anti-vaccination movement is visible in various social groups. Opponents of vaccination uptake can also be found in the group of pregnant women [3].

Two questions can therefore be asked that are closely related: 'What determines the vaccination rate of the population?' and 'What are people really afraid of in relation to vaccination?' There are five factors that determine the vaccination rate of the population: availability, accessibility, awareness, acceptance and activation. The availability and accessibility of immunization is influenced by geographical location and where the vaccination is performed. Studies show that the opportunity to be vaccinated at the workplace and in schools positively influences the vaccination coverage of the population. In addition, people who are closely associated with health care are more likely to be vaccinated compared to those who have limited contact with it. Availability of free vaccinations also has a positive impact on the vaccination status of the population.

However, the most common reason for refusal of vaccination is lack of awareness of its importance. This is why education and public awareness by those working in health care and by credible opinion-forming sources is so important [4]. Based on research, it has been shown that the most common sources of information on vaccination that the public is most likely to use are the doctor, nurse/midwife, the Internet, leaflets, guides and the mass media [5,6,7].

OBJECTIVE

The aim of this study was to determine women's views on immunization recommended before and during pregnancy in terms of health locus of control and fear of coronavirus.

MATERIALS AND METHOD

The study was conducted in 2022 at the Health Care Centre among 144 women of the Obstetrics, Pregnancy Pathology and Gynaecology Department. The study was approved by the Bioethics Committee (KB 336/2022) at the first author's place of affiliation in Bydgoszcz. The questionnaire surveys were located in a generally accessible and visible place. After filling them out, women could drop them into a sealed urn? The questionnaire stated that filling out the survey was voluntary and anonymous, and also constituted consent to participate in the study.

For the purposes of the study, the Multidimensional Health Locus of Control Scale, the SARS-CoV-2 Anxiety Scale and a self-administered survey questionnaire were used, which included questions on the following: women's opinions on immunization, sources of information on immunizations recommended in the preconception period and during pregnancy, decision to receive immunization during the aforementioned periods, type of immunization received, factors influencing acceptance or deferral of immunization, morbidity and acceptance of COVID-19 immunization.

The Multidimensional Health Locus of Control Scale (MHLC), version A, was developed by Kenneth A. Wallston, Barbara S. Wallston, Robert DeVellis, while the adaptation in Polish was made by Zygryd Juczyński. The scale reveals different people's views on certain important health-related issues. It consists of 18 questions which, when analysed, show the beliefs regarding generalized expectations in 3 dimensions of locating health control: internal – my own health depends on me; the influence of others – my own health depends on other people (e.g. medical personnel); chance – my own health is determined by chance or other external factors. Scores are calculated separately for each dimension by summing-up the points. Scores range from

6–36. The higher the score, the stronger the belief that a factor influences health [8].

The Coronavirus Anxiety Scale (CAS) was developed by Sherman Lee and adapted in Polish by Sebastian Skalski, Patrycja Uram and Paweł Dobrakowski. The SARS-CoV-2 Anxiety Scale is a single-factor tool designed to assess the severity of anxiety associated with psychological crisis caused by the coronavirus pandemic. The scale consists of 5 questions, the answers to which are presented on a 5-point scale – where 0 = never and 4 = almost every day. The respondent provides answers based on his/her experience over the past 2 weeks. A score of ≥ 9 indicates the likelihood of coronavirus-related anxiety. A high score within individual statements, as well as a high overall score, may warrant further clinical assessment and/or treatment [9].

The statistical tests used in the current study were Spearman's rho correlation analysis, the Shapiro-Wilk test and the Mann-Whitney U test. A result was considered statistically significant when $p < 0.05$.

RESULTS

The survey was conducted among 144 women between 18 and 45 years of age, mean age – 29.63 years (Tab. 1).

