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Original Article

Attitudes of Parents Towards COVID-19 Vaccinations for Their Children: A Single-Center Cross-Sectional Study

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ABSTRACT

Aim: Vaccine hesitancy has recently grown worldwide, caused by misinformation generally. This study aimed to determine parental intention to vaccinate children against the coronavirus disease-2019 (COVID-19) and any factors associated with vaccination hesitancy.

Materials and Methods: This cross-sectional survey study was conducted in a general pediatrics outpatient clinic. The parents of 12 to 18 years old children who were admitted to the clinic between June and December, 2021 (n=819) were included in this study. They were asked about their intention to vaccinate themselves and their children. The vaccination status against COVID-19, hesitancy or willingness to vaccinate their children, and factors affecting the parents' thoughts regarding COVID-19 vaccines were the measures of this study.

Results: The vaccination rate of the parents was 70.3%, while parents' intention to have their children vaccinated was 69.0%. Most parents had awareness regarding COVID-19 vaccines (88.3%), and most parents (89.4%) stated that the vaccination was necessary for the COVID-19 pandemic. Parents who had a male child or younger child were inclined to be hesitant. The parents' beliefs about the necessity of vaccines, their awareness of COVID-19 vaccines, and their vaccination status against COVID-19 were identified as factors decreasing their hesitancy.

Conclusion: Parents' attitudes and vaccination status play a key role in their children's vaccination. Providing reliable information to parents regarding COVID-19 vaccines should be considered a priority in order to increase childhood immunization.

Keywords: COVID-19, intention to vaccination, parents' attitudes, vaccination in children, vaccine hesitancy

Introduction

The coronavirus disease-2019 (COVID-19) is a severe infectious disease caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) virus which first emerged in Wuhan, China, in December, 2019 (1). The World Health Organization (WHO) declared COVID-19 to be pandemic disease on the 1th of March, 2020. Large numbers of people (over 500 million cases) had suffered from COVID-19 and 6.2 million patients had died from COVID-19 worldwide as of April, 2022. More than 15 million people had been infected with SARS-CoV-2 at the time of writing and nearly 100,000 deaths occurred in Turkey (WHO COVID-19 Dashboard. Available at: https://covid19.who.int/, accessed on the 26th April, 2022). Therefore, since transmission occurs predominantly via airborne droplets, preventive strategies such as keeping a physical distance of at least 1 meter from others, avoiding crowds and close contact, wearing

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a properly fitting mask, and keeping hands clean with alcohol-based hand rub or soap have been strenuously recommended by health communities worldwide.

Vaccination also plays a vital role in the fight against infections, especially during pandemics. Vaccines have dramatically reduced the rate of infectious diseases and deaths caused by them since their introduction (2). Nowadays, it is thought that vaccines reduce the severity and mortality of COVID-19 and the transmission of SARS-CoV-2 (3,4). The side effects of the vaccines have been stated in studies as being broad-spectrum but tolerable and low severity (3,5,6). As a severe side effect, myocarditis is prominent; however, it is commonly reported as mild to moderate and with quick recovery (7,8). Although the COVID-19 incidence and disease severity in childhood are lower than in adults, childhood vaccination has been proposed and applied in order to provide more effective control of the disease spread and provide herd immunity (4). After having approved the emergency use of mRNA vaccine (the Pfizer-BioNTech) in children 12 years of age and older by the Food and Drug Administration (FDA) in May, 2021 (FDA Authorizes Pfizer-BioNTech COVID-19 Vaccine for Emergency Use in Adolescents in Another Important Action in the Fight Against the Pandemic. Available at: https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-pfizer-biontech-covid-19-vaccine-emergency-use.), immunization against COVID-19 in all children of these ages was also recommended by the Centers For Disease Control and Prevention (CDC), and the American Academy of Pediatrics (9). After the CDC and WHO recommendations, in Turkey, children 16 to 18 years of age started to vaccinated in July, 2021, and those aged 12-15 years started to be vaccinated in September, 2021.

