

Original Article

Parents' Attitudes Towards Childhood Vaccines, and Related Factors

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Abstract

Purpose: This study was aimed at determining parents' attitudes towards childhood vaccines and related factors. **Methods:** This cross-sectional study was conducted with 462 parents who had children aged 0-59 months and presented to the paediatric outpatient clinic of a hospital located in the central Anatolian region of Turkey between October 2020 and March 2021. The study data were collected using a questionnaire including the Personal Information Form and the Parents Attitudes about Childhood Vaccines scale. **Findings:** Of the parents participating in the study, 81.6% stated that they considered it necessary to vaccinate their children, 83.1% had their children get all the vaccines recommended by the Ministry of Health, 76.9% stated that they missed some of the recommended vaccinations due to the side effects of vaccines, and 25.7% were hesitant to have their children vaccinated. **Conclusions:** While determining parents' attitudes towards and beliefs about vaccination, and factors affecting their attitudes and beliefs is of critical importance for the success of vaccination programs, parents' lacking knowledge about vaccines and having vaccine hesitancy may adversely affect vaccination rates in the community. Therefore, we recommend that parents should be supported through trainings on the importance of vaccination, and that parents and the society should be informed about vaccination through public service announcements using mass media.

Key words

Attitude; Knowledge; Parents' hesitancy; Vaccine refusal

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Introduction

Immunisation services are carried out in order to prevent the emergence of diseases that can be prevented through vaccines in the society, especially in infants and children, and to prevent deaths and disabilities caused by these diseases. The main goal of these services is to have no children left unvaccinated.¹ Within the scope of the Expanded Program on Immunisation, free vaccination against 13 diseases is carried out in primary health care institutions in Turkey.² Approximately 2% of 12-23-month-old children in Turkey are never vaccinated, approximately 50% of 24-35-month-old children are vaccinated according to age, and the rate of those who have all basic vaccinations in this age range is approximately 72%.³ The "anti-vaccine" movement started in our country, Turkey, eight years ago, and the cases of vaccine refusal have increased rapidly since a lawsuit regarding "receiving parental consent for vaccination" was won in 2015 and anti-vaccine discourses frequently appeared in the media. While the number of families who did not want their children to be vaccinated was 183 in 2011, it increased to 980 in 2013, to 5,400 in 2015, and approximately to 12,000 in 2016. The number of cases related to vaccine refusal reached 23,000 as of 2018.^{4,5} Inadequacies in providing information about vaccination programs in many countries in the world, and the increase in vaccine hesitancy lead to obstacles in achieving community immunity.⁶ The rates of those with vaccine hesitancy vary from country to country. For instance, it is between 9% and 42% in European countries. In 90% of the countries worldwide, people are vaccine hesitant.⁶⁻⁸

Effects of low levels of education and income, and having many children on vaccination rates have been determined, and it has been concluded that parents are not knowledgeable enough about vaccinations.⁹ It is reported that the rate of vaccine refusal is also high in parents with high socioeconomic status.¹⁰ As is reported, the main reason for vaccine refusal among parents is that those who refuse vaccines do not think that vaccines are safe and are concerned about the side effects of vaccines.¹¹ Negative attitudes towards vaccines stem from both religious beliefs, and lack of knowledge about vaccines and diseases.¹² If vaccine refusal is to be prevented, health professionals' informing families about vaccines and their possible side effects, identifying those who are vaccine hesitant and intervening in a timely and appropriate manner is of great importance.¹¹ Since parents' attitudes towards childhood vaccinations will affect their

vaccination intentions and vaccination rates, it is very important to determine their attitudes towards vaccinations and related factors.

In this study, we aimed to determine parents' attitudes towards childhood vaccinations and related factors.

Methods

Type of the Study

The study is a cross-sectional type study.

Population and Sample of the Study

The population of the study consisted of parents who had children aged 0-59 months, presented to the paediatric outpatient clinic of a university hospital located in the central Anatolian region of Turkey between October 2020 and March 2021.