Table 1. Characteristics of the study group

		N	%
Age, years	18–20	7	4,9
	21–25	17	11,8
	26–30	72	50,0
	31–35	28	19,4
	36–40	18	12,5
	41–45	2	1,4
Place of residence	Village	45	31,2
	City of up to 100,000 inhabitants	27	18,8
	City with more than 100 000 inhabitants	72	50,0
Education	Primary	6	4,2
	Professional	18	12,5
	Secondary	37	25,7
	Higher	83	57,6
Marital status	Single	4	2,8
	Married or in Partnership	140	97,2
Professional activity	Learning/Studying	7	4,9
	Unemployed	26	18,1
	Employed	111	77,0
Material status	Very good	28	19,4
	Good	96	66,7
	Average	20	13,9

The majority of respondents believed that vaccines are safe (76.4%), many diseases have been eliminated thanks to preventive vaccination (85.4%), vaccines cause more good than bad (78.4%), the risks of infectious diseases are many times higher than the risks of adverse vaccine reactions (69.5%), vaccination is the most effective way to protect against dangerous diseases (67.3%). Only 41.7% of respondents were of the opinion that vaccines are safe during pregnancy and

its planning. A minority of women believed that: vaccines overload the immune system (11.8%), they contain toxic compounds (13.9%), that instead of vaccination it is better to acquire natural immunity by experiencing a disease (25%), and that vaccination often causes dangerous complications (8.3%). The knowledge about vaccinations recommended in the preconception period and during pregnancy was most frequently obtained by the respondents from their gynaecologist (54.9%) and from the Internet (45.1%), and least frequently from their family doctor (13.9%) and the staff of a birthing school (8.3%).

Preconception immunization was received by 34 women (23.6%). The most common vaccinations were pertussis (61.8%) and influenza (55.9%), followed by vaccination against rubella, measles and mumps (32.4%), hepatitis B (20.6%) and chickenpox (14.7%). The factors that influenced the decision to receive immunization were mainly the safety of the child (76.5%), own safety (55.9%), and the opinion of the gynaecologist (35.3%). In the group of women who did not receive immunization, the main reasons for this decision were most often: lack of knowledge/information about the recommendation to receive the vaccination in the preconception period (26.4%), vaccination before the pregnancy planning period (23.6%), fear that the vaccination would have a negative impact on the development of the foetus (19.1%), and unplanned pregnancy (19.1%).

Protective vaccination during pregnancy was received by 29.2% of the women surveyed. The most common vaccinations were pertussis (71.4%), tetanus (31%), diphtheria (31%), influenza (23.8%). As before, when vaccinating they were primarily guided by the safety of the child. The lack of vaccination was due to their ignorance of the possibility of vaccination.

Coronavirus SARS-CoV-2 infection affected 49.3% of the surveyed women, 34.7% did not pass infection and 16% of the surveyed women did not know whether they had contracted such an infection. 54.9% of the surveyed women chose to be vaccinated against COVID-19 during the preconception period, while 22.9% chose to be vaccinated during pregnancy. After delivery, 9% planned to be vaccinated. As reasons for not being vaccinated, the respondents most frequently mentioned: fear of adverse post-vaccination reactions (37.8%), fear for the health of the child (27.9%), insufficient testing (26.1%), and being a convalescent (21.6%). The respondents' knowledge of SARS-CoV-2 coronavirus came mainly from the Internet (54.2%), less frequently from medical personnel (27.1%) and from television (21.5%). 32.6% did not update their knowledge at all. Among the respondents, 9% feared contracting coronavirus, 33.3% said their fears were decreasing and 57.7% had no fears.

The study group was asked to rate their fear of coronavirus on a scale from 0–4 points. The mean score was 0.75. This meant that the women surveyed mostly did not feel any fear of coronavirus, and high levels were felt only by some (Tab. 2).

The survey also used the MHLC questionnaire to measure the health locus of control among the respondents (Tab. 3).

On the basis of the analysis of normality with the Shapiro-Wilk test, it was shown that only the distribution of the internal health locus of control differed from the normal distribution ($p < 0.05$).

