A QUESTIONNAIRE-BASED STUDY TO ASSESS KNOWLEDGE AND ATTITUDES TO MENINGOCOCCAL DISEASE AND PREVENTION AMONG PARENTS OF CHILDREN UP TO TWO YEARS IN LITHUANIA

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SUMMARY

Objectives: In July 2018, vaccine against meningococcal B infection in Lithuania was added to the national vaccination calendar. However, vaccination rates were low. The aim of the study was to identify parents' attitudes towards meningococcal disease and vaccination.

Methods: In the period from February to March 2019, a questionnaire survey was conducted; 483 parents of children aged up to 2 years participated. In the validated questionnaire respondents provided data on their gender, education, age and answered questions that helped to estimate knowledge and attitudes towards meningococcal disease and vaccination.

Results: Parents with higher education are more likely to believe that meningococcal infection can be prevented; 316 (65.4%) parents are concerned that their child is at high risk of infection and evaluated the level of anxiety M = 7.39, SD = 2.29 out of 10 points; 309 (64.0%) believe that the vaccine is effective (M = 8.41; SD = 1.15 out of 10 points). One third of parents will not vaccinate their children because they believe that the MenB vaccine is not safe (71.2%); 370 (76.6%) have heard negative information about this vaccine, the majority (83.2%) from the Internet. The negative information received is positively correlated with the belief that the vaccine is not effective ($r = 0.18$, $p = 0.031$) and not safe ($r = 0.35$, $p < 0.001$); 49.3% of parents report side effects after vaccination; 326 (67.5%) parents believe that they need more evidence-based information on MenB vaccination and 90.8% would like to get it from a healthcare professional.

Conclusions: Due to high level of mistrust of vaccines and the lack of evidence-based information, parents decide not to vaccinate their children against meningococcal B infection. There is a great need for parents' education and the dissemination of evidence-based information among them.

Key words: MenB, meningococcal, immunisation, prevention, parent's attitude

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INTRODUCTION

According to the European Centre for Disease Prevention and Control 3,221 (0.6/100,000) cases of invasive meningococcal disease (IMD) have been reported in 2017 in Europe; 2,979 (92%) had a known serogrouping result, half of them belonged to serogroup B (51%); 282 deaths were reported in 30 EU/EEA member states. Most of the IMD cases were in the United Kingdom – 775 cases (1.1/100,000); 81 (2.5/100,000) cases of IMD have been registered in Lithuania in 2017, and 75% of all cases have been diagnosed in children. Five patients have died from meningococcal infection in Lithuania in 2018 (1, 2).

The vaccine against type B meningococcal infection was first registered in the European Medicine Agency in January 2013. As early as May 2014, the Joint Committee on Vaccination and Immunization of the UK suggested adding this vaccine to the UK's immunization programme (3). The United Kingdom is the first country to introduce vaccine against *Neisseria Meningitidis* serotype B (4). Austria, Ireland, Italy, and Poland also introduced this vaccine into their immunization programmes. However, in Poland, it is not funded by the National Health System (5). In Lithuania, vaccination of children started in 2014. During the period of 2014–2016, 14,607 children aged 0–17 years and only 377 adults were vaccinated. In 2018, the MenB vaccine was introduced into the Lithuanian vaccine programme. However, the vaccination rate was not as high as it could be (6).

According to the WHO, vaccine hesitancy is one of ten major threats to the global health. The numbers of hesitation about vaccination are growing, resulting in the increase of vaccine refusal (7). The reasons and the level of hesitation can differ in communities (8). The importance of identifying them is crucial. Areas with a low vaccination rate can result in vaccine-preventable disease outbreaks.

MATERIALS AND METHODS

Study Design

A questionnaire-based cross-sectional study was conducted in the period from 1 February to 31 March 2019 in 3 healthcare institutions in Vilnius, capital of Lithuania: Children's Hospital, Affiliate of Vilnius University Hospital Santaros Klinikos, Karoliniskes Outpatient Clinic, and Antakalnis Outpatient Clinic. The hospital is teaching, secondary–tertiary level, with out-of-hours primary care healthcare services. Both outpatient clinics provide primary and secondary ambulatory care for children.

