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The knowledge of mothers in Poland on measles and its prevention - a survey study

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Abstract

Introduction and purpose: Measles is a highly contagious childhood rash disease. An effective way to prevent it is to give two doses of MMR vaccine. An increase in both the incidence of measles and vaccine refusal is observed. The aim of the study is to assess the knowledge of mothers having children under 18 years old about measles and MMR vaccination. It was decided to determine whether measles may turn out to be a threat to the population of our country.

Material and methods: A survey questionnaire has been made, which was disseminated on social networks in spring 2020. A total of 537 answers were collected. Data analysis was performed using MS Excel and Statistica. The results were compared with the literature from the last 5 years from PubMed and ResearchGate databases.

Results: The average test result was 10.33 out of 17 points. The questions with the highest number of correct answers concerned the obligation, the method of vaccine administration, the etiology of the disease and the method of infection. The problematic questions were the symptoms of measles, complications or the ways of preventing the disease. 8.6% of respondents said that they did not vaccinate their child according to the vaccination calendar, giving real contraindications and unreasonable reasons. It was shown that education, place of residence and age of the respondent statistically significantly affect the level of knowledge about measles. There was no correlation between the fact of vaccination and the level of knowledge about measles.

Conclusions: The level of knowledge of respondents is mediocre. Parents should receive reliable information about the threats of infectious diseases. Considering presented data, the disease may be a threat to the population of our country.

Key words: measles, knowledge, mothers, vaccination

Introduction

Measles is a highly contagious childhood rash disease. The etiological factor is the measles virus belonging to the family *Paramyxoviridae*, genus *Morbilivirus* [1]. Measles virus infection occurs via the droplet route. The incubation period usually lasts 7-21 days (average 13) [1]. The disease usually begins with prodromal symptoms (2-4 days), such as fever, runny nose, cough, conjunctivitis or pathognomonic rash on the mucous membranes of the cheeks opposite the molars (Koplik spots), followed by a period of erythematous papular-spotty rash [1]. Skin eruptions are pink, confluent, initially located on the face, and over time cover the entire surface of the body. The rash disappears after 5-10 days in the same order it appeared [1]. The infectivity of the patient is greatest in the prodromal phase and begins about four days before the rash occurs and persists until the fourth day after it occurs [1]. Complications in the course of measles occur in 10-40% of cases and are more common and more severe among very young, elderly, immunodeficient, malnourished and pregnant patients [1]. The most common complications include pneumonia, encephalitis and meningitis, myocarditis and otitis media. The most serious and at the same time the least (1 in 1,000,000 cases) complication of measles is subacute sclerosing encephalitis (SSPE), which can occur 5-10 years after infection [1]. Measles treatment is symptomatic - it includes lowering the fever, adequate hydration and nutrition.

Prophylaxis against measles is the isolation of ill children and vaccine on the compulsory vaccination calendar. In 1975, mandatory vaccination against measles was introduced in Poland with a monovalent vaccine. Since 2004, measles vaccination has been combined with rubella and mumps vaccination, currently at 13-15 month and 6 years of age [2]. The vaccination efficiency after administration of 2 doses of the vaccine is 98-99%. Prior to vaccination, measles was common. Outbreaks occurred every 2-3 years, and the number of recorded cases ranged from 70,000 up to 130,000 in the years between epidemics and from 135,000 up to 200,000 in epidemic years [3].

There is an increase in the incidence of measles in Poland now, as indicated by data in individual years: 2013 - 84 cases (incidence 0.22/100,000), 2014 - 110 (0.29/100,000), 2015 - 48 (0.12/100,000), 2016 - 133 (0.35/100,000), 2017 - 63 (0.16 per 100,000), 2018 - 359 (0.93/100,000), 2019 - 1511 (3.94/100,000) [3,4,5,6,7,8]. Both the increase in the number of cases as well as an increase in the number of people avoiding compulsory vaccinations is observed (2010 - 3,437; 2011 - 4,689; 2012 - 5,340; 2013 - 7,248; 2014 - 12,681; 2015 - 16,689; 2016 - 23,147; 2017 - 30,090). In 2018 (as at 30 June 2018), there were 34,273 waivers from vaccinations [9]. Most cases of measles, collected from cases recorded by the National Central Point for International Health Regulations, occurred in unvaccinated persons against this disease, respectively: 92%, 70%, 25%, 68%, 71% of cases in 2013-2017 [3,4,5,6,7,9].