The minimum sample size was calculated as 395 people using the G*Power 3.1.9.7 program (study power=80%, significance level $\alpha=0.05$, effect size $d=0.02$). Considering the possibility of losses during the study, we decided to include 20% more people (N: 474).^{13,14} Of the parents who presented to the paediatric outpatient clinic during data collection, 462 who volunteered to participate in the study, spoke Turkish, had the cognitive ability to answer the research questions, and had children aged 0-59 months were included in the study.

Data Collection Forms

The study data were collected using a questionnaire including the Personal Information Form and the Parents Attitudes about Childhood Vaccines (PACV) scale.

Personal Information Form: The 15-item form prepared by the researchers in line with the literature is used to question the following: sociodemographic characteristics of the parents, the number of children they have, whether children have childhood vaccines regularly, the source of information about childhood vaccinations, etc.¹⁵⁻¹⁷

PACV Scale: The PACV scale developed by Opel et al¹⁸ and adapted to Turkish by Çevik et al¹⁵ consists of 15 questions and the following 3 sub-dimensions: Behaviour, Attitude, and Safety. Of the items, those indicating that the respondent is hesitant are given 2 points, those indicating that the respondent does not know or is not sure are given 1 point and those indicating that the respondent is not hesitant are given 0 points. Two items in which the 'don't know' response was not included as missing data (items 1 and 2) are given 2 points for the response indicating that

the respondent is hesitant and 0 points for the response indicating that the respondent is not hesitant. The total raw score is calculated by simply summing the score of each item. If all the items are answered and items 1 and 2 are not excluded as missing data, the total raw score ranges between 0 and 30. If there is at least one item not responded, or if items 1 and 2 are answered as 'don't know' and therefore are excluded as missing data, the total raw score should be adjusted. The total raw score is converted to a scale ranging from 0-100 using a simple linear transformation method for questions with missing data. If a PACV score is below 50, it indicates that the respondent is not vaccine hesitant. If it is 50 or above, it indicates that the respondent is vaccine hesitant. The Cronbach's Alpha value of the scale was 0.676 in Çevik's study.¹⁵

Data Collection

The parents included in the present study were informed about the purpose and content of the study, and of them, those who agreed to participate in the study were asked to sign the informed consent form. The researchers collected the data from the parents who signed the informed consent form through face-to-face interviews.

Data Analysis

The study data were analysed in the SPSS 23.0 statistical package program. In the analysis of the data, numbers, percentages, arithmetic mean, standard deviation were used. Pearson's chi-square test was used to find out whether sociodemographic characteristics led to a difference between the parents and children in terms of vaccine hesitancy. Multivariate logistic regression analysis was used to determine the factors associated with vaccine hesitancy. The variable vaccine hesitancy (non-vaccine hesitant=0, vaccine hesitant=1) was included in the logistic regression model as the dependent variable. The variables such as the parent's sex (female=0, male=1), age (continuous), education level (junior high school and below=0, senior high school and above=1), employment status (not working=0, working=1) and perceived economic status (income less than expenses=0, income equal to/more than expenses=1), the spouse's age (continuous) and education level (junior high school and below=0, senior high school and above=1), the child's sex (male=0, female=1), age (continuous), birth order from oldest to youngest (continuous) and previous exposure to vaccine side effects (No=0, yes=1), place of residence (province/district centre=0, town/village=1), source of information on childhood vaccines (health personnel=0,

others=1) and the number of children (continuous) all of which were indicated to be associated with vaccine hesitancy in the literature and were determined to be related with vaccine hesitancy in our univariate analysis were included in the logistic regression model as independent variables. The fit of the model was tested with the Hosmer-Lemeshow goodness-of-fit test, and its explanatory power was tested with the Nagelkerke R square. The significance level of the statistical tests was accepted as $p < 0.05$.