Vaccine hesitancy is the most critical and biggest problem in childhood vaccination programs. This issue has recently grown worldwide and has been included in the list of ten threats to global health in 2019 by WHO (World Health Organization, Ten threats to global health in 2019. Available at: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. Accessed on the 28th of February, 2022). Lack of confidence was indicated as a critical reason, caused by misinformation, especially regarding the COVID-19 vaccination (10). Due to the fact that vaccination is a remarkable life-saving method, the causes of vaccine hesitancy should be considered in order to take measures and so increase the vaccination rate of COVID-19.

The primary objective of this cross-sectional study was to identify parental intention or hesitancy to have their children vaccinated and to assess factors associated with vaccine hesitancy. The second aim was to detect the parents' awareness regarding COVID-19 vaccines and their thoughts about vaccine necessity.

Materials and Methods

Subjects and Study Design

This cross-sectional study was conducted as a survey from July to December, 2021. A questionnaire was prepared online and in written format, and parents were asked to fill out the survey. The parents of 12-18 years old children filled out the form, and the data of eight hundred and nineteen parents who filled out the survey sufficiently were analyzed. The participants whose responses to the questionnaire were insufficient and/or conflicting were excluded from this study. The study was conducted according to the World Medical Association Declaration of Helsinki. Informed consent to participate in this study was taken from all children and their legal guardians via e-mail or in writing, and the Ethical Review Committee of the Ege University Faculty of Medicine approved the study (approval number: 21-8T/7).

Survey Design

The questionnaire included both written answers and multiple-choice questions. The survey consisted of three main domains: 1) Demographic data, 2) Parents' attitudes and behavior regarding the COVID-19 vaccination, and 3) Hesitancy or willingness regarding COVID-19 vaccines.

The "Demographic data" part included seven questions for the parents: the child's age, gender, their immunization status (for the routine schedule according to the National Immunization Program), their type of residential area, and the parents' education level (both the mothers' and the fathers'), and whether healthcare workers (HCWs) were among their nuclear family members.

The second part, entitled "Parents' attitudes and behavior regarding the COVID-19 vaccination", includes four questions. The survey asked whether the parents have information about the vaccines for SARS-CoV-2 and follow the news about COVID-19. Another question in this part asked what the parents thought about the necessity of COVID-19 vaccines and their reason. Potential causes (separately for each answer; "necessary" and "unnecessary") were listed in this part of the survey, and they were asked to choose one of them.

In the third part, "Hesitancy or willingness regarding COVID-19 vaccines", there were three questions. First, the

parents were asked about their immunization status against COVID-19. They were asked to choose "yes" if they had been fully vaccinated. In this study, the participants were considered "fully vaccinated" if the subject had received two vaccine doses as the booster dose had not been applied when we conducted this study. Other questions were about their children. The survey asked parents whether they had decided to vaccinate their children. If they answered "yes", they were asked which vaccine (BioNTech-Pfizer/Germany or CoronaVac, Sinovac/China) they would prefer.

Statistical Analysis

All data were analyzed using the inclusion body myositis (IBM) statistical package for the social sciences 25.0 software package (IBM Corp., Armonk, NY, USA), and p-values <0.05 were considered statistically significant. The quantitative variables which did not exhibit normal distribution were reported with median and interquartile range (IQR), and categorical variables were shown as frequencies and percentages. Univariate associations between the parents' vaccination status or willingness to have their child vaccinated and the various potential affecting factors were tested via the chi-squared test (pearson chi-squared and Fisher's exact test). We used a logistic regression model to identify the unique contribution of relevant factors affecting the vaccination of children. Variables significantly associated with study outcomes in univariate analyses were included in the regression analyses.

Results

A total of 819 parents completed the survey. The median age of subjects was 14.77 years (IQR=3.18); 68.6% of children (n=562) were 12-16 years old, and 51.0% (n=418) were female. The demographic data of participants are shown in Table I.

Most parents had awareness regarding COVID-19 vaccines (n=723, 88.3%) and stated that they followed news bulletin about COVID-19 (n=710, 86.7%). Most parents (89.4%) thought vaccination was necessary for the COVID-19 pandemic. The views on the reasons for the necessity of COVID-19 vaccines for parents are summarized in Table II. The most common reason was "vaccination provides mild relief from disease" (43.2%) among those parents who thought that vaccines were necessary, and "I do not trust vaccines' content" (24.1%) was among others.