The aim of the study

The aim of the study is to present the state of knowledge of mothers with children under 18 years of age, including women in the first pregnancy, about both measles and vaccination against it. In addition, it was decided to determine whether this disease could prove to be a recurring threat to our country's population.

Material and methods

An original survey questionnaire was developed, which was disseminated on social networks in April and May 2020. It contained general and metric questions regarding knowledge about measles and MMR vaccination. Participation in the study was anonymous and voluntary. A total of 537 answers were collected.

The study involved women aged 18-47, from each age group in the range from 18 to 47 years old. The average age was 30.5 years, with a median of 30 years and a standard deviation of 5.1. The respondents came from every voivodeship in Poland, the most from Mazowieckie (16.9%), Lubelskie (10.6%) and Małopolskie (8.9%), and the least from Świętokrzyskie (2.4%), Opolskie (2.2%) and Podlaskie (1.5%). Most women lived in cities with more than 100,000 inhabitants (42.3%), followed by rural areas (24.6%), 20,000-100,000 inhabitants in the city (20.1%), and the least in cities with less than 20,000 inhabitants (13.0%). Most of the women surveyed had higher education (60.7%), less secondary (30.5%), and much less - basic vocational (5.2%), junior high (1.9%) and primary (1.7%). Over half of mothers (55.9%) have one child (including women in the first pregnancy - 6.0% of respondents), 30.4% have two children, 8.8% - three, 3.2% - four, 0.9% - five, and 0.7% - six. The maximum number of children was 7 (0.2%).

For each correct answer in closed questions in the knowledge test the participant received 1 point, for incorrect answer or "I do not know" 0 points. In the multiple-choice question, the respondents obtained 1 point for each correct answer. A maximum of 17 points could be obtained. Data analysis was performed using Microsoft Office 2016 and Statistica PL 13.3.721.1 StatSoft. Pearson's χ^2 test was used to analyze qualitative variables. P values <0.05 were considered statistically significant. The results were compared with the available literature from the last 5 years regarding measles, vaccination and incidence of this disease entity. PubMed and ResearchGate databases were used to analyze the available literature.

Results

The average result of the knowledge test was 10.33 points (minimum 1 point, maximum 17 points, median 11 points, standard deviation 3.28 points) (Fig. 1).

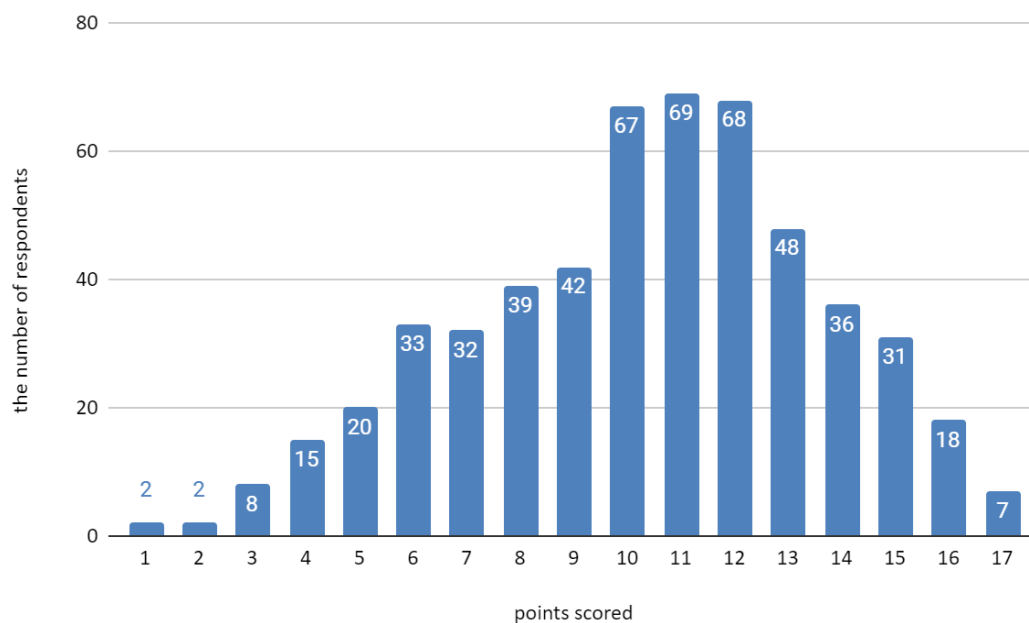


Fig. 1. Assessment of the knowledge level of the respondents on the basis of obtained number of points (maximum 17 points)