Ethical Issues

Ethics committee approval was obtained from Karamanoğlu Mehmetbey University Faculty of Health Sciences Non-Interventional Clinical Research Ethics Committee for the research with the decision number 07-2020 with protocol number 41, dated 30/09/2020. Permission was obtained from the relevant hospital in order to conduct the research. Written and verbal consent was obtained from parents included in the research, after purpose of study was explained.

Results

The sociodemographic characteristics of the participating parents and their children are given in Table 1. Of the participating parents, 93.3% were women, 97.6% were married, 8.4% were in the 40 and over age group, 38.5% had university or higher education, 77.9% lived in the city centre, 90.5% had a nuclear family, 39.8% worked in an income-generating job, 48.7% had a monthly household income of \$270 or less, and 46.5 had income less than their expenses (Table 1). As for their spouses, 17.1% were in the 40 and over age group and 38.3% had university or higher education (Table 1). Of the participating parents, 40% had 2 children, and 44.2% stated that their child admitted to the hospital ranked first regarding the birth order of their children, Of the children admitted to the hospital, 53.9% were boys, and 43.5% were 24-47 months old (Table 1).

Data on the participating parents views regarding childhood vaccines are given in Table 2. Of the parents, 81.6% considered it necessary to have their child vaccinated, 83.1% had their child vaccinated with all the vaccines recommended by the Ministry of Health, 76.9% did not have their child vaccinated due to side effects, 16.7% thought that some vaccines had a harmful effect, 79.0% obtained information about childhood vaccines

Table 1 Sociodemographic characteristics of the participating parents and their children (n=462)

Sociodemographic characteristics		Number (n)	Percentage (%)
Sex	Women	431	93.3
	Men	31	6.7
Age (Mean±SD:30.89±5.99. min:18. max:50) years	≤30	226	48.9
	31-39	197	42.6
	≥40	39	8.4
Spouses' age (Mean±SD:33.79±6.02. min:20. max:56) years	≤30	150	32.5
	31-39	233	50.4
	≥40	79	17.1
Marital status	Married	451	97.6
	Single	11	2.4
Educational status	Illiterate	2	0.4
	Literate but not a graduate of any school	6	1.3
	Primary school	39	8.4
	Junior high school	96	20.8
	Senior high school	141	30.5
	University and higher	178	38.5
Spouses' educational status	Illiterate	4	0.9
	Literate but not a graduate of any school	2	0.4
	Primary school	44	9.5
	Junior high school	101	21.9
	Senior high school	134	29.0
	University and higher	177	38.3
Place of residence	City centre	359	77.9
	District centre	61	13.2
	Town	12	2.6
	Village	29	6.3
Family type	Nuclear	418	90.5
	Extended	37	8.0
	Fragmented	7	1.5
Employment status	Employed	184	39.8
	Not employed	278	60.2
Monthly income (Mean±SD: \$406±\$261. min: \$215. max: \$2400)	≤\$270	225	48.7
	\$271-\$535	114	24.7
	≥\$536	123	26.6
Perceived economic status	Income less than expenses	215	46.5
	Income equal to expenses	203	43.9
	Income more than expenses	44	9.5
The number of the children	1	136	29.4
	2	185	40.0
	≥3	141	30.5
The child's sex*	Girl	3	46.1
	Boy	249	53.9
The child's birth order among siblings*	1st	204	44.2
	2nd	162	35.1
	≥3rd	96	20.8
The child's age* (Mean±SD: 32.57±14.62 months. min:6. max:59) months	≤24 months	160	34.6
	25-47 months	201	43.5
	≥48 months	101	21.9

*The children who presented to the hospital were taken into account.

from nurses or midwives, 14.1% stated that their children suffered from side effects of vaccines, and 56.7% answered the question of how vaccination services should be carried out in Turkey as that there should be a legal obligation in vaccination and every newborn baby, and child should be vaccinated (Table 2).

