

Routine Pediatric Vaccination During Pandemic: Attitudes of Parents

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What is already known on this topic?

- Vaccination prevents the death of 2-3 million people each year.
- In the event of a decline in vaccination rates, it is likely that adequate protection against preventable diseases will be compromised by vaccination.
- A pandemic poses a risk to routine childhood vaccination.

What this study adds on this topic?

- This study investigates parents' attitudes toward routine childhood vaccination during the pandemic.
- When families visit a health care facility, they have fear and are concerned about contagion COVID-19
- Fear of contagion COVID-19 leads to failure to vaccinate in a timely manner.

ABSTRACT

Objective: To examine the effects of a pandemic on children's routine vaccination between 0 months and 24 months and to determine the affecting factors on vaccination during the pandemic.

Materials and Methods: Our study was conducted between July 17, 2020, and August 1, 2020, among 513 mothers whose children were aged between 0 months and 24 months old. A total of 21 questions were asked to participants' sociodemographic characteristics and attitudes and behaviors towards pediatric vaccines during the pandemic.

Results: The rate of vaccination for children was 82.8% (n = 425), unvaccinated children was 3.9% (n = 1). 13.3% (n = 68) of vaccinated children had "delayed" vaccination. 76.2% (n = 391) of the participants stated "they were concerned about COVID-19 infection" while visiting a healthcare center for vaccination. The 3 most common affecting factors for vaccination; 43.9% (n = 340) "pediatric vaccines are vital and must be administered," 23.6% (n = 183) they had vaccine appointment and have been informed "vaccination service would continue as usual," 22.7% (n = 176) have been informed that "required precautions have been taken". It was found that reasons for not to be vaccinated in the pandemic; 63.2% (n = 12) "fear of COVID-19," 15.8% (n = 3) "quarantined as the whole family" and 10.5% (n = 2) "vaccine hesitancy."

Conclusion: Healthcare providers should inform parents that vaccination is vital, and vaccination must always be administered on time during a pandemic. During a pandemic, continuing appointments for vaccination services, calling to inform the parents that required precautions to minimize the spread of infection have already been taken, and alleviating parents' concerns would prevent vaccination rates from decreasing in this period.

Keywords: Attitude, child, COVID-19, immunization, vaccine

INTRODUCTION

Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus-2, continues to spread rapidly throughout the world. According to the World Health Organization (as of December 2020), there are approximately 67 million confirmed cases and more than 1.5 million reported deaths to date.¹ To contain the pandemic, governments have taken a number of measures, including quarantine, flexible working hours, closing schools, and banning gatherings and social events.^{2,3} In addition to these precautionary measures, Turkey had a curfew for people younger than 20 and older than 65 years between March and June 2020.^{4,5}

This pandemic, caused by COVID-19, affected the entire world and led to international trade restrictions and travel disruptions in health care. Another impact that is less frequently mentioned was vaccination services.⁶

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Received: October 31, 2021

Accepted: February 8, 2022

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Cite this article as: Bakır Altuntaş S, Kara Elitok G. Routine pediatric vaccination during pandemic: attitudes of parents. *Turk Arch Peditr.* 2022;57(3):342-348.

Vaccination is a successful and cost-effective health practice that prevents the deaths of 2-3 million people each year. Vaccinations can prevent many life threatening diseases and associated disabilities from infancy through adulthood.⁷ It is well known that in Turkey, the number of childhood diseases that can be prevented by vaccination has remarkably decreased. This is mainly due to the fact that vaccination programs have been successfully implemented throughout the country.⁸ Under the National Vaccination Program, vaccines provide protection against 13 different infectious agents.⁹ As shown in the 2019 data, the vaccination rate in Turkey