The average test result was rated as mediocre (only 60.76% of correct answers). The majority, 82.5% of women, correctly indicated the viral etiology of measles, 5.4% indicated the bacterium as a measles-causing agent, 0.9% the protozoan, 11.2% said they did not know, and none of them indicated fungal etiology. A large majority, 90.3%, knew how to contract measles, indicating contact with secretions from infected people, 0.2% indicated contact with animals, 1.1% consumption of unwashed vegetables and fruits, 0.6% transmission through the placenta, 7.8% did not know the answer to this question. Slightly over three quarters, 77.5% of respondents, knew that the measles virus can survive and remain infectious on surfaces or suspended in the air for up to two hours, 16.9% did not have this knowledge, and 5.6% thought that the virus cannot survive in this way surfaces.

Almost the same number (77.1%) believed that measles virus infection can occur when a sick person leaves the room, 13.2% did not know that this may lead to infection, and 9.7% of respondents believed that measles virus cannot spread in a room that a sick person has already left. A vaccination is the only method to prevent the illness according to 32.3% respondents, 8.6% indicated isolation as the only method to avoid disease, and 55.7% gave correct vaccination, isolation and in some situations immunoglobulin as a method of preventing measles (3.0% did not know the answer to this question). In the question about the time when a sick child can infect others, the percentage of correct answers was 45.8. 22.5% did not know the answer to this question, 5.0% indicated only up to 4 days the rash persisted, 16.4% 4 days before the rash appeared, and 10.2% for only 1-2 days before the first symptoms appear. Results showed that 11% of respondents did not know that the rash is a symptom of measles, and 5.8% do not give high fever above 40 degrees Celsius as a symptom of measles. In questions about measles symptoms 17.5% of respondents did not provide gray-white lumps on the cheeks' mucosa near premolars, 22% did not know the answer to the question about symptoms and 43.8% correctly indicated that salivary gland enlargement is not a symptom of measles. In the question of measles complications, 72.6% correctly indicated the possible occurrence of encephalitis or meningitis after measles, more than half (50.8%) indicated death, less than half of otitis media (44.5%) and for pneumonia (43.6%). The least respondents (12.1%) knew that blindness could be a complication of measles. 25.1% reported arthritis as a complication of measles, which was probably confused with rubella complications, and 10.6% pointed to testicular inflammation, which can actually be a complication of mumps (Fig. 2).