The mean score obtained from the Parents Attitudes about Childhood Vaccines scale by the participating parents was 39.12±17.57 (min.: 0; max.: 93). According to the cut-off point of the scale, 25.7% of the parents were vaccine hesitant (Table 3).

Vaccine hesitancy of the participating parents

Table 2 Participating parents views regarding childhood vaccines

Views	Number (n)	Percentage (%)
Do you consider it necessary that your child be vaccinated?		
Yes	377	81.6
No	26	5.6
Undecided	59	12.8
Have you had your child vaccinated with all the vaccines recommended by the Ministry of Health?		
Yes, all of them	384	83.1
Yes, but not all of them	56	12.1
My child was sick; thus, vaccination was postponed	7	1.5
No, none of them	7	1.5
I do not know / I do not remember	8	1.7
Why did you miss some of the recommended vaccines?*		
Due to forgetfulness	5	12.8
Due to the side effects of vaccines	30	76.9
I do not believe that vaccines protect against diseases	2	5.1
I do not trust the health personnel who will administer the vaccine	2	5.1
Who / What is the source of your information on childhood vaccines?		
Nurse / midwife	365	79.0
Physician	48	10.4
Neighbour / friend	2	0.4
Internet	31	6.7
Books	1	0.2
Scientists	14	3.0
Others	1	0.2
Has your child ever been exposed to side effects of a vaccine?		
Yes	65	14.1
No	397	85.9
How do you think vaccination services should be carried out in Turkey?		
Vaccination should be mandatory. Every newborn baby and child should be vaccinated	262	56.7
The decision to have the child vaccinated should be given by the parents	200	43.3
The child should not be vaccinated if parents do not give consent		

*Only 39 participants responded to the question of why you missed some of the recommended vaccinations.

Table 3 Whether the participating parents were vaccine hesitant according to the scores they obtained from the parents attitudes about childhood vaccines scale

Participating parents' attitudes towards childhood vaccines	% (n)	Mean±SD	Range
Vaccine hesitant (≥50 points)	25.7 (118)	39.12±17.57	0-93
Non-vaccine hesitant (<50 points)	74.3 (341)		

according to their and their children's sociodemographic characteristics are given in Table 4. The frequency of vaccine hesitancy was statistically significantly higher in the fathers than in the mothers, in those and their spouses who had secondary school or higher education, in those whose children suffered from vaccine side effects previously, and in those who obtained information about childhood vaccines not from health personnel but from neighbours, friends, internet, books, etc. ($p < 0.05$). There was no statistically significant difference between the vaccination hesitancy status of the participants in terms of the variables such as age, spouse's age, marital status, place of residence, family type, employment status, monthly income of the family, perceived economic status, number of children, the child's sex, the birth order of the child from the oldest to the youngest, and the child's age ($p > 0.05$, Table 4).

According to the multivariate logistic regression analysis, the risk of vaccine hesitancy was 2.73 (95%CI: 1.01-7.40) times higher in the male parents than in the female parents, and 3.62 (95%CI: 1.96-6.70) times higher in those whose children experienced vaccine side effects than in those whose children did not experience any vaccine side effects, and 5.89 (95%CI: 2.96-11.74) times higher in those who obtained information about childhood vaccines not from health personnel but from neighbours, friends, internet, books, etc. ($p < 0.05$, Table 5).

The rate of vaccine hesitancy was significantly higher in parents whose children did not receive all vaccines. The mean PACV score was significantly higher in parents whose children did not receive all vaccinations ($p < 0.001$, Supplementary Table 1).