Correlation between interviewed women's views on vaccination and the health locus of control was also explored (Tab. 4).

Table 2. Descriptive statistics for coronavirus anxiety

	Min	Max	M	SD	Me	p	α
I felt dizzy when I read or listened to information about coronavirus.	0	4	0,17	0,63	0		
I had trouble sleeping because I was thinking about coronavirus.	0	3	0,15	0,53	0		
I felt paralyzing anxiety when thinking about or receiving information about coronavirus.	0	4	0,25	0,73	0		
I lost my appetite by thinking about or receiving information about coronavirus.	0	3	0,07	0,35	0		
I had nausea or other stomach problems when thinking or receiving information about coronavirus.	0	3	0,11	0,46	0		
Anxiety level	0	15	0,75	2,12	0	0,000	0,82

Min – minimum, Max – maximum, M – mean, SD – standard deviation, Me – median, p – level of statistical significance, α – Cronbach's alpha

Table 3. Descriptive statistics for the health locus of control

	Min	Max	M	SD	Me	p	α
Internal health locus of control	15	36	26,59	4,55	27	0,010	0,66
Influence of others	6	36	19,13	5,93	20	0,335	0,71
Chance	6	36	17,68	5,66	17	0,123	0,73

Min – minimum, Max – maximum, M – mean, SD – standard deviation, Me – median, p – statistical significance level, α – Cronbach's alpha

It was found that the location of chance-dependent health locus of control was associated with the issues of vaccine safety ($\rho = -0.18$; $p < 0.05$), overloading the immune system by vaccines ($\rho = 0.17$; $p < 0.05$), the presence of toxic compounds in vaccines ($\rho = 0.26$; $p < 0.01$), and causing dangerous complications after vaccination ($\rho = 0.27$; $p < 0.01$). Women who had a high level of chance-dependent health locus of control were more likely to believe that vaccines were not safe, overloaded the immune system, contained toxic compounds and often caused dangerous complications. Their attitudes towards vaccination were therefore negative. When assessing the influence of socio-demographic factors on the health locus of control of the female respondents, only the internal health locus of control scale was found to be associated with education ($\rho = 0.20$; $p < 0.05$). The correlation was positive, meaning that women with a higher education had a higher level of internal health locus of control; they were therefore aware that they were mostly responsible for their own health status (Tab. 5).

Professional activity proved to be irrelevant (Tab. 6).

The study also aimed to verify how fear of coronavirus influenced the decision to vaccinate against COVID-19 – before

Table 5. Results of Spearman's rho correlation analyses for the association of health locus of control with age, place of residence, education and material status

	Internal health locus of control	Influence of others	Chance
Age	0,07	0,00	0,15
Place of residence	0,11	0,04	0,13
Education	0,20*	-0,07	-0,06
Material status	0,03	0,08	-0,15

* $p < 0,05$

Table 6. Results of Mann-Whitney U-test analyses for the association of health locus of control with professional activity

	Inactivity		Activity		U	p
	M	SD	M	SD		
Internal health locus of control	26,03	4,41	26,76	4,60	1,06	0,287
Influence of others	19,33	6,41	19,06	5,81	0,36	0,717
Chance	17,21	4,95	17,82	5,87	0,28	0,780

M – mean, SD – standard deviation, U – Mann-Whitney U statistic, p – statistical significance level

and during pregnancy. It was shown that women with higher levels of perceived coronavirus anxiety were those who had undergone SARS-CoV-2 infection and those who had received the COVID-19 vaccination during the preconception period ($\rho = 0.17$; $p < 0.05$). Thus, the level of perceived fear of coronavirus influenced the decision to be vaccinated against COVID-19 before pregnancy, whereas it did not influence such a decision during pregnancy.