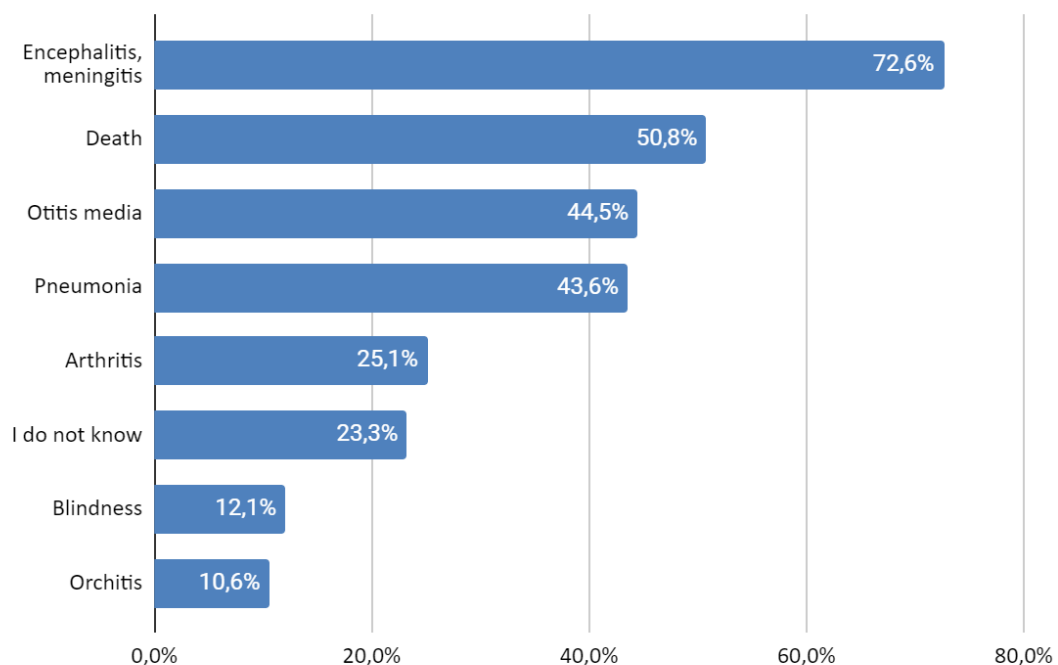


Fig. 2. Complications of measles in the respondents' opinion

All complications were correctly marked by 5.4% of respondents, while 21.6% did not correctly indicate any measles complication. Fewer respondents considered it correct that subacute sclerosing encephalitis could develop many years after measles (65.5%), 30.5% did not know this, and 3.9% said it was not true. The question with the most correct answers concerned the method of administering the vaccine - 95.0% of mothers knew that vaccination against measles is performed in childhood with two doses of the vaccine, 3.7% did not know the answer to this question, 0.7% indicated an annual vaccination in fall-winter season (combination with vaccination against influenza), 0.6% indicated vaccination of adolescents over 16 years of age. Fewer respondents (92.2%) knew that it is mandatory, and the same percentage (3.9%) considered them to be optional or did not know the answer to the question. Most mothers estimate the risk of infection in person who is not immunized after contact with someone who has measles at 50-90% (45.6%), although in reality it is over 90%, and 28.3% gave the answer. Less, 13.5% indicated a risk of <50%, and 12.5% do not know the answer to the question. Among respondents, 73.9% knew that the vaccine protects both the vaccinated child's health and unvaccinated children who cannot be vaccinated because of their health status, 14.9% claimed that vaccination protects only the vaccinated person, 7.6% did not agree with this statement at all, and 3.5% had no opinion.

The study showed that 85.5% of mothers used measles prophylaxis in the form of MMR vaccine in their child in accordance with the compulsory vaccination calendar, 6.0% of respondents was in their first pregnancy, and 8.6% admitted that they did not vaccinate their children (Fig. 3).

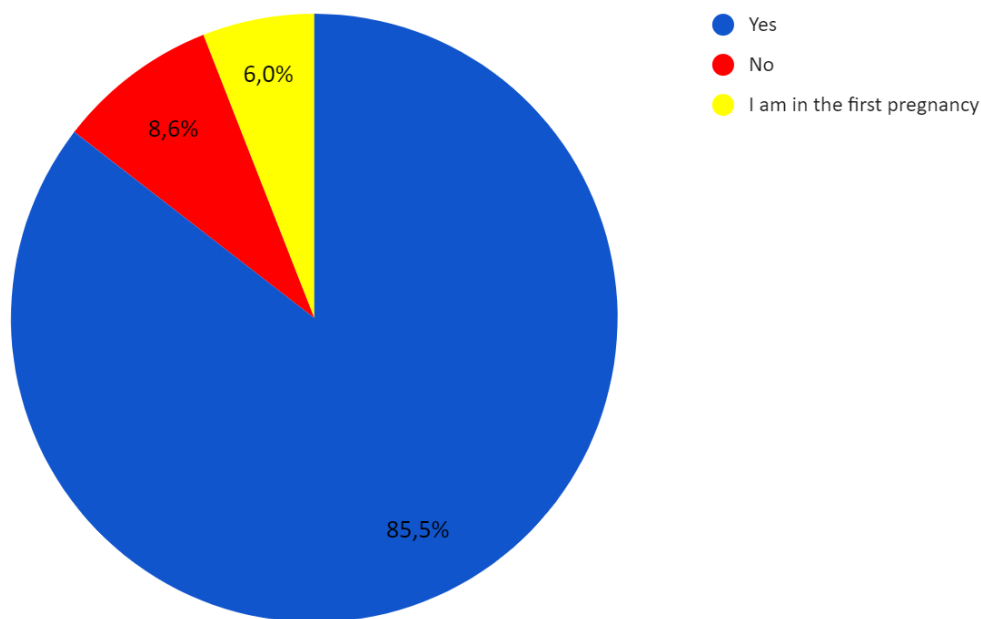


Fig. 3. Statement of the fact performing vaccination in children by mothers

As a reason, complications after various vaccinations in children were given, in respondents, in the family or in strangers (32.6% of those not vaccinating children against measles), reservations about the vaccine production process, fear of its composition and unwanted vaccination reactions, adjudgement of the vaccine against measles for dangerous, ineffective and unnecessary, “damaging” the child's immunity, lack of compensation after vaccination

complications, willingness to decide for themselves what to vaccinate the child for, lack of trust in doctors and lack of appropriate qualification tests before vaccination. The analysis showed that 13.0% of mothers of non-vaccinated children indicated diseases excluding the possibility of vaccinating a child, mainly assessed by a neurologist. Atopic dermatitis was also given as a reason and an allergy, but it was not specified what the child was allergic to. One person indicated allergy to chicken egg protein as a reason for not vaccinating the child against measles. It was pointed out that the vaccination was delayed according to the calendar due to frequent child infections, various life situations, the COVID-19 pandemic and the desire to separate vaccinations, which shifts the entire calendar (26.1%). Further, 73.6% of respondents declared that they had not suffered from measles in childhood, 13.2% indicated that they had suffered and just as much did not remember being sick with measles. The vast majority of women, reported that their child had not had measles, 1.3% of respondents indicated that they had been ill, and 1.9% did not know if the child had had measles.