In this study, 576 participants (70.3%) stated they had been vaccinated with two doses. Five hundred and sixty-five parents (69.0%) were willing to vaccinate their children, while 254 (31.0%) were hesitant about vaccinating them against SARS-CoV-2. Most willing parents (n=497, 88.0%) indicated that they would choose the BioNTech-Pfizer vaccine for their children.

Univariate analysis showed that the parents' willingness or hesitancy was associated with children's gender and age, their own immunization status, and the presence of a HCW in their family (Table III). In addition, it was found that there was an association between the belief in the necessity of vaccines and the parents' intentions. When a logistic regression model was conducted with significantly associated factors to identify the unique contribution of the relevant factors [The model fit was good (Hosmer and Lemeshow test p=0.117, Negelkerke R^2=0.305; Omnibus X^2=199.672, df=6)]; it was determined that vaccine hesitancy was quite common in unvaccinated parents and in those whose child was younger (12-16 years) or whose child was male (p≤0.001, 0.007, and 0.007; respectively) (Table IV). In addition, it was determined that the parent's belief that the vaccine was necessary and the parents' awareness about vaccines reduced their risk of hesitation significantly (p≤0.001, and 0.002; respectively).

Discussion

This cross-sectional study, conducted between July and December, 2021, showed that parents mostly had been vaccinated against COVID-19, and a similar rate were willing to have their children vaccinated. The gender and age of the children and the parents' immunization status affected the parents' willingness or hesitation. This study also found that awareness of SARS-CoV-2 vaccines and the belief in the necessity of these vaccines were other subjective factors associated with vaccinating children.

Many studies have investigated the rates of parents' intentions to have their children vaccinated with SARS-CoV-2 vaccine before the beginning of the vaccination program. A review published in December, 2021 reported that parents' willingness rates range from 10.4% to 92%, with a median rate of 59.3% (11). Previous studies from Turkey also showed the same heterogeneity, with 10.4%, 28.9%, 36.3%, 38.4%, 73.9%, and 75% (12-17). A study conducted by Yılmazbaş et al. (12) showed a high intention to vaccinate children at the beginning of the pandemic, and another study reported the intention to vaccinate children in pediatrician parents at a high rate (13). Fortunately, it was determined that the intention was at the highest rate at 69.0% just after the beginning of the vaccination program for 12 to 18 years old children in our study.

The HCWs showed a higher willingness to vaccinate their children against COVID-19, although this was non-significant statistically. Similar to our study, two studies conducted in Italy and Turkey demonstrated more parental willingness to vaccinate children against COVID-19 in HCWs (16,18). Similarly, Akarsu et al. (15) from Turkey showed high acceptance of the COVID-19 vaccine in HCWs for themselves but not their children. However, another study showed that doctors and especially nurses had a lower acceptance rate of future COVID-19 vaccines for their children than in the general population (19).

In this study, it was determined that the age and gender of children were associated with parents' hesitancy to vaccinate them with the COVID-19 vaccine. Those parents who had younger children (12-16 years) tended to have less intent to vaccinate their children. Similarly, a recent study by Goldman et al. (20) revealed that children's median ages were associated with their parents' willingness to

Table I. Demographic data of children in the study group

Age (years), median (IQR[a])		14.77 (3.18)
Age group, n (%)	12-16 years	562 (68.6)
	>16 years	257 (31.4)
Gender, n (%)	Female	418 (51.0)
	Male	401 (49.0)
Resident area, n (%)	Rural	74 (9.0)
	Urban	745 (91.0)
Children immunization status, n (%) (according to the NIP[b])	Fully-vaccinated	761 (92.9)
	Under-vaccinated	58 (7.1)
Having an HCW[c] in the family, n (%)	Yes	143 (17.5)
	No	676 (82.5)
Mother education level, n (%)	Illiterate and elementary school	366 (44.7)
	High school and higher	453 (55.3)
Father education level, n (%)	Illiterate and elementary school	336 (41.0)
	High school and higher	483 (59.0)

