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Assessment of knowledge level and behavior about vaccines of mothers applying to the children's hospital

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ABSTRACT

Objectives: The aim of this study is to evaluate the knowledge levels of mothers who applied to a university hospital about childhood vaccinations and the sociodemographic characteristics affecting them.

Methods: The population of the descriptive cross-sectional study consists of mothers who applied to the outpatient clinics of Ondokuz Mayıs University Children's Hospital between February 1 and March 31, 2019. A 32-item questionnaire developed by the researchers was applied to 338 mothers who agreed to participate in the study. Ethics committee and institution permissions were obtained. Data were presented with descriptive statistics.

Results: Ninety-five point three percent of the mothers stated that the vaccine was necessary. While 52.7% of the individuals stated that they were aware of the existence of self-paid vaccines, it was determined that 84.0% of the participants did not have self-paid vaccines for their children. Thirty-seven point six of the participants knew that the first vaccine of the newborn was given at birth. Healthcare staffs were among the sources of information for 94.7% of the mothers who stated that they received information about vaccination.

Conclusions: It was found out that the mothers had information about the vaccine. However, the rate of vaccination other than routine vaccines was low. In order to combat vaccine refusals and prevent misinformation, it is considered to be important to provide information at every opportunity, and especially about paid vaccines, parents should be given more information.

Keywords: Vaccine, knowledge level, mother

The response caused by the administration of antigen to the body to protect against a microorganism is called "immunization", and the procedure to obtain this response is called "vaccination". Vaccination is one of the most cost-effective health interventions available, saving millions of people from illness, disability and death each year [1]. Despite the current availability of effective and safe vaccines that protect against a range of serious diseases and the development of many promising new vaccines, these diseases still pose significant threats to developed and developing countries [2]. Routine vaccination services are provided against 13 diseases (diphtheria, pertussis, tetanus, polio, hepatitis B, hepatitis A, H. influenzae type b, tuberculosis, measles, mumps, rubella, chickenpox and pneumococcus) in infants and children within the scope of the "Expanded Immunization Program", which was initiated by the Ministry of Health

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in 2008 in our country. Although it varies by region, it is reported that the childhood vaccination rate in 2019 is between 96-99% on average [3]. However, the number of fully vaccinated children is below the desired targets. For example, according to Turkey Demographic and Health Survey 2020, it is stated that in 15% of registered infants who received the first dose of DTaP-IPV-Hib vaccine (Diphtheria, tetanus, acellular pertussis, inactive polio virus, Hemophilus influenza type b), the third dose was left missing, therefore, full protective resistance cannot be achieved against these five diseases [4].

Among the reasons why children are not fully vaccinated at the appropriate time, it is stated that there are various factors such as the socioeconomic structure of the family, the education level of the parents, the number of children, problems in accessing the health institution, crowded family, parents being young, being a single parent, insufficient or misinformation [5]. In addition, it has been stated that the increasing number of vaccination refusals around the world are due to the lack of sufficient and accurate information about the vaccines by the parents and the speculative news on vaccines in the media [2].

Especially the knowledge, attitude and behavior of mothers about vaccination are important because mothers play an important role in improving the health of children. The practices of mothers to cope with side effects, their negative perception of mild illnesses, negative attitudes towards vaccination, and misconceptions of mothers on vaccination are some of the most important obstacles to childhood vaccination [6]. It is important for mothers to obtain precise and accurate information about vaccines and to develop positive perceptions about vaccines, thus it will contribute to the prevention of many infectious diseases that cause mortality and morbidity in childhood.

In this study, it was aimed to evaluate the knowledge level and influencing sociodemographic characteristics of mothers who applied to a tertiary health institution, which is an important reference hospital in the Black Sea region, about childhood vaccines.

METHODS

Mothers who applied to Ondokuz Mayıs University Children's Hospital outpatient clinics between February 1 and March 31, 2019 constituted the population of the study, which is a descriptive cross-sectional type. Considering the average monthly number of patients examined in pediatric outpatient clinics and using the data of a study conducted in our country [7], it was calculated that at least 338 mothers should be reached.