The data obtained in the study indicate that 81.0% of mothers believed that vaccination is a safe method of preventing disease, 10.6% of respondents had the opposite opinion, and 8.4% had no opinion on this subject. Fewer, 79.3% of women believed that vaccination is an effective method of preventing measles, 11.9% of respondents thought no, 8.8% had no opinion. 84.4% of respondents indicated that vaccination is a necessary method of preventing disease, 10.4% of respondents believed that vaccination is not a necessary method of preventing measles, 5.2% have no opinion on this topic. The respondents are most convinced as to the need for vaccination, further - safety, and the least as to their effectiveness (Table 1).

Table 1. Assessment of the necessity, safety and effectiveness of measles vaccination by respondents

	necessary	safe	effective
yes	84,4%	81,0%	79,3%
no	10,4%	10,6%	11,9%
no opinion	5,2%	8,4%	8,8%

In the question about course of measles, 35.4% of mothers stated that they thought it is moderately severe, 28.7% indicated severe, 16.0% mild, 6.1% life-threatening, and 13.8% had no opinion (Fig.4).

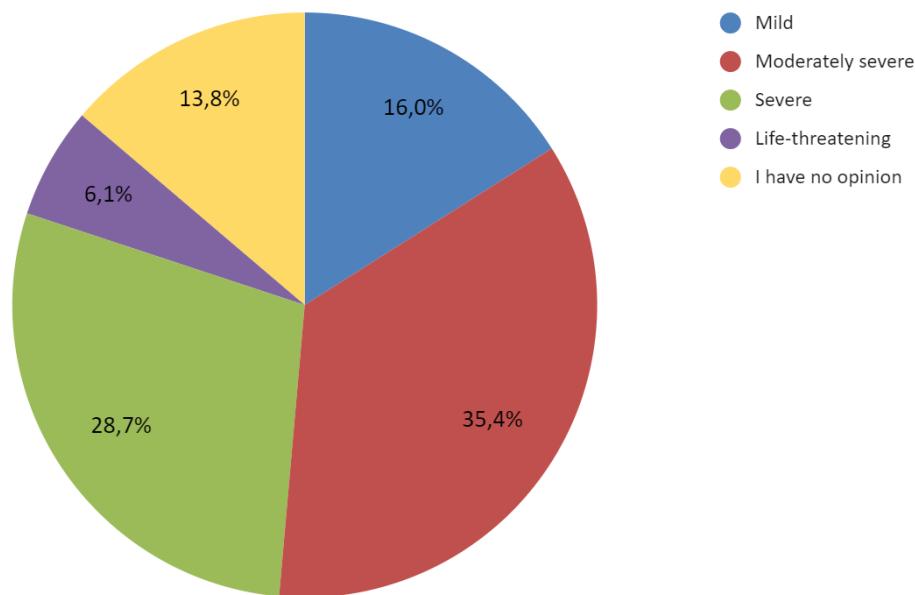


Fig.4. Assessment of the severity of measles by respondents

Statistical analysis showed that education ($p < 0.00001$) and place of residence ($p = 0.00021$) had a statistically significant effect on the level of knowledge about measles. Respondents with higher education more often achieved very good (14-17 points) and good (11-13 points) result in the test than people with secondary, basic vocational, junior high or elementary education. The average test result (7-10 points) dominated among respondents with secondary education, and the low result (1-6 points) among persons with basic vocational, junior high or basic education. Very good and good results in the test of knowledge were most often obtained by mothers living in a city of over 100,000 inhabitants. The average result in a similar percentage was obtained by respondents who did not live in the city with over 100,000 inhabitants. A low score dominated among mothers living in the countryside. The age of the respondent also statistically significantly affected the level of knowledge about measles ($p = 0.02188$). A very good test result was most often obtained by women aged 25-34. The surveyed at the age of 35 and above most often achieved the average result in the test. Low results dominated among respondents under the age of 25 and at least 40 years.