Discussion

The fact that the concept of community immunisation has come to the fore in the world, that its importance has been admitted and that the rate of vaccine preventable diseases has increased in recent years urged the World Health Organization to include vaccine hesitancy and vaccine refusal among the global health problems that should be resolved immediately. It has been emphasized that if vaccine hesitancy and vaccine refusal, which are among the global health problems, are to be resolved, based on the Vaccine Hesitation Determinants Matrix, determinants of vaccine hesitancy should be addressed in the following three groups: contextual effects, individual effects and group effects, and vaccine or vaccination-

specific effects. One of the sub-steps of the individual and group effects step includes people's personal perceptions of and beliefs about vaccines, and the effects of the social environment such as the belief that vaccines are not safe.^{6,19} Therefore, one of the important factors in demonstrating the success of community immunisation programs is the determination of parents' attitudes and beliefs towards vaccines.

Vaccine hesitancy is a complex concept that can change according to place, situation, time and type of the vaccine.⁶ As is stated in the literature, parents' views on immunisation services may differ.¹⁹⁻²¹ In the literature, it is stated that in a successful immunisation program, factors such as how the service is managed and how well parents and the society adopt the vaccination campaigns are important in demonstrating the success of the service.^{22,23} In several studies, it has been demonstrated that parents' thoughts of and attitudes towards immunisation services are effective in increasing immunisation rates and compliance with the vaccination schedule.^{8,9,24-26} In our study, consistent with the studies in the literature, 81.6% of the participating parents considered it necessary to have their children vaccinated, which demonstrated that parents' adopting and maintaining immunisation services made it possible to achieve vaccination services at a high rate.^{9,27,28}

Vaccine safety is perceived as a concern by all parents, but more by vaccine hesitant and anti-vaccine parents.²⁵ In studies conducted in our country, healthcare professionals are stated as the leading source of information in the continuation of immunisation services.^{4,8,9} Educating healthcare professionals and their providing homogeneous information on vaccines in line with national recommendations is crucial to alleviation of parents' concerns.²⁵ In our country, immunisation services are carried out by nurses working in family health centres. In the present study, of the parents, while approximately 80% stated that their source of information about vaccines was nurses, 10% reported that their source of information was physicians. This result indicates that nurses play an active role in parents' displaying a positive attitude towards immunisation services.

Vaccination is an application which has not only individual but also social consequences.^{4,29,30} Therefore, policies for immunisation services are being developed around the world, which vary from country to country. While there is no legal obligation related to the stipulation of immunisation services in our country, in some countries, financial incentives or obligations may be applied to encourage people to consent to immunisation services.^{21,31}

Table 4 Vaccination hesitancy status of the parents and their children in terms of their sociodemographic characteristics