The questionnaire form, which was used as data collection tool in the study, was composed of 32 questions developed by the researchers by reviewing the literature. The survey included 11 questions about the socio-demographic characteristics of the mothers and 21 questions about childhood vaccinations. The answer of the participants who replied the question "What is the first vaccination time of children" in the questionnaire as "At birth" was accepted as correct. After obtaining the permission of the ethics committee (verdict number: 2019/98), the questionnaire application was initiated by the researchers using the face to face interview method. Beforehand, explanatory information was given to the mothers about the study and verbal consent was obtained from all mothers who agreed to participate.

Statistical Analysis

After the data were encoded, they were transferred to the SPSS (Version 22 for Windows, SPSS Inc, Chicago, IL, USA) program and analyzed. Continuous variables were expressed as mean ± standard deviation and discrete variables as numbers and percentages (%). Analysis of data was made using Pearson chi-square and Fisher's exact test. The statistical significance level for all tests was accepted as $p < 0.05$.

RESULTS

The mean age of 338 mothers was 33.6 ± 6.8 years, and 33.4% were primary school graduates. It was determined that 79.6% of the participants did not have a job, 46.2% had two children, and the household income of 43.2% was between 2,001 and 3,000 TL (Turkish Lira) (Table 1).

Ninety-five point three percent of the mothers stated that the vaccine was necessary, while 4.7% stated that it was not. When Table 2, in which the ques-

Table 1. Sociodemographic characteristics of the mothers (n = 338)

Characteristics	n	%
Age group (years)		
18-34	199	58.9
35-64	139	41.1
Education status		
Primary education	113	33.4
Secondary education	65	19.2
High school	87	25.7
University	73	21.6
Working status		
Not working	269	79.6
Officer	42	12.4
Worker	10	3.0
Other	17	5.0
Total household income (TL)		
0-2,000	83	24.6
2,001-3,000	146	43.2
3,001-4,500	41	12.1
Above 4,500	68	20.1
Number of children		
1	80	23.7
2	156	46.2
3	75	22.2
4 and above	27	7.9

tions and answers are presented measuring the knowledge level of the participants, is examined, 90.1% of the people who considered the vaccine necessary answered the question "Why do you think vaccination is necessary" as "The vaccine protects from infectious diseases". The answer of 73.3% of the mothers to the question "What would be the harm if the vaccine is not given" was "Infectious diseases increase". While the answer to the question about whether vaccines have any side effects was "yes" with a rate of 85.5%, the most commonly said side effect was "fever" (90.6%). Thirty-seven point six percent of the participants stated that the first vaccine of the newborn was given at birth, 95.6% of the participants stated that the vaccines were administered in family health centers and 74.5% of the participants said that the vaccines were administered by nurses. Fifty-two point seven percent of the individuals stated that they were aware of the existence of self-paid vaccines and 70.3% of them specified that vaccines could be delayed in the presence of disease.

According to the statements of the participants, the number of children who developed side effects after any vaccination was found to be 150 (44.4%), and the number of children who had the related disease despite vaccination was 27 (8.0%). Healthcare staff were among the sources of information for 305 (94.7%) of 322 (95.3%) mothers who stated that they had received information about vaccination. Other sources of information were listed as internet (5.0%), neighbors and friends (1.9%) and television, radio, and newspaper (1.6%). It was determined that 284 of the participants (84.0%) did not have self-paid vaccines for their children. The most common reasons for this were the lack of knowledge about self-paid vaccines (63.4%) and not thinking that it was necessary (38.4%).

In Tables 3 and 4, the distribution of knowledge levels, attitudes and behaviors of the mothers on vaccination according to their sociodemographic characteristics are presented. Accordingly, those between the ages of 35-64 were more aware of the existence of self-paid vaccines and the frequency of self-paid vaccination was higher than those in the 18-34 age group ($p = 0.009$ and $p < 0.001$, respectively). On the other hand, mothers between the ages of 18-34 knew the time of first vaccination more accurately ($p = 0.005$). Participants with high school education and above gave more accurate answers about the availability of self-paid vaccines ($p < 0.001$), time of first vaccination ($p < 0.001$) and delay of vaccines ($p = 0.017$). The frequency of getting self-paid vaccination ($p < 0.001$) and getting information about vaccination ($p = 0.004$) was also higher in this group. It was determined that working mothers had more information about the side effects of vaccines ($p = 0.036$), existence of self-paid vaccines ($p < 0.001$) and time of first vaccination ($p = 0.011$) and got more self-paid vaccinations for their children ($p < 0.001$). Individuals with a total household income above 3,000 TL were more successful in self-paid vaccination ($p < 0.001$) and vaccination postponement questions ($p = 0.012$); it was found out that they got more self-paid vaccines ($p = 0.003$), got more information about vaccination ($p = 0.023$), and bene-