There was no correlation between the fact that the child was vaccinated or not vaccinated and the level of knowledge about measles ($p = 0.24243$). The fact that the child had suffered from the measles ($p = 0.23849$) does not statistically significantly affected the mother's level of knowledge about the disease. The fact that the mother had had measles in childhood ($p < 0.00001$) significantly affected the level of her knowledge in the analysis. A very good result was achieved much more often by women who did not have measles, and the rarest they achieved the low result. In a good and medium test result, the differences in the level of knowledge in individual groups of mothers was smaller.

The mother's age statistically significantly influenced the fact of vaccination or non-vaccination of the child ($p = 0.00002$). The percentage of women who did not vaccinate their children according to the compulsory vaccination calendar was in the largest percentage (25.9%) of those aged at least 35. The size of the place of residence, voivodeship of residence

and education did not have a statistically significant impact on the fact of vaccinating or not vaccinating a child ($p=0.77162$, $p=0.10061$, $p=0.23769$ respectively).

Discussion

The level of knowledge of surveyed mothers who have children under 18 years of age and women who are in the first pregnancy can be considered as mediocre. The respondents obtained the highest scores in questions about the obligation of the vaccination, the method of vaccine administration, disease etiology and the way of measles infection. This is a subject that you can quite often meet in the media and at follow-up visits to the doctor. Respondents dealt worse with more detailed questions about measles symptoms, virus persistence and all measles prevention methods. The fact that the respondents did not know all the symptoms of the disease is not such a big problem, because the role of the doctor, not the mother, is to recognize the disease entity. In addition, the fact of having been infected with measles by the child or by mother did not increase the level of their knowledge about this disease, which means that the experience of the respondents in this matter did not improve the level of knowledge. However, a more accurate knowledge of measles complications among mothers would make it clear to them that it is actually a fairly serious disease. It is necessary to further educate women so that they know what the symptoms of an infectious disease, which is measles can be to isolate the child in time from others and to know what symptoms are necessary to visit a doctor. Some respondents did not know that high fever and rash could be a symptom of measles. It is worrying that some mothers indicated only vaccine or only isolation of patients as measles prophylaxis, without combining them. Almost 15% of respondents believe that the vaccine only protects vaccinated children. Less than 8% question the effectiveness of vaccination. In conversations with parents, it is worth paying attention to the population aspect of vaccination, because the fact of not vaccinating a child has not only consequences for him, but also for children from the environment who cannot be vaccinated. More than half of surveyed mothers did not know exactly when a child with measles can infect other people which combined with the above survey data, may have negative consequences in the spread of the disease. In a study conducted in Krakow and Myslenice in 2014-15, surveyed women assessed the risk of developing a measles at unvaccinated child in 40.2% as possible moderate, in 37.1% as possible high, 5.6% as possible low, 2.5% said that this is not associated with the risk of falling ill while 14.6% had no opinion [10]. In the same study, 17.4% of respondents rated the course of measles as mild, 49.5% as severe, 21.9% as life-threatening, while 11.2% did not have an opinion on this [10]. These data are consistent with the data collected in the presented analysis.

The relationship between the level of knowledge about measles and age did not seem to be clear. Low results were found in the test of knowledge in the survey of women under 25 and over 40 years of age. For women over 40 years of age, the low score could be affected by more difficult access to knowledge about measles in the past or a lack of interest in the topic of childhood diseases due to having older children. Women under 25 years of age may not be interested in measles and its prevention due to the fact of the first pregnancy (the largest percentage of women in the first pregnancy, 13.2%, appeared in the group of respondents under 25 years of age, although the average age of mothers in the first pregnancy was 30.5 years). The results of the survey showed a large impact of education and place of residence,

which may correlate with access to education, on the level of knowledge about measles and its prevention among mothers. On the other hand, the level of education and place of residence did not significantly affect the decision to vaccinate the child, but it was influenced by age. Women who did not vaccinate according to the compulsory vaccination calendar were mainly people at least 35 years old. Analyzing the presented results, it is concluded that education among the youngest parents awaiting the birth of their first child and the need to further disseminate knowledge about measles and its prevention also among older, more experienced mothers is extremely important. Secondly, one should not focus only on the safety or complications of vaccinations, but also broaden the knowledge about the infectious diseases they prevent, because these are key arguments that can convince opponents of vaccination to this method of prevention [10].