Study Participants

Finally, 483 parents of children aged 0–2 years participated. According to the Lithuanian Statistics Department, in 2019, there were 499,593 children aged 0–18 years; 87,440 of which are children aged from 0–2 years (9). Then sample size was calculated using sample size calculator and amounted to 383 respondents with a confidence level of 95%. To reach the appropriate sample size, 600 questionnaires were distributed; 553 have returned; 70 questionnaires were rejected because they were not fully or correctly answered.

Study Instruments

In the original questionnaire respondents provided data on their gender, education and age, answered questions that helped to estimate knowledge and attitudes towards Meningococcus B diseases MenB vaccination. The questionnaire consisted of questions which were divided into 5 parts (A, B, C, D and E). A part included general questions about the respondents: gender, age, education level, marital status, number of children, and residence. B part was made of questions about parents' knowledge about Meningococcus B diseases and MenB vaccination. The questions about parents' opinions on MenB vaccination formed part C. In part D, respondents who have vaccinated their child with the MenB vaccine were asked about the side effects that occurred. In the last part E, parents had to answer the question about negative information received about the MenB vaccine.

Statistics

Statistics have been calculated using the Statistical Package for the Social Sciences (SPSS) 22.0. The results were summarized applying descriptive statistics, linear regression, logistic regression, correlation multiple comparisons, correlation analysis methods, omnibus tests of model coefficients, and ANOVA tests.

RESULTS

Characteristics of Respondents

Finally, 483 parents have participated in the study. All the characteristics can be found in Table 1. As seen in the table, most of the respondents are mothers. Respondents' average age is M = 30.84; SD = 4.81. Most of the respondents have university degree, more than half have only one child. The average age of respondents' partners is M = 32.98; SD = 4.99.

Knowledge about Meningococcal B Infection and Vaccination

Most parents (93.6%) have heard that MenB infection is the cause of meningitis and sepsis. The main sources of this information for parents are paediatricians (Table 2). In addition, 475 (98.3%) respondents consider meningitis a difficult disease.

Table 1. *Characteristics of respondents (N = 483)*

Characteristics	Respondents n (%)	Respondents with children aged 0–1 year n (%)	Respondents with children aged 1–2 years n (%)
All participants	483 (100.00)	309 (63.98)	174 (36.02)
Mothers	457 (94.62)	292 (60.46)	165 (34.16)
Average age, M (SD)	30.84 (4.81)	30.82 (4.85)	31.01 (4.82)
Marital status			
Married or living with a partner	474 (98.14)	308 (63.77)	166 (34.37)
Living alone or divorced	9 (1.86)	1 (0.21)	8 (1.66)
Education			
University degree	347 (71.84)	229 (47.41)	118 (24.43)
No university degree	78 (16.15)	47 (9.73)	31 (6.42)
Professional education	24 (4.97)	11 (2.28)	13 (2.69)
Secondary education	32 (6.63)	20 (4.14)	12 (2.48)
Primary education	2 (0.41)	2 (0.41)	0 (0.00)
Number of children			
1 child	258 (53.42)	158 (32.71)	100 (20.70)
2 children	177 (36.65)	119 (24.64)	58 (12.01)
3 children or more	48 (9.94)	32 (6.63)	16 (3.31)

Table 2. *Sources of information that MenB infection is the cause of meningitis and sepsis (N = 483)*

Source	Respondents n (%)
Paediatricians	390 (80.8)
General practitioners	101 (20.9)
Internet	317 (65.6)
Media	161 (24.0)
Friends	139 (28.8)

Table 3. *Parents' opinion on MenB infection transmission (N = 483)*

Disease transmission	Respondents n (%)
Spread by droplets through the air	445 (92.1)
Spread through food or water	10 (2.1)
Do not know how disease is spread	37 (7.7)

Parents were asked on their opinion how MenB infection is spread (Table 3). They could choose more than one option or write their own. Most of them were right by choosing the option that MenB infection is spread by droplets through the air. However, there are parents who have no idea how this infection is spread.

Parents were asked which age group (newborns, babies, children, teenagers, adults, seniors) is at high risk to catch meningococcal infection; 319 (66.1%) answered that all groups have the same risk; 401 (83.0%) of parents know that MenB infection can be prevented; 377 (94.0%) indicated vaccination as the best option to prevent MenB infection; and 130 (32.4%) think that avoiding people gatherings is the way to prevent disease.