Table 2. Distribution of mothers' responses to questions about vaccines

Questions	n	%†	Questions	n	%†
Are there self-paid vaccines? (n =336)			**Are there any side effects of vaccines? (n = 338)**		
Yes	177	52.7	Yes	299	88.5
No	159	47.3	No	39	11.5
What will be the harm if the vaccine is not given?* (n = 322)			**What are the side effects of vaccines?* (n = 299)**		
Infectious diseases increase	236	73.3	Fever	271	90.6
The disease is severely cured	50	15.5	Rash	103	34.4
Disabilities - fatal risks occur	34	10.6	Allergy	91	30.4
I don't know	19	5.9	Gets sick	6	2.0
Other	11	3.4	Other	33	11.0
Who applies the vaccine?* (n = 333)			**Where are vaccines administered?* (n = 338)**		
Nurse	248	74.5	Family Health Center	323	95.6
Midwife	151	45.3	Hospital	72	21.3
Physician	33	9.9	Maternity and Child Health Center	4	1.2
Why are vaccinations necessary?* (n = 322)			**When is the first vaccination of newborn? (n = 338)**		
Protect against infectious diseases	290	90.1	At birth	127	37.6
The disease is mildly cured	10	3.1	One month old	82	24.3
Other	24	7.5	One week old	38	11.2
I don't know	5	1.6	Two weeks old	3	0.9
Can vaccinations be delayed? (n = 333)			**I don't know**	**88**	**26.0**
When gets sick	234	70.3			
Cannot be delayed	18	5.4			
I don't know	81	24.3			

*Multiple choices, †Calculated on valid respondents

fited more from healthcare staff as a source of information ($p = 0.016$).

DISCUSSION

The majority of mothers in the study stated that vaccination was necessary. In a study conducted in Zonguldak, all mothers and 98% in Hatay stated that they considered vaccination necessary [8, 9]. In a study in Italy, 86.2% of the parents found it necessary to apply vaccines even if a healthy lifestyle was followed and natural treatments were used [10]. Considering that the anti-vaccine tendency has increased in the world and in our country especially in recent years [11], it is a positive finding that vaccines are considered necessary by the majority of the mothers included in our study, regardless of sociodemographic characteristics such as education level, age group, employment status or household income.

Local side effects such as pain, swelling and erythema at the injection site, mostly mild and temporary, and systemic side effects such as fever and rash may occur after vaccination applications. Much less often than these side effects, there is a risk of developing anaphylaxis to the vaccine or its components, with about one in a million doses [12]. In order not to take a negative attitude about vaccination, we think it is im-

Table 3. Distribution of mothers who gave correct answers according to their sociodemographic characteristics

Characteristics	Correct Answers to Questions (%)					
	Are there any side effects of vaccines?	Are there any self-paid vaccines?	When is the first vaccine given?	Can vaccination be postponed?	n	%
Age group (years)						
18-34	85.9	46.7	43.7	69.1	199	58.9
35-64	92.1	61.2	28.8	71.9	139	41.1
p value	0.081	0.009	0.005	0.572		
Education status						
Secondary school and below	87.6	36.4	25.3	64.6	178	52.7
High school and above	89.4	70.6	51.3	76.6	160	47.3
p value	0.618	< 0.001	< 0.001	0.017		
Working status						
Not working	86.6	46.3	34.2	68.8	269	79.6
Working	95.7	77.9	50.7	76.1	69	20.4
p value	0.036	< 0.001	0.011	0.241		
Total household income (TL)						
Below 3,000	87.8	41.2	34.5	65.9	229	67.8
3,000 and above	89.9	76.9	44.0	79.4	109	32.2
p value	0.566	< 0.001	0.091	0.012		
Number of children						
1	95.0	55.0	40.0	66.7	80	23.7
2	86.5	57.8	41.0	71.4	156	46.2
3 and above	86.3	43.1	30.4	71.3	102	30.2
p value	0.111	0.064	0.198	0.728		