Table 4. Results of Spearman's rho correlation analyses for the association of health locus of control with views on vaccination

	Internal health locus of control	Influence of others	Chance
Do you think vaccines are safe?	0,00	0,04	-0,18*
Do you think that vaccines are safe during pregnancy and its planning?	0,07	-0,02	-0,14
Do you think that many diseases have been eradicated through immunization?	0,14	0,09	-0,14
Do you think vaccines cause more good than bad?	0,02	0,01	-0,12
Do you believe that the risks associated with infectious diseases are many times higher than the risks of adverse vaccine reactions?	0,12	0,03	-0,16
Do you believe that vaccination is the most effective way to protect against dangerous diseases?	0,14	0,15	-0,04
Do you think vaccines overload the immune system?	0,02	-0,01	0,17*
Do you believe that vaccines contain toxic compounds?	-0,09	-0,04	0,26**
Do you think that, instead of vaccination, it is better to acquire natural immunity by being sick?	-0,04	-0,08	0,07
Do you think that vaccinations often cause dangerous complications?	-0,11	-0,07	0,27**

* $p < 0,05$; ** $p < 0,01$

DISCUSSION

Vaccines have significantly reduced the incidence of disease and death from infectious diseases. For this reason, vaccination is considered one of the most important global public health achievements of the 20th century. In recent times, vaccination has caused much controversy which was reinforced during the COVID-19 pandemic when a vaccine was introduced, although many people felt it had not been thoroughly tested. Vaccination has a large number of both opponents and supporters.

Analysing the views of the women surveyed on immunization showed that they were mostly positive. The reasons for not receiving vaccines in the preconception and pregnancy periods were ignorance or completed vaccination before the pregnancy planning period, as well as fear of the negative effects of vaccines on fetal development.

In the study by Pędryś et al. [7], almost half (48%) of the women surveyed believed that vaccination of pregnant women was safe and 54% believed that it was effective. More than half (57%) agreed with the statement that some vaccinations are recommended for pregnant women, 29% were of the opposite opinion and 14% had no knowledge. However, three-quarters of those surveyed while pregnant, did not undergo any of the recommended vaccinations, either because they felt that vaccines for pregnant women are insufficiently tested and therefore not very safe (35%), or because they had no knowledge that it is possible to be vaccinated (34%). Concern for the safety of the child (29%) and their own safety (19%) were also important reasons for not being vaccinated. Scatigna et al. [10] also found that the most common reasons for not receiving the immunization were lack of knowledge about the possibility of receiving the vaccination and the belief that it was not necessary to receive the vaccination. A much smaller percentage of the reasons were lack of time and concerns about the safety of vaccine preparations. According to O'Leary et al. [11], refusals to receive the influenza vaccine during pregnancy were most often due to: belief that the vaccine causes illness (48%), belief that the vaccine is unlikely to cause illness (38%), general concerns about vaccines (32%), desire to maintain a natural pregnancy (31%), and fear of their child becoming ill with autism (25%).

The existing phenomenon of misinformation regarding preventive vaccinations recommended in the preconception and pregnancy periods, and the consequent failure to vaccinate, requires actions leading to increased awareness among Polish women. They should point out that vaccination is an effective protection against disease not only for the woman herself, but also for her child. It is up to the attending physician and midwife to educate the patient in this regard. The woman should be informed about the possibility of receiving the vaccination and be provided with all the necessary knowledge for there to be no room for doubt and understatement. Similar conclusions were made by McCarron et al. [12].

One of the more common sources for obtaining knowledge about vaccination of pregnant women has been the Internet, which can be both an advantage and a disadvantage. Unfortunately, it is relatively easy to obtain erroneous information from the Internet which undermines the reliability of the tests performed or the safety of vaccination. This inevitably has a significant impact on the decision-making of women.

On the other hand, however, the increasing amount of medical advice by professionals on social media can be an excellent way to fill a certain educational niche and reach a wide audience in an accessible way. Specialists in a particular field should be the main source of knowledge for the public. According to a study by Sabahelzai et al. [13], pregnant women actively sought advice on vaccines from health professionals, especially doctors (40%), and about one-fifth (20.8%) said they sought additional information about vaccines on the Internet.