There is a negative correlation between the age of the respondents and opinion about infection prevention ($p = 0.019$, $r = -0.108$). Parents with higher university education tend to believe that there is prevention from MenB infections compared to those with secondary education ($p = 0.008$). Furthermore, a positive average correlation is observed between respondents' response to meningococcal infection and non-vaccination of children ($p < 0.001$, $r = 0.90$) and the average negative correlation between non-vaccination of children and the idea that vaccines can protect against meningococcal B infection ($p < 0.001$, $r = -0.478$); 401 (83.02%) respondents indicated that the MenB vaccine is included in the Lithuanian vaccination programme, and 60 (12.42%) deemed that it is not included.

Trust in MenB Vaccines Depending on Different Respondents' Factors

More than half of parents – 316 (65.4%) have concerns that their child can catch meningococcal infection, on a scale from 1 to 10 (1 – no worries, 10 – very worried), the level of anxiety is: $M = 7.39$, $SD = 2.29$; 309 (64.0%) believe that the vaccine is effective, and efficacy is assessed by: $M = 8.41$; $SD = 1.15$ (1 – not effective, 10 – very effective); 94 (19.5%) respondents think the vaccine is not effective; and 80 (16.6%) do not know.

A positive weak correlation ($r = 0.12$) between the evaluation of efficacy of the vaccine and the age of the respondents was observed ($p = 0.04$).

Around a third of kids – 146 (30.2%) are not vaccinated, and their parents are not going to vaccinate their child for meningococcal B infection; 110 (22.8%) are still unvaccinated however parents will vaccinate them; of them 76 (69.1%) will pay for the vaccine themselves, 34 (30.9%) will vaccinate according to the Lithuanian National Vaccination Programme; 227 (46.0%) children were vaccinated – 95 (41.8%) paid for the vaccine themselves, 132 (58.1%) were vaccinated according to the Lithuanian National Vaccination Programme.

Those who do not vaccinate their children indicated the reasons that lead to their opinions. These reasons are given in Figure 1.

In Figure 2, 337 respondents who have already vaccinated their children or are getting to vaccinate their children have indicated the reason. The results show that most parents vaccinate their children because they are afraid that meningococcal infection type B is very dangerous and that the child can easily catch it. It is important to say that less than half of respondents got recommendations from their doctor or nurse to vaccinate their children. The least popular answer was that this vaccine is not expensive.

