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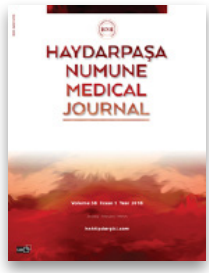

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ORIGINAL ARTICLE

Why is the Meningococcal Vaccine not Being Administered?: Mothers' Opinions

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Abstract

Introduction: The present study aimed to investigate mothers' knowledge and attitudes about the meningococcal vaccine and to determine the reasons for not applying this vaccine.

Methods: This cross-sectional prospective study was conducted between 01 August and 30 October 2018. Mothers who had children between 3-59 months were included in this study. Thirteen questions were asked about the sociodemographic characteristics of participants, their knowledge and attitudes about the meningococcal vaccine.

Results: This study included 426 mothers. The mean age of mothers was 31.4±5.5 (19-48) years and children were 18.5±13.4 (3-59) months. 59.4% of mothers knew that the meningitis vaccine protects brain membrane from inflammation. 232 (54.5%) of the children were recommended meningococcal vaccination. The rate of meningococcal vaccine application was 24.9% (n: 106). The findings obtained in this study showed that maternal education level ($p<0.001$), family income ($p<0.001$) and where other vaccines were applied ($p<0.001$) were the factors affecting vaccination. Causes of non-application meningococcal vaccine; 50.3% lack of the information, 16% the financial insufficiency, 12% not considering the time of vaccination, 5.7% to think that the vaccine is not necessary and various reasons were stated.

Discussion and Conclusion: The findings showed that mothers do not have enough information about the meningococcal vaccine. We think that providing education to parents and health workers about the meningococcal vaccine would increase the rate of vaccination.

Keywords: Child; knowledge; meningococcus; vaccine.

Invasive meningococcal diseases (IMD) are among the preventable infections with high mortality and severe sequelae rates in childhood[1]. It is estimated that there are at least 1.2 million cases of meningococcal infection in the world each year, and 135,000 of them result in death[1]. A rapid and fatal course can be seen in IMD, and it has been reported that severe sequelae (amputation, skin necrosis, deafness, paralysis, mental retardation, etc.) can develop in 10-20% of who survived[2].

The human species is the only natural host of Neisseria meningitidis, and it is colonized in the upper respiratory tract of approximately 10% of people[3]. In a multi-center study conducted in our country, the carrier rate was found to be 6.3% in individuals aged 10-24[4].

Neisseria meningitidis has 13 serogroups according to its polysaccharide capsule. Serotypes A, B, C, Y, X and W are the most common serotypes that cause invasive disease in humans[2,4-6]. Today, conjugate and polysaccharide me-

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ningococcal vaccines containing these serotypes are manufactured[7]. Polysaccharide vaccines are not preferred for immunization in young children because they induce a weak immune response, have no effect on carriage and do not contribute to social immunity[8]. Conjugate vaccines are available in single-component and multi-component forms. Conjugate meningococcal vaccine containing four serotypes (A, C, Y, W) was licensed in 2012 in our country, and currently, the vaccine from three different manufacturers is approved by the Ministry of Health for applicability[9,10]. Serogroup B meningococcal vaccine was licensed in our country in September 2018 and has been on sale since November 2018. Meningococcal vaccines are not yet included in the national routine vaccination program in our country[11].

In the present study, it was aimed to determine the knowledge and attitudes of mothers about the meningococcal vaccine, which is not included in our country's national vaccination program but recommended to be administered in childhood, and to determine the reasons for not administering it.

Materials and Methods

This descriptive cross-sectional prospective study was conducted between 01 August - 30 October 2018 in Istanbul Şişli Hamidiye Etfal Training and Research Hospital Hospital. Mothers who applied to our hospital's Pediatric Outpatient Clinic and had children between 3-59 months of age, were included in the study. Mothers with native language other than Turkish were excluded from the study. Approval was obtained from the hospital ethics committee (07/08/18-1057) for the study.

A questionnaire form was created by using the literature information by two experts on the subject. The mothers were informed about the study, and the study questionnaire was filled by face-to-face interviews in a quiet environment with those who gave consent. While answering the questions, they were asked to answer according to their youngest children. Participants were asked six questions about their sociodemographic characteristics and seven questions about their knowledge and attitudes about the meningococcal vaccine.