The percentage of women not receiving measles vaccinations according to the compulsory vaccination calendar, both in the presented analysis (8.6%) and from nationwide data, seems to be too high. To eliminate measles in the country, it is necessary to achieve a level of vaccination at 95% of its population and to monitor the epidemiological situation (reporting suspected measles and carrying out laboratory diagnostics in the reference laboratory) [3]. Data from the National Institute of Public Health - National Institute of Hygiene indicate that on 31 December 2013 the vaccination status against measles of individual age groups of children and adolescents aged 2 to 11 years for primary vaccination ranged from 82.8% to 99.5% (year 2012-2007), and for booster vaccination from 73.6% to 93.2% (2004-2001 year) - counting the percentage of vaccinated persons compared to the number of immunization cards checked [4]. In subsequent years, the vaccination status for the following basic and booster vaccinations was as follows: 2014: 79.7-94.8% and 77.7-85.8%; 2015: 77.9-99.5% and 71.5-88.9%; 2016: 77.4-99.4% and 74.9-97.2%; 2017 92.9-99.3% and 92.4-97.8% [3,5,6,7].

The respondents gave different reasons for not vaccinating the child. The fact that more women considered measles vaccines to be ineffective, unnecessary or dangerous than they did not vaccinate their child, may indicate the impact of additional factors than her own opinion that influenced the vaccination decision. This decision may be influenced by a doctor who qualifies for vaccination or a positive opinion of family and friends about vaccinations. On the other hand, mass media, which sometimes disseminate scientifically unconfirmed information, can raise doubts among mothers and reduce the level of trust in health care institutions. The authors of the review work carried out in Lublin divide the reasons why parents refuse, hesitate or delay vaccination into four categories: religious, philosophical or personal beliefs, concerns about the safety of vaccination and the desire to obtain additional information from medical service providers [11]. The respondents indicated no pre-vaccination tests. However, they did not provide the exact type of test that was not done. It is important to draw the attention of medical staff to the need to properly inform parents during the visit about what the doctor is doing and for what purpose, and to ensure that he has done everything in accordance with the latest standards and the best knowledge. There is a need to accurately collect a medical interview and perform a physical examination for vaccination qualifications, but it is worth noting that it is not necessary to routinely perform the entire panel of laboratory tests before each vaccination.

Religious beliefs are shaped by generations and culture, so it's difficult to convince parents to change their views. Personal or philosophical beliefs indicate that natural immunity after illness is better for children than immunity acquired through vaccination. Some parents believe that according to current rules the diseases we vaccinate children are not very common and their children are minimally at risk of these diseases, so the possible negative side effects of vaccine administration outweigh the benefits of vaccination [11]. These reasons also appeared among the respondents given in the survey. One woman indicated that she was afraid of “damaging” the child’s immune system by vaccination, but such complications after vaccination against measles were not found in the literature.

Women participating in the survey most often reported vaccine adverse events in her family or in her children as a reason for not vaccinating. The most common vaccine reactions reported after administration of the MMR vaccine are local allergic reaction and puncture site pain (both accounted for 52% of adverse reactions) [12]. Local reactions are recorded in the case of 15,000 per 100,000 vaccinations [12]. The most common systemic symptoms include fever (10,000 cases per 100,000 vaccinations) and headache. However, rash and joint pain are much rarer (5,000 cases per 100,000 vaccinations) [12]. Febrile seizures, parotitis, thrombocytopenia, encephalitis and anaphylaxis are extremely rarely reported. Increased, longer-lasting reactions are considered vaccine adverse events. The risk of febrile seizures increases after the first vaccination dose above the recommended 12-15 month of life [13]. Severe vaccine adverse events, however, are extremely rare in relation to complications after the natural illness of measles, rubella or mumps [13]. Therefore the MMR vaccine is considered safe in the short-term assessment and the long-term effects should be evaluated [12]. The occurrence of a severe vaccine adverse events in older siblings, a parent and distant relatives is not a contraindication for vaccinating a child. This situation may frighten the mother and discourage her from vaccinating other children, which is evident in the arguments given by the respondents, but it should be provided to parents with information that a vaccine adverse event in the family is not a contraindication to vaccinating the child.

Mothers of non-vaccinated children also used past neurological complications and contraindications as arguments. Unspecified neurological disease, unstable neurological condition, suspicion of progressive disease of the central nervous system with untreated epilepsy are contraindications for vaccination against measles. It is possible that one of these contraindications was assessed by a neurologist in the children of women answering in the survey.