portant for parents to know these symptoms and to be aware that these side effects are expected and temporary. Eighty-eight point five percent of the mothers in the study stated that vaccines had side effects, and this rate was found to be 73.7% in another study [9]. In studies involving parents and adults, the rate of those who stated that vaccines had side effects was 53.6% and 67.7%, respectively [7, 13]. In our study, it was determined that working mothers knew the side effects of vaccines with a higher frequency. Similarly, correct answers to other questions of knowledge were received with high frequency in this group. This may be due to working mothers' communication with mothers who have similar experiences in the working environment, or different factors such as education and economic levels. As a limitation of the study, working mothers constituted approximately one-fifth of the participants in this study. However, the participation of working mothers in similar studies was also low [7, 9]. Different study designs in which the two groups show a similar distribution are needed to determine the factors affecting knowledge levels of working and non-working mothers.

The answers given to the question of which side effects can be seen in vaccines, although the order varies, were found to be generally similar to those in

Table 4. Distribution of mothers' attitudes and behaviors towards vaccination according to sociodemographic characteristics

Characteristics	Questions					
	Is vaccination necessary?	Have you got a self-paid vaccine?	Do you obtain information about vaccination?	Who is your source of information on vaccination?	n	%
	Yes (%)	Yes (%)	Yes (%)	Healthcare staff (%)		
Age group (years)						
18-34	94.5	8.7	95.0	90.4	199	58.9
35-64	96.4	23.9	95.7	91.4	139	41.1
p value	0.411	< 0.001	0.763	0.752		
Education status						
Secondary school and below	95.5	8.6	92.1	89.2	178	52.7
High school and above	95.0	22.0	98.8	92.5	160	47.3
p value	0.827	0.001	0.004	0.297		
Working status						
Not working	95.2	11.2	95.2	90.7	269	79.6
Working	95.7	29.9	95.7	91.2	69	20.4
p value	1.000*	< 0.001	1.000*	0.898		
Total household income (TL)						
Below 3,000	96.5	11.0	93.4	88.2	229	67.8
3,000 and above	92.7	23.4	99.1	96.3	109	32.2
p value	0.120	0.003	0.023	0.016		
Number of children						
1	95.0	16.3	96.3	92.5	80	23.7
2	96.2	17.6	94.9	89.0	156	46.2
3 and above	94.1	9.9	95.1	92.2	102	30.2
p value	0.747	0.223	0.891	0.571		

*Fisher's exact test

other studies [7-9, 13]. It was determined that 44.4% of the children of the participants developed side effects after vaccination. This was higher than the two domestic studies, in which the related rates were 13.3% and 15.0% [8, 14]. In a study carried out in Egypt, this rate was found to be much higher with 94.4%, and most of these side effects were fever [15]. The reason for these differences may be related to the difference in the options presented in the closed-ended questions, the memory factor or the application of the vaccines at the country level and the difference in the vaccines administered.

In studies involving mothers and parents across the country, the rate of awareness of self-paid vaccines outside the Expanded Immunization Program varies between 27.8% and 63.3% [7-9, 16]. In our study, this

rate was found to be 52.7% and the rate of the participants who had their children vaccinated at least once for a fee was 16.0%. Similarly, the frequency of self-paid vaccination was found as low as 9.7% and 15.6% in other studies [7, 9]. In one of those studies, similar to the this study, the most common reason was not having knowledge about self-paid vaccines [9]. The higher frequency of self-paid vaccination among mothers in the 35-64 age group, with higher education and income levels, and those working in a job is generally compatible with the literature [7, 9, 16]. These findings show that awareness about paid vaccines, income and education level play an important role in the administration of these vaccines.

Hepatitis B vaccine, the first vaccine given to babies, should be administered within the first 72 hours after birth, preferably within the first 24 hours [17]. While the rate of knowing that the first vaccine was given at birth was found to be 65.4% and 92.2% in studies conducted in our country [8, 9], this rate ranged between 68.5% and 97.1% in studies abroad [18-20]. The rate of knowing the time of first vaccination was found to be 37.6% in this study, and it was quite low compared to the literature. Although individuals in the 35-64 age group, who are not working and have a secondary school or less education level, give correct answers to this question at a lower rate, it is an issue that should be emphasized that almost half of the mothers with high school and above education level could not give the correct answer.