[a]IQR: Interquartile range, [b]NIP: National immunized program, [c]HCW: Healthcare worker

Table II. Thoughts of parents on the necessity of COVID-19 vaccination

Necessary n (%) 732 (89.4)	Vaccination provides mild relief from disease	316 (43.2)
	Vaccination protects against getting ill	135 (18.4)
	Vaccination prevents death caused by COVID-19	126 (17.2)
	Vaccination positively affects public health	111 (15.2)
	No reason	44 (6.0)
Unnecessary n (%) 87 (10.6)	Mistrust in COVID-19 vaccines' content	21 (24.1)
	Mistrust on COVID-19 vaccines	13 (14.9)
	Worried about the side effects of COVID-19 vaccines	13 (14.9)
	Concern about unknown effects of COVID-19 vaccines	12 (13.8)
	Negatively affected by the news	7 (8.0)
	Production of COVID vaccines abroad	7 (8.0)
	Religious beliefs	1 (1.1)
	No reason	13 (14.9)

In the questionnaire, parents were asked what they thought about the necessity of COVID-19 vaccines and the reason for them. Potential reasons shown in the list were given in the survey, and they were asked to choose the priority one for them
COVID-19: Coronavirus disease-2019

Table III. Factors affecting parental willingness or hesitancy of vaccination against COVID-19 for their children

		Willingness n (%), 565 (69.0)	Hesitancy n (%), 254 (31.0)	p-value
Age of children	12-16 years	363 (64.6)	199 (35.4)	<0.001
	>16 years	202 (78.6)	55 (21.4)	
Gender of children	Female	305 (73.0)	113 (27.0)	0.012
	Male	260 (64.8)	141 (35.2)	
Resident area	Rural	47 (63.5)	27 (36.5)	0.286
	Urban	518 (69.5)	227 (30.5)	
Having an HCW[a] in family	Yes	110 (76.9)	33 (23.1)	0.024
	No	455 (67.3)	221 (32.7)	
Parents' COVID-19 vaccination status	Vaccinated	451 (78.3)	125 (21.7)	<0.001
	Unvaccinated	114 (46.9)	129 (53.1)	
Mother's education level, n (%)	Illiterate and elementary school	244 (66.7)	122 (33.3)	0.197
	High school and higher	321 (70.9)	132 (29.1)	
Father's education level, n (%)	Illiterate and elementary school	225 (67.0)	111 (33.0)	0.297
	High school and higher	340 (70.4)	143 (29.6)	
Parent's awareness about COVID-19 vaccines		522 (72.2)	201 (27.8)	<0.001
Following the news about COVID-19		493 (69.4)	217 (30.6)	0.477
Parents' beliefs that a COVID-19 vaccine is necessary		555 (75.8)	177 (24.2)	<0.001

[a]HCW: Healthcare worker, COVID-19: Coronavirus disease-2019

Table IV. Predictors of hesitancy in parents to receive the COVID-19 vaccine for their children

Variables	OR (95% CI)	p-value
Age group		
12-16 years	1.726 (1.162-2.563)	0.007
>16 years	-	Ref
Gender		
Male	1.617 (1.144-2.286)	0.007
Female	-	Ref
Having an HCW[a] in family		
Yes	0.670 (0.416-1.081)	0.101
No	-	Ref
Parent's awareness about COVID-19 vaccines		
Yes	0.455 (0.277-0.748)	0.002
No	-	Ref
Parents' beliefs that a vaccine is necessary		
Yes	0.058 (0.028-0.117)	<0.001
No	-	Ref
Vaccinated parents (against COVID-19)		
No	2.216 (1.531-3.209)	<0.001
Yes	-	Ref

[a]HCW: Healthcare worker, COVID-19: Coronavirus disease-2019, OR: Odds ratio, CI: Confidence interval

have then vaccinated. These findings indicate that the age of the children was one of the essential factors in the willingness of parents to vaccinate their children. Contrary to our outcomes, which are in agreement with several studies, since COVID-19 has mainly spread via transmission in schools, the acceptance of the vaccine by parents who were worried about the disease was higher in the 7-12 years age group in the study of Zhang et al. (21). With regards to gender, studies generally pointed out that individuals intend to vaccinate male children more (22-25). The inaccuracy of vaccine-associated infertility, which has also been mentioned in the past, has been observed for COVID-19 vaccines (26,27). In the current study, parents' hesitancy for vaccination against COVID-19 was interestingly higher for male children.