Statistical Analysis

Statistical analysis of the study was performed using the Statistical Package for the Social Sciences 16.0 for Windows (SPSS Inc.; Chicago, IL, USA) program. Continuous values from descriptive statistics were given as mean±standard deviation and the lowest-the highest value. Frequency analyzes were expressed as n number and percentage (%). For numerical variables, Student t Test was used in independent two groups and One Way ANOVA test was used in more than two independent groups. Statistical alpha significance level was accepted as $p<0.05$.

Results

A total of 435 mothers were interviewed during the study. It was learned that 9 of the mothers did not have other childhood vaccinations for their children because they were vaccine-hesitant. These mothers were excluded from the study. The study was completed with 426 mothers who agreed to participate. The mean age of the mothers was 31.4±5.5 (19-48) years, and of the children, it was 18.5±13.4 (3-59) months. 291 of the participants (68.3%) were housewives, and the median number of children they had was 2 (1-7). According to the national vaccination program, it was seen that 96.5% (n=411) of the children had their vaccines fully administered, and 3.5% (n=15) were administered incompletely according to chronological age.

When asked to mothers the reasons to administer of the meningococcal vaccine to children"; 59.4% (n=253) told that it was given to protect from the meningitis, 1.2% (n=5) told that it was given to protect from diarrhea, 0.2% (n=1) from upper respiratory tract infection, and 39.2% (n=167) stated that they didn't not know why. Meningococcal vaccine was recommended to 232 (54.5%) of the children. The vaccine was recommended for 113 (48.7%) by a pediatrician, for 76 (32.8%) by a nurse, for 41 (17.7%) by family physician, and for 2 (0.9%) by their neighbors.

The rate of administration of meningococcal vaccination was found to be 24.9% (n:106). It was determined that maternal education level ($p<0.001$), family income ($p<0.001$) and the health institution where other vaccines were given ($p<0.001$) were the factors affecting the administration of meningococcal vaccine. The rate of meningococcal vaccination was higher for those whose mothers were university graduates, those in the high-income group, and those whose routine vaccinations were administered in hospitals. The sociodemographic characteristics of the participants and the factors affecting the administration of meningococcal vaccine were shown in Table 1.

When asked to mothers the reasons not to administer of the meningococcal vaccine to their children; 50.3% stated lack of information, 16% financial insufficiency, 12.8% stated that it was not time for the vaccine, 5.7% thought that the vaccine was not necessary, and 3.5% stated that the vaccine was not safe and various reasons were specified (Table 2). There were 41 mothers who did not administer

Table 1. Sociodemographic characteristics of the participants and factors affecting meningococcal vaccination

	Those who got meningococcal vaccine (n=106)	Those who didn't get meningococcal vaccine (n=320)	p	Rate of vaccination within the group %(n/group n)
Mother's level of education				
Illiterate	3	20	<0.001	13 (3/23)
Primary education	21	106		16.5 (21/127)
High school	28	101		21.7 (28/129)
University	54	93		36.7 (54/147)
Mother's monthly income				
Less than 1600 TL	3	46	<0.001	6.1 (3/49)
1600-2400 TL	26	98		20.9 (26/124)
2400-3200 TL	21	78		21.2 (21/99)
More than 3200 TL	56	98		36.3 (56/154)
Health institution where routine vaccinations are administered				
Family Health Center	48	260	<0.001	15.5 (48/308)
Public Hospital	47	56		45.6 (47/103)
Private Hospital	9	3		75 (9/12)
Private Physician	2	1		66.6 (2/3)

the meningococcal vaccine to their children because they thought it was not time to vaccinate. The age distribution of these children was shown in Figure 1. It was learned that some participants waited for the child to reach one year of age (n:6) or two years of age (n:6) in order to receive a single dose of vaccine.