The fear of giving the vaccine to a child may be related to the opinion that the MMR vaccine is allegedly associated with autism in immunized children. This concept was advanced by British physician and scientist Andrew Wakefield in an article published in the journal *The Lancet*. His research showed that the measles virus contained in the MMR vaccine causes enteritis and penetrates into the central nervous system, which in turn affects the development of autism. Publication of the article contributed to a significant decrease in vaccinations among children, which in consequence led to outbreaks of measles. Over the years, this theory was repeatedly challenged and in 2010 the publication was withdrawn. The author’s study has been proved to be a scientific counterfeit and he has been deprived of the right to practice medicine, but this thesis is still being disseminated [1,11,13,14,15]. No evidence was found that receiving 1 or 2 doses of MMR vaccine was associated with an increased risk of

autism in children who had older siblings with this disorder [16]. Interestingly, none of the respondents used the word "autism" as the reason for giving up vaccination, and mothers generally reported various types of neurological or developmental disorders. It is possible that the information campaign explaining the origin of the myth about the connection between MMR vaccination and autism brings positive results. In another study, the main reason for not vaccinating children with the MMR vaccine, according to most parents, was negative family, personal or child past experiences, and concerns about the composition and safety of the vaccine [14], as shown by the results of the survey. In addition, thimerosal used as a preservative in vaccines (in the opinion of some opponents of vaccination) accumulates in the body and is toxic [11]. It is credited with being associated with the pathogenesis of optic atrophy and multiple sclerosis. The conducted tests have determined that the administration of a thimerosal-containing vaccine does not exceed safe levels of mercury, and this compound is completely excreted intestinally within a few days, which contradicts the thesis [11].

Another neurological disease entity considered a complication after MMR vaccination that the mothers may have feared is acute disseminated encephalomyelitis (ADEM). However, one study reports that there is no evidence arising from the mechanism of action of the MMR vaccine that the complication may be ADEM whereas it is very rarely reported after natural infections with wild-type measles, mumps or rubella [17]. In turn, according to the authors of another article the excessive risk of ADEM is probably no more than 1.16 cases per million administered MMR vaccines [1]. No association was found between MMR vaccination and encephalitis or encephalopathy [15]. The evidence is insufficient to accept or reject the link between MMR vaccination and optic neuritis [15].

The respondents also indicated a fear of convulsions after vaccination. The MMR vaccine induces a statistically significant increased risk of febrile seizures, while it does not increase the risk of convulsions of a different etiology [15]. Both febrile seizures and MMR vaccination alone were not found to increase the risk of epilepsy [15]. In turn, the authors of another study claim that the first dose of MMRV vaccine administered at the age of 10-24 months is associated with an increased risk of both febrile convulsions and convulsions of a different etiology [18].

Among the indicated reasons for not vaccinating, the respondents reported atopic dermatitis or an allergy to eggs in the child. The literature does not provide atopic dermatitis as a contraindication to measles vaccination. A study on 87 newborns with known allergy to egg protein showed no link between a mild hypersensitivity reaction after exposure to eggs or egg products and MMR vaccination [19]. Only children with severe allergies leading to cardiorespiratory reactions and concomitant chronic asthma should be vaccinated in hospital [19]. Most children with an anaphylactic reaction after vaccination with MMR were not allergic to eggs, which suggests that the factor causing anaphylaxis may be gelatin present in high concentration as a stabilizer [19]. MMR vaccination should not be postponed in patients who are allergic to eggs, even in severe cases [20]. Vaccination for measles is not contraindicated in children who are allergic to eggs. A study describing the case of anaphylaxis after the first dose of MMR vaccine in a child with milk and eggs allergy shows that a booster dose can be safely given in small divided doses administered every 20 minutes without causing anaphylaxis [21].

Both publicly available data on the incidence of measles in Poland in the last few decades, as well as the results of the survey show that surveyed mothers in childhood suffered from measles more often than their children. The fact of reducing the incidence of measles has certainly been influenced by the introduction of mandatory vaccinations, an increase in the level of education and easier access to knowledge, which is associated with an increase in public awareness of infectious diseases and improvement in the quality of medical services provided.

Conclusions

The level of knowledge of Polish mothers who have children under 18 years of age about measles and vaccinating against it is mediocre. It is thought-provoking that the respondents knew and listed disproportionately many possible vaccination complications in relation to the knowledge of complications that may occur after measles. Therefore we should strive to get the best possible information for parents about the dangers of infectious diseases. It is worth to implement new campaigns promoting vaccination and raising awareness about the high risk of childhood diseases and their complications. Due to the observed increase in the frequency of vaccination refusal by parents, often not reflected in actual contraindications to vaccination and with a significantly different level of knowledge about measles and vaccination against it the disease may pose a threat to our population.

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