Since 2014, vaccination of pregnant women against influenza – especially in the second and third trimesters of pregnancy – has been recommended in most European countries, including Poland, because during this period pregnant women are most at risk of complications related to influenza. In contrast, since 2015, the pertussis vaccine has been recommended for pregnant women in Poland [7]. Despite the many proven advantages of vaccinating pregnant women, fears related to insufficient research on vaccine safety lead many pregnant women to refrain from vaccination [14]. In the current study, the majority (76.4%) of respondents believed that vaccines are safe, but only 41.7% believed that vaccines are also safe for pregnant women. During the preconception period, the respondents were vaccinated against pertussis – 61.8%, and influenza – 55.9%; and during pregnancy, 71.4% and 23.8%, respectively. In the results of the study by Erazo et al. [15], 36.6% of pregnant women received the influenza vaccination, while in the study by Rowe et al. [16] 39%, and against pertussis 64%.

The current study confirmed that women who have a high level of chance-dependent health locus of control are characterized by negative attitudes towards immunization. Such women are of the opinion that the state of their health does not depend on themselves or, for example, on medical personnel. They attribute whether they become ill or remain healthy to the action of chance, which is not conducive to good health and is largely the cause of a lower sense of responsibility for one's own health [17]. Such individuals may be more prone to refrain from receiving immunization.

The COVID-19 pandemic was a major public health threat and the prevailing fear for self, family and the future left its mark – both mentally and physically – on everyone worldwide [18]. Its persistence led to the acceleration of the development and testing of vaccines to protect people from severe infection [19]. The goal has been largely achieved as the pandemic has ended, but this is not synonymous with the absence of the virus, the disease is still being reported, but no longer on such a large scale as a few years ago. The first of the vaccines was developed and used within less than a year of the start of the pandemic [20]. There was scepticism because a considerable number of people believed that such a rapid introduction of vaccines was synonymous with the fact that they were inaccurately tested and unsuitable for adoption. The current study shows that just over half of the women surveyed had taken the COVID-19 vaccination during the preconception period, while 22.9% said they had taken the vaccination during pregnancy. The postponement of vaccine uptake by the others was most often through fear of adverse vaccine reactions (37.8%), fear for the health of the unborn child (27.9%), and insufficient research (26.1%). Analogous findings were provided by a study by Ayhan et al. [21], in which pregnant women who did not vaccinate against COVID-19 justified the lack of data on the safety of the

vaccine in the pregnant population, as well as the possibility of harm to the developing foetus. In the current study it was found that the women with higher levels of fear of coronavirus were those who had undergone SARS-CoV-2 infection, and those who had received the preconception vaccination. It can be hypothesized that respondents who had undergone the infection may have bad memories associated with it. They were not asked what symptoms they experienced, but they could not have been mild since they were characterized by higher levels of fear of coronavirus.

Vaccinations are the most effective method of prevention in reducing infectious diseases prevalent worldwide and offer the possibility to control their development or even eliminate them. Vaccination has its group of supporters as well as opponents. Everyone has the right to decide whether to accept vaccination, to postpone it or to refuse it altogether. The current misinformation among women regarding vaccinations recommended during the preconception period and during pregnancy is an unfortunate phenomenon. It is therefore very important to raise women's awareness, which is primarily the responsibility of medical personnel (e.g. pregnancy doctor, midwife). This will increase the number of vaccinated women and reduce the proportion of the population with negative attitudes towards vaccination.

CONCLUSIONS

Despite the many proven advantages of vaccinating pregnant women, fears related to insufficient research on vaccine safety result in many pregnant women refraining from vaccination. An important piece of information is the insufficient awareness among women of the possibility of being vaccinated. It is therefore advisable to increase the emphasis on the dissemination of knowledge on recommended vaccinations during the preconception period and during pregnancy. Doctors and midwives who care for women should play a central role in this regard.

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