In conditions such as severe illness or high fever, it is preferable to postpone vaccinations until recovery [21]. Seventy point three percent of the mothers knew that vaccines could be delayed when the disease develops. In this respect, a similar result was obtained in a study conducted on parents in Istanbul, and 71.6% of the participants stated that vaccines could be delayed when fever or disease occurred [22]. The point that should not be overlooked in this regard is that diseases such as mild upper respiratory tract infections do not prevent vaccination, and the decision to postpone in cases of severe illness and high fever should be made by the physician [21]. In the questions posed in our study, not making a distinction between disease and severe disease can be considered as a limitation.

Ninety-five point three of the participants stated that they received information about vaccination. In studies involving mothers or parents in our country, the rate of those who declared that they received information varies between 58.3% and 88.6%, and similar to our study, it is seen that healthcare staff are the most benefited as a source of information [7-9, 14]. There are different findings about the source of information abroad. For example, in studies involving pregnant women, it was determined that word-of-mouth information was obtained most frequently in Italy, and more frequently from family or friends in China [23, 24]. In Ethiopia, it was observed that mothers or caregivers received the most information about vaccination from healthcare workers [18]. It is of utmost importance to obtain accurate information in order to reduce the increasing number of vaccine rejection and to eliminate false hesitations about vaccination. For this purpose, we think that the primary source of information should be health professionals. As a matter of fact, even if information is obtained from different sources, it has been shown that physicians are trusted the most in this regard [24] and that giving positive opinions by physicians increases the rate of vaccination [25].

Among the mothers, those with high school or higher education, those working in a job, and those with higher income were more knowledgeable in most of the information questions. This situation is similar in many studies carried out in our country and abroad, and it is seen that people with high education or income levels are more conscious about vaccination [19, 20, 23, 26-28]. Assuming that people with a high level of education are more involved in business life and have higher income, we think that the main determinant variable in this issue is the level of education.

We found that the number of children did not affect the level of knowledge or attitudes and behaviors about vaccination. There are different findings on this subject in similar studies. For example, as the number of children increased in the parents who applied to the pediatric health and diseases outpatient clinic in İzmir, there was a decrease in the rate of parents who know about self-paid vaccines and have these vaccinations for their children [7]. In a study conducted in Lebanon, as the number of children increased, it was seen that the knowledge, attitude and behavior scores of the parents about vaccination decreased [26]. It was determined that the number of children did not affect the knowledge level of vaccination in a study carried out in Kars, similar to our study [27].

Limitations

This study has several limitations. Since the sample of the study consists of mothers who applied to the hospital, the results can be generalized to the population they belong to. Post-vaccination side effects and disease development is a finding based on mothers' statements. In the question about vaccination postponement, no distinction was made between illness and severe illness.

CONCLUSION

As a result, it was found out that the majority of the mothers in this study considered the vaccine necessary, had information about the side effects of vaccines, but did not have enough information about the time of the first vaccination, and although almost half of the participants were aware of the existence of paid vaccine, a small portion of them had paid vaccines for their children. It turned out that those with higher education and income levels and those who work were generally more knowledgeable about vaccination, almost all mothers were informed about vaccination in some way, and healthcare staff ranked first as the source of information. In order to prevent vaccination refusals and misinformation, it is thought that the continuity of first-hand information provided by healthcare professionals is of great importance and the information needs of parents should be met, especially about paid vaccines.

Authors' Contribution

Study Conception: BT, ŞÖ, SH, HNA, ÖT, CD; Study Design: BT, ŞÖ, SH, HNA, ÖT, CD; Supervision: BT, ŞÖ, SH, HNA, ÖT, CD; Funding: CD; Materials: HNA; Data Collection and/or Processing: ŞÖ; Statistical Analysis and/or Data Interpretation: SH; Literature Review: BT; Manuscript Preparation: ÖT and Critical Review: BT, ŞÖ, SH, HNA, ÖT, CD.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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