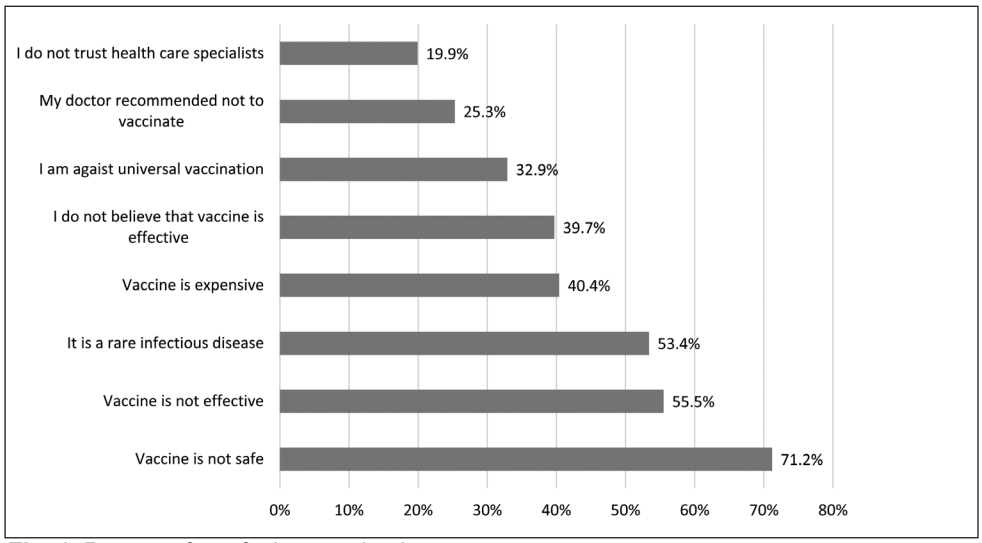

Fig. 1. *Reasons for refusing vaccination.*

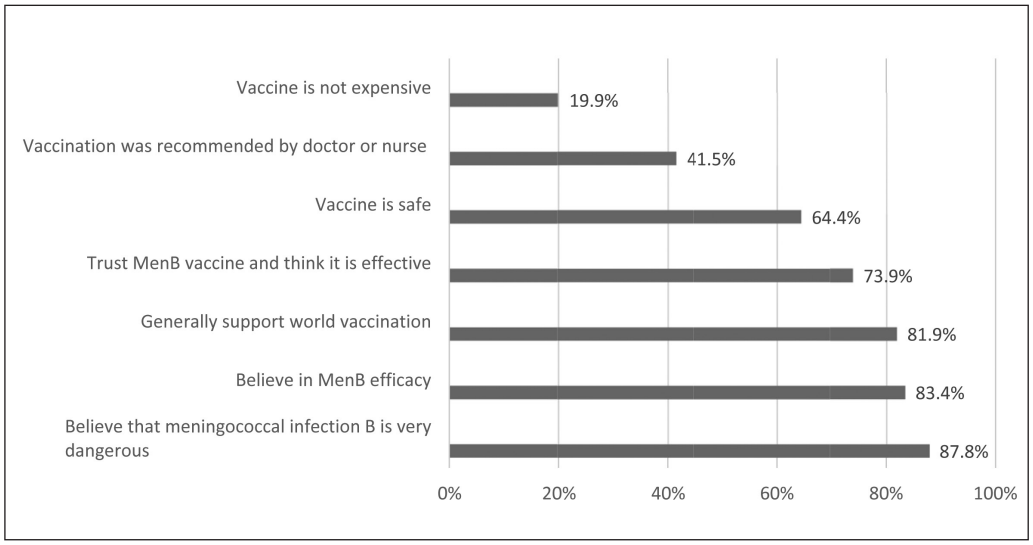

Fig. 2. *Reasons why parents vaccinate children.*

Weak negative correlation (−0.20) was observed between parents' fear that their child can get meningococcal B infection and a decision not to vaccinate children ($p < 0.001$). There is a strong positive correlation (0.61) between parental willingness to vaccinate children and the view that the vaccine is effective ($p < 0.001$).

Presence of Side Effects

Less than half of parents – 113 (49.3%) reported that their child had side effects after MenB vaccine. The most common were pain or tenderness at the injection site and irritability there. Other side effects can be seen in Table 4.

Of the 229 vaccinated children, only 141 (61.6%) reported that paracetamol was given to their children after vaccination, 86 (37.5%) paracetamol was not offered, and 2 (0.9%) parents refused to give their child paracetamol.

Table 4. *Occurred side effects after MenB vaccination (N = 113)*

Reported adverse effects	Respondents n (%)
Pain or tenderness at the injection site	79 (69.9)
Irritability at the injection site	79 (69.9)
Fever (≥ 38 °C)	78 (69.0)
Skin redness at the injection site	75 (66.4)
Skin hardening at the injection site	73 (64.6)
Skin swelling at the injection site	66 (58.4)
General malaise	56 (49.6)
Unusual crying	39 (34.5)
Drowsiness	38 (33.6)
Loss of appetite	23 (20.4)
Headache	8 (7.1)
Skin rash	6 (5.3)
Diarrhoea	5 (4.4)
Vomiting	2 (1.8)

Influence of Received Information on Parents' Opinion about Vaccination

Out of 483 respondents, 113 (23.4%) have never heard negative information about MenB vaccine. Other 370 (76.6%) have heard negative information. In Table 5 the sources of negative information and how many respondents got that information can be seen. Most of parents received negative information on the Internet. Unfortunately, there were parents who received negative information from healthcare workers. The weak negative correlation (−0.12) between negative information received about the vaccine and the trust in the vaccine was observed ($p = 0.007$).

Negative information received is positively correlated with the suggestion that MenB is not effective against meningococcal B infection ($r = 0.18$, $p = 0.031$), MenB is not safe against meningococcal B infection ($r = 0.35$, $p < 0.001$), belief that the vaccine is not efficient ($r = 0.26$, $p = 0.002$), and lack of trust in vaccination

Table 5. *Sources of negative information about MenB vaccine (N = 370)*

Source	Respondents n (%)
Internet	308 (83.2)
Friends	174 (47.0)
Media	169 (45.7)
Healthcare professionals	53 (14.3)
Family members	37 (10.0)

Table 6. *Where parents want to receive evidence-based information about MenB vaccine (N = 326)*

Source	Respondents n (%)
Healthcare specialists	296 (90.8)
Media	182 (55.8)
Internet	162 (49.7)
Friends	22 (6.7)
Family members	13 (4.0)

in general (r = 0.16, p = 0.049); 157 (32.5%) parents believe they do not need more research-based information on vaccination of meningococcal type B infection, and 326 (67.5%) would like to get it from the following sources (Table 6).