Table 2. Reasons why meningococcal vaccine were not administered to children

	n (%)
I have not been informed about the vaccine before	161 (50.3)
I cannot get my child vaccinated for financial reasons	51 (16)
The time to administer the vaccine has not come yet	41 (12.8)
I don't think vaccine is necessary	18 (5.7)
I think the vaccine is not safe	11 (3.5)
There are too many side effects of the vaccine	5 (1.6)
I am indecisive	7 (2.2)
I will have my child vaccinated after the age of one	6 (1.8)
I will have my child vaccinated after the age of two	6 (1.8)
I will have my child vaccinated one month later	5 (1.6)
I will have my child vaccinated at 9th month	3 (0.9)
Other*	6 (1.8)
Total	320

*Other: Nobody in the family got it (n=2), Because it was not in the Ministry of Health's vaccination program (n=2), Some doctors do not recommend it (n=1), I missed the time (n=1).

When asked about their views on including the meningococcal vaccine in the national vaccination program for free, 362 (85%) of the participants stated that they wanted the vaccine to be included in the national vaccination program, 7 (1.6%) did not, and 57 (13.4%) stated that they were undecided.

Discussion

There was no previous study in the literature investigating the knowledge and attitudes of mothers about meningococcal vaccine in our country exists. In our study, it was de-

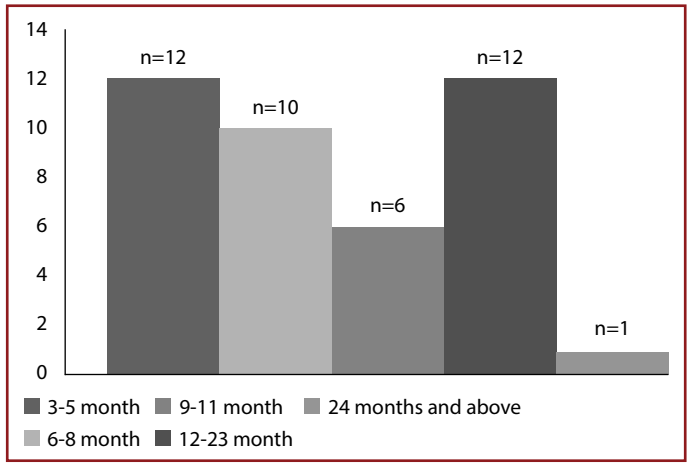

Figure 1. The age distribution of children whose mothers thought it was not time to vaccinate.

termined that approximately half of the mothers did not have sufficient knowledge about the meningococcal vaccine. Meningococcal vaccine was recommended for half of the children.

In a multi-center study investigating the attitudes of families and healthcare professionals towards new childhood vaccination practices; most healthcare professionals reported that they were responsible for educating parents about vaccines and the diseases they prevent, and their advice on vaccination has been reported to affect vaccine acceptance[12]. In a study conducted in Italy, 82.7% of pediatricians reported that they routinely educated parents about vaccinations to be administered[13]. In a study conducted in Germany, it was found that 95% of the parents regarded their pediatrician as the most important source of information on immunization[14]. In a study conducted with pediatricians in our country, it was reported that the most effective method of protection from meningococcal diseases is known to be vaccination, and the vaccine was recommended at a rate of 56.8% for children in the risk group and 40.7% for all children[8]. In this study, the most frequent reasons for not recommending the meningococcal vaccine were stated as the high cost and side effects of the vaccine[8]. The present study, it was determined that the person who the most recommended meningococcal vaccine to children was the pediatricians.

In our study, the rate of applied meningococcal vaccination was found to be lower than the rate of applied vaccines in the national vaccination program. In a study conducted in the United States, it was reported that mothers who were university graduates and those in the high income group were more likely to refuse vaccines than others[15]. Similarly, in a study conducted after the meningococcal B vaccine was licensed in Italy, it was found that university graduate mothers were less likely to accept the vaccine than others[16]. It has been reported that parents with higher level of education had easier access to various sources of information that raised their concerns about vaccine safety, which may have resulted in the lower rate of vaccine acceptance[16]. Differently, in our study, it was found that the rate of vaccine acception of mothers who were university graduates and families in the high income group was higher than the others. This may be due to university graduate mothers' better understanding of the severity of the disease and the importance of immunization. We think that the higher rate of vaccination by mothers in the high income group is related to the financial availability of the vaccine. In our study, it was determined that "the health institution where routine vaccines are given in the national vaccination program" was a factor affecting the administration of meningococcal vaccine. The rate of meningococcal vaccination was higher than others, in those whose routine vaccines were not administered in the family health center. We think that the low rate of recommendation of meningococcal vaccine by family physicians might cause this.