Sociodemographic characteristics		Vaccination hesitancy		χ^2	p
		Yes % (n)	No % (n)		
Parent	Mother	24.5 (105)	75.5 (323)	4.584	0.032
	Father	41.9 (13)	58.1 (18)		
Age (years)	≤30	24.6 (55)	75.4 (169)	0.305	0.581
	≥31	26.8 (63)	73.2 (172)		
Spouse's age (years)	≤30	25.0 (37)	75.0 (111)	0.057	0.811
	≥31	26.0 (81)	74.0 (230)		
Marital status	Married	26.3 (118)	73.7 (330)	3.900	0.074
	Single	0.0 (0)	100.0 (11)		
Educational status	Junior high school and lower	16.8 (24)	83.2 (119)	8.663	0.003
	Senior high school and above	29.7 (94)	70.3 (222)		
Spouse's educational status	Junior high school and lower	16.8 (25)	83.2 (124)	9.211	0.002
	Senior high school and above	30.0 (93)	70.0 (217)		
Place of residence	Ciry / district	25.4 (106)	74.6 (311)	0.289	0.591
	Town / village	29.3(12)	70.7 (29)		
Family type	Nuclear	26.5 (110)	73.5 (305)	2.884	0.236
	Extended	21.6 (8)	78.4 (29)		
	Fragmented	0.0 (0)	100.0 (7)		
Employment status	Employed	22.8 (63)	77.2 (213)	3.011	0.083
	Not employed	30.1 (55)	69.9 (128)		
Monthly income	≤\$270	23.1 (52)	76.9 (173)	2.714	0.257
	\$271-\$535	25.0 (28)	75.0 (84)		
	≥\$536	31.1 (38)	68.9 (84)		
Perceived economic status	Income less than expenses	24.4 (52)	75.6 (161)	0.349	0.555
	Income equal to or more than expenses	26.8 (66)	73.2 (180)		
The number of children	1	29.4 (40)	70.6 (96)	1.665	0.435
	2	25.3 (46)	74.7 (136)		
	≥3	22.7 (32)	77.3 (109)		
The child's sex*	Girl	29.7 (63)	70.3 (149)	3.315	0.069
	Boy	22.3 (55)	77.7 (192)		
The child's birth order among siblings*	1st	27.7 (56)	72.3 (146)	1.062	0.588
	2nd	23.0 (37)	77.0 (124)		
	≥3rd	26.0 (25)	74.0 (71)		
The child's age*	≤24 months	25.8 (41)	74.2 (118)	0.559	0.756
	25-47 months	27.0 (54)	73.0 (146)		
	≥48 months	23.0 (23)	77.0 (77)		
Has the child suffered from side effects of a vaccine?	Yes	51.6 (33)	48.4 (31)	26.029	<0.001
	No	21.5 (85)	78.5 (310)		
Source of the information about childhood vaccines	Health personnel	21.2 (87)	78.8 (323)	40.514	<0.001
	Others	63.3 (31)	36.7 (18)		

*The children who presented to the hospital were taken into account

Although there are various views and practices in order to increase the vaccination rates around the world, it is emphasized in studies in the literature that the decision to vaccinate the child should not be left to the family.^{32,33} In the present study, 56.7% of the participating parents answered the question "How do you think the vaccination services should be carried out in our country?" as follows: "There should be a legal obligation in the vaccination application and every newborn baby, and child should be vaccinated." This result, which is consistent with those in the literature, reveals the parents' trust in community immunisation services.

Parents' attitudes towards vaccination differ from parent to parent and are heterogeneous.³⁴ In the literature, it is indicated that several studies in which parents' attitudes towards vaccination were investigated were conducted in different countries. As was stated in these studies, the frequency of parents' vaccine hesitancy varied between 9% and 35%.^{15,35,36} In the present study, approximately 26% of the parents were vaccine hesitant (Table 3). In their study in which they administered the PACV questionnaire in three languages in Switzerland, Olarewaju et al³⁶ stated that approximately 27% of the parents were vaccine hesitant. In Marshall et al's study,³⁷ in which parents' attitudes towards vaccination in the Irish population were investigated, the prevalence of vaccine hesitancy was approximately 7%. In Çevik et al's¹⁵ study

conducted with the parents having 0- to 59-month-old children, they reported that 7.6% of the participants were vaccine hesitant. In Al-Regaiey et al's study,³⁸ 11% of the parents were vaccine hesitant. Napolitano et al³⁵ reported that 23.2% of the parents in Italy were vaccine hesitant. In their study, Opel et al³⁹ found that of the participating parents, about 30% were very or somewhat vaccine hesitant, that 24% postponed their children's vaccination for reasons other than illnesses or allergies, and that 8% decided not to have their children vaccinated unless they were sick. The comparison of the findings of our study with those in the literature demonstrated that the rate of the vaccine hesitant parents in our study was higher than was that in some studies, and lower than was that in other studies. This is probably because sociodemographic characteristics of the research groups and immunisation policies of the countries were different, or because our study data were collected during the COVID-19 pandemic.