DISCUSSION

Despite the fact that 316 (65.4%) parents have anxiety that their child can catch meningococcal infection, a third of them will never vaccinate their child with the MenB vaccine. The fact that every third child aged 0–2 years is not vaccinated leads to apprehension that there is an abyss between parents and evidence-based information about MenB vaccine (10). According to the WHO, the effective vaccination rate is 95%. If that vaccination rate is not reached, there remains a great possibility that even vaccinated people can get meningococcal infection. Of course, the biggest question is why only 309 (64.0%) of parents believe that MenB vaccine is effective. Also, why do those who decide not to vaccinate, as a reason, name MenB vaccine as unsafe (71.2%).

Studies have shown that European countries are more likely to question the safety of vaccines (11). However, the benefits of vaccines always overweight that opinion. According to the research, which took place in Italy, 67.2% of parents consider the vaccine useful and would vaccinate their children (64.1%). The reasons of hesitation are quite similar: their child/children were not vaccinated because the vaccine was not considered safe (45.3%), it was not recommended by their physician (27.2%), the vaccine was not considered effective (17.4%), they did not believe in the usefulness of vaccinations (12.8%), and that the vaccine was available only recently (11.8%) (12). The situation is quite different in the United Kingdom (13). Parents do not identify any concerns about the MenB vaccine. The fact that the MenB vaccine was introduced there earlier can play a significant role in the opinion of parents.

The reason for non-vaccination can also be considered the fact that almost half of respondents (49.34%) who have vaccinated their child noted that there was a side effect after MenB vaccines. Those parents or their relatives spread this information throughout the Internet and between friends or other relatives. Unfortunately, young parents tend to believe this information and decide not to vaccinate their child. Especially parents with a lower education level. What is the most frightening is the number of parents who have heard negative information about this vaccine; 370 (76.6%) parents state that have heard negative information. Most, of course, have read this information on the Internet (83.2%). The big problem here is that this negative information is not evidence-based. There is a huge need in spreading such information among parents. Even 326 (67.5%) parents mentioned that they need evidence-based information about vaccine against meningococcal infection. And the biggest part of such parents (90.8%) would like to get it from healthcare specialists. Compared to Italy, only one third of respondents have heard or read negative information. Surprisingly, the majority of negative information they obtain from physicians (71.7%) and only 35.9% from the Internet. Most of parents (78%) also mark the need for additional information about the vaccine (12).

Because of lack of evidence-based information about vaccines and difficulties of spreading it, nowadays, there are a lot of anti-vaxxers. They gather in groups and spread false, not evidence-based information about vaccines, especially new vaccines (14). Today, the WHO names vaccine hesitancy as one of 10 threats to global health. Vaccine hesitancy is flush with HIV, air pollution, noncommunicable diseases, etc. Vaccine is always the easiest and most effective way of stopping the disease spread. Also, regarding financial part, vaccination is much cheaper than recovery costs. It is important to understand that the parents' way of thinking regarding vaccines can be changed (12). Studies have shown that interventions can be made here. The major fact is that there is no intervention that would fit all countries or even small groups within the country. It is important to understand specific concerns within those groups, evaluate them, and apply intervention considering that.

Limitations

Although, this amount of the respondents is enough to represent Lithuanian population, some factors could influence the results. First, the majority of the respondents are mothers. Fathers were not as communicative as mothers, consequently the process of collection of questionnaires was burdened. Fathers' opinion could make significant influence on the results. Second, most of the data was collected from parents who live in Vilnius or near. The answers of parents who live in the smaller cities or in countryside could also change the numbers.

CONCLUSIONS

Parents' knowledge of the meningococcal B infection and its vaccination is good. While most parents are worried that their child may have meningococcal B infection due to a lack of confidence in vaccine and evidence-based information, some parents are reluctant to vaccinate their children. There is a strong need for parental education and dissemination of evidence-based information among parents of young children. Further studies concerning this topic can be conducted expanding the respondents' group, comparing whether parents' opinion about the MenB vaccine has changed after particular vaccination time, and whether evidence-based information change parents' opinion about MenB vaccination.

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Conflict of Interests

None declared

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