In our study, it was determined that the most common reason for not administering meningococcal vaccine was lack of knowledge about the vaccine. It was determined that the most common reason for the participants, who were informed about the vaccine, for not having the vaccine was financial insufficiency and the thought that the time of vaccination had not yet come.

In the previous studies, N.meningitidis was reported as the most common cause of childhood meningitis in our country. The most commonly isolated meningococcal types were serogroups W and B[4,17,18]. Considering the distribution of IMD by age groups globally, although it can be seen in all age groups, infants and children under 5 years of age constitute the biggest risk group[17,18]. This may be due to the immaturity of the alternative and lectin complement pathways and the poor infant response to bacterial polysaccharides[19]. Similarly, the majority of the cases in our country were in the 0-5 age range and it has been reported that the majority of the cases were infants in the 0-1 age range[18]. Death and sequelae among meningococcal diseases were also seen most frequently in this age group. Therefore, early protection against disease is crucial[11,17,18].

Three different conjugate meningococcal vaccines containing A/C/W/Y serogroups are licensed in our country. Although these vaccines contain the same serogroups, the age ranges and dose numbers in which they should be applied are different[7,10,11]. ACWY-DT vaccine (Menactra®) is licensed to be administered between 9 months - 55 years old. The vaccine is recommended as 2 doses at least 3 months apart between 9-23 months of age and as a single dose between the ages of 2-11. ACWY-TT vaccine (Nimenrix®) has been approved in our country to be administered in 6 week- and older ages. The vaccine is recommended as 2 doses at 2 months intervals for infants of 6-12 weeks and a booster dose at 12 months, and 1 dose for children and adults aged 1 year and above. ACWY-CRM (Menveo®) has been approved for 2 month- and older ages. It is recommended that this vaccine be administered in 4 doses in the 2^{nd}, 4^{th}, 6^{th} and 12^{th} months in early infancy, in 2 doses in the 7^{th} and 12^{th} months in the late infancy, or in a single dose in children over 2 years of age[7,10,11]. Meningococcal serogroup B (Bexsero®) vaccine, on the other hand, has been recently approved in our country and was not yet available for sale at the time of this study. In our study, it

was learned that some of the mothers thought that it was not the time of vaccination or did not get the vaccine to reduce the number of doses. However, these children were in the age group at risk for invasive meningococcal disease, and successful prevention could be achieved with early vaccination.

In our study, the majority of the participants stated that after being informed about the meningococcal disease and vaccine, they wanted the vaccine to be included in the national vaccination program free of charge. Therefore, we think that the rate of meningococcal vaccination will increase if the lack of information and financial insufficiency, which we have identified as the two most common reasons for not vaccination, are eliminated.

Our study has some limitations. The first limitation is that it was conducted only in Istanbul, thus, the information about the country may be limited. The second limitation is that the answers to the questionnaire were dependent on the statement of the mother.

Conclusion

In our study, it was determined that the mothers' knowledge about the meningococcal vaccine was not sufficient. The administration rate of meningococcal vaccine was found to be 24.9%. The two most common reasons for not having the vaccine were lack of knowledge about the vaccine and financial insufficiency. It was found that the administration of different doses of vaccine at different times affected the rate of vaccination. We think that training about the meningococcal vaccine given to the healthcare professionals who provide vaccination services to families and children and lowering the vaccine fee in order to increase their financial accessibility will increase the vaccination rates.

Ethics Committee Approval: Approval was obtained from the hospital ethics committee (07/08/18-1057) for the study.

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: G.K.E.; Design: G.K.E., A.B.; Data Collection or Processing: G.K.E., L.B; Analysis or Interpretation: G.K.E., A.B.; Literature Search: L.B., G.K.E.; Writing: G.K.E.

Conflict of Interest: None declared.

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