It has been identified that the parents' trust in COVID-19 vaccines plays a critical role in their intention to have their vaccinated in many studies (22,25,28-31). Moreover, a good relationship between the physician and the patient might dramatically reduce hesitancy regarding the COVID-19 vaccination during the vaccine explanation. In our study, the parents' belief in a necessity of the vaccine, which was stated as "vaccination provides mild relief from the disease", was the prominent factor in decreasing the hesitancy of implementation. The parents' education level has been one of the most curious issues for vaccination hesitancy since the early stages of the pandemic. Several recent studies reported that high education levels substantially increased parents' willingness to have their children vaccinated (15,31-34). However, we determined that neither the mother's education level nor the father's education level affected the hesitancy or willingness of the parents in our study. In addition to the education level, it is crucial to underline that sufficient and reliable knowledge about new viral vaccines increases vaccine acceptance in COVID-19 vaccines (11,33-35). Consistent with our hypothesis, our study found that those parents who knew about new viral vaccines were less hesitant to have their children vaccine against COVID-19. This situation suggests that we could increase child vaccinations by properly informing the parents.

As expected, the parents' vaccination status for COVID-19 was obviously associated with the intention of having their child vaccinated. Thus, in this study, unvaccinated parents (29.7%) were more hesitant to have their children vaccinated. When we concluded this study in one of the biggest cities in our country, which has high awareness, the vaccination rate in adults was 72.4% nationwide, similar to our account (70.3%). However, one of the critical points was that among the unvaccinated parents, 46.9% of those were willing to have their children vaccinated against COVID-19. This rate was 9.4% in Israel, 11.7% in the United States, and in another study in Turkey, only 4.2% (15,31,36). The rate in our study was much higher than in those other studies. As a possible explanation, it was thought that parents trusted vaccinations to protect their children against severe diseases. The other explanation was that they were accustomed to vaccinations due to other childhood vaccinations. Akarsu et al. (15) conducted a study during the early pandemic period in Turkey. At that time, vaccinations had not been started yet for either adults or children; therefore, the low rate might be attributed to a lack of vaccine confidence during this early period. As also shown in several studies, it was emphasized insistently that a trust in physicians' recommendations (25,31,33,37) and the safety of vaccines (11,22,28,34) may improve the willingness of parents to have their vaccinated.

Study Limitations

There were a few limitations in our study. This study was conducted as a survey study; therefore, we obtained the data as stated by the parents. Moreover, because these data showed the parents' attitudes and thoughts, they do not reflect the actual vaccination rates of their children.

Conclusion

Despite the mild disease severity in children, vaccination against COVID-19 is the most prominent protection factor in children against severe infection and it also provides herd immunity. The parents' attitudes and vaccination status play a key role in their children's vaccination. Therefore, the parents' awareness and thoughts about the necessity of the COVID-19 vaccines are essential in decreasing the hesitancy to have their vaccinated. Considering that parents mainly obtain misinformation from social media or their social environment, the importance of reliable information provided by pediatricians should be emphasized. Consequently, increasing trust in doctors by providing accurate and sufficient information should be the primary goal in order to increase childhood vaccination rates.

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Ethics

Ethics Committee Approval: The Ethical Review Committee of the Ege University Faculty of Medicine approved the study (approval number: 21-8T/7).

Informed Consent: Informed consent was taken from the participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: B.E.D., Ş.G., F.K., Z.K., Concept: B.E.D., Ş.G., F.K., Z.K., Design: B.E.D., Ş.G., F.K., Z.K., Data Collection or Processing: B.E.D., Ş.G., F.K., Z.K., Analysis or Interpretation: B.E.D., Ş.G., F.K., Z.K., Writing: B.E.D., Ş.G., F.K., Z.K.

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