As is stated in the literature, there are many factors causing parents to be vaccine hesitant, and to reject or to accept their children to be vaccinated.^{15,20,28,34,37} In Napolitano et al's³⁵ study conducted with the parents having daughters, the rate of vaccine hesitancy was higher in those who were not knowledgeable about recommended vaccines, those who were more concerned about the possible side effects of vaccines, those who believed that

Table 5 According to the multivariate logistic regression analysis, factors related to vaccine hesitancy in the participating parents

Variables	B	SE	OR (95% CI)	p
Sex (Men)	1.005	0.509	2.73 (1.01-7.40)	0.048
Age (Continuous)	-0.063	0.044	0.93 (0.86-1.02)	0.150
Spouse's age (Continuous)	0.017	0.042	1.02 (0.93-1.10)	0.678
Education level (Senior high school and above)	0.300	0.345	1.35 (0.68-2.65)	0.384
Spouse's education level (Senior high school and above)	0.447	0.331	1.56 (0.81-2.99)	0.177
Place of residence (Town / village)	0.454	0.414	1.57 (0.69-3.54)	0.273
Employment status (Employed)	0.004	0.271	1.04 (0.59-1.70)	0.989
Perceived economic status (Income equal to / more than expenses)	-0.250	0.249	0.77 (0.47-1.26)	0.314
The number of the children (Continuous)	-0.153	0.264	0.85 (0.51-1.43)	0.561
The child's sex (Girl)*	0.364	0.238	1.44 (0.90-2.29)	0.125
Birth order of the child from oldest to youngest (Continuous)*	0.252	0.274	1.28 (0.75-2.20)	0.359
The child's age (Continuous)*	0.003	0.009	1.03 (0.98-1.20)	0.731
Has the child suffered from side effects of a vaccine? (Yes)	1.288	0.314	3.62 (1.96-6.70)	0.000
Source of information on childhood vaccines (Others)	1.774	0.352	5.89 (2.96-11.74)	0.000

B: Beta. SE: Standard Error. OR: Odds Ratio. CI: Confidence Interval

*The children who presented to the hospital were taken into account. Nagelkerke $R^2=0.208$. Hosmer-Lemeshow = 0.883. Omnibus test = $p<0.001$

vaccination was inconvenient and those who obtained information about vaccination from the Internet, social media and mass media. In Almutairi et al's⁴⁰ study, the participating mothers' sociodemographic characteristics did not affect their knowledge, practices and attitudes related to vaccines. In Alshammari et al's²⁷ study, they stated that being a male parent increased vaccine hesitancy. In their study conducted with Canadian parents having 24-59-month-old children, Dubé et al²⁸ stated that trust-building interventions that promote pro-vaccine social norms and that address negative attitudes toward vaccination could enhance vaccine acceptance among Canadian parents. In a study conducted by Alqassim et al⁴¹ in Saudi Arabia, being a mother, being over 30 years old and working in the field of health were the leading factors stated to affect the knowledge and behaviour of the parents regarding child vaccination adversely. In their study, Al-Regaiey et al³⁸ reported that social media and education level did not affect vaccine hesitancy. In their study, Giambi et al²⁵ reported that there was a significant relationship between the level of vaccine hesitancy and factors such as having two or more children, having children aged 16-36 months, residing in central or southern Italy, and being an Italian citizen, and that the level of vaccine hesitancy was high in parents who were not recommended by a paediatrician that their child should be fully vaccinated, whose children experienced serious side effects after vaccination and who mostly resorted to non-traditional medical treatments. In Çevik et al's¹⁵ study, the level of vaccine hesitancy was significantly high in those whose income level was low, those whose educational level was low, those whose children experienced post-

vaccine side effects, those who lacked knowledge about vaccines, those who supported the anti-vaccination movement in the media and those who said "I would hesitate to have my child vaccinated if I had a child today". The results of the multivariate logistic regression analysis obtained in the present study regarding the risk of vaccination hesitancy were consistent with those of Alshammari et al's study²⁷ in terms of being a male parent, those of Çevik et al's¹⁵ study and Giambi et al's study²⁵ in terms of experiencing vaccine side effects previously, those of Napolitano et al's study³⁵ and Çevik et al's¹⁵ study in terms of obtaining information about childhood vaccinations not from health personnel but from other sources such as neighbours, friends, internet, books, scientists, etc.

Practice Implications

Vaccine hesitancy and refusal is a significant public health problem all over the world. The decrease observed in vaccination rates due to parents' negative attitudes towards vaccination in recent years is a worrisome situation for the future. In the resolution of vaccine hesitancy and vaccine refusal, which are among the global health problems that should be urgently resolved, the determination of parents' attitudes towards vaccination and related factors plays a critical role in the success of vaccination programs. The findings of the present study are expected to contribute to the determination of parents' attitudes towards childhood vaccinations, and related factors. Thus, healthcare professionals will be able to use these findings to identify parents who may be hesitant to consent to the vaccination of their children, and once they

Supplementary Table 1 Attitudes of parents towards childhood vaccines according to the status of having all recommended vaccines for their children

Vaccination status	Vaccine hesitant (n=118) (≥50 points) % (n)	Non-vaccine hesitant (n=341) (<50 points) % (n)	p*
Those whose children had received all vaccinations (n=384)	22.0 (84)	78.0 (297)	<0.001
Those whose children had not received all vaccinations (n=34)*	58.8 (20)	41.2 (14)	
Vaccination status	PACV Mean ± SD		p
Those whose children had received all vaccinations (n=384)	10.99 ± 4.71		<0.001
Those whose children had not received all vaccinations (n=34)*	17.29 ± 7.50		

PACV: Parents Attitudes about Childhood Vaccines Scale

*In response to the question "Why did you miss some of the recommended vaccines?", those who answered "Due to the side effects of vaccines", "I do not believe that vaccines protect against diseases" and "I do not trust the health personnel who will administer the vaccine" were taken into consideration.

identify them, they will be able to better offer counselling services to parents in hopes of increasing childhood immunisation rates over time. Healthcare professionals can use the results obtained in the present study to initiate and support individualised education to identify parents at risk of vaccine hesitancy and to encourage them to display approaches favoring childhood immunisation services.

Limitations of the Study

The present study has some limitations. First, its results cannot be generalised to the whole population because the study was conducted only with the parents who presented to a secondary health care institution (selection bias). Second, data collection was based on personal reporting (reporting bias).

Conclusion

In the present study, it was determined that of the participating parents, approximately one-quarter were vaccine hesitant, and 81.6% considered it necessary to have their children vaccinated. It was also determined that being the male parent, suffering from side effects of vaccine previously and obtaining information about childhood vaccines not from health personnel but from other sources (neighbours, friends, internet, books, scientists, etc.) were among the risk factors for vaccine hesitancy.

Determining parents' attitudes towards and beliefs about vaccine is of critical importance for the success of vaccination programs. Parents' being hesitant in terms of knowledge and practices about vaccines can negatively affect the vaccination rates in the community. Parents' hesitancy and concerns about vaccination can significantly affect their attitudes and behaviours regarding vaccination; thus, it is important to identify and eliminate their information deficiencies. Considering these findings, health professionals and the national government should implement reliable strategies to address the harmful effects of misinformation leading to an increase in vaccine hesitancy. Therefore, supporting of all parents regardless of sociodemographic differences between them by primary and secondary health institutions with educational processes about the importance of immunisation in order to raise their awareness of vaccine acceptance, and informing parents and the society and improving their health literacy levels with frequent public service announcements in the social media and press by using technology and

communication tools will lead to improvement in the fight against "anti-vaccine movement".

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Conflicts of Interest

The authors report no actual or potential conflicts of interests.

Ethical Consideration

This study was performed in line with the principles of the Declaration of Helsinki. The study was inspected and approved by the Ethical Committee of Karamanoğlu Mehmetbey University Faculty of Health Science (IRB number 07-2020/41, September 30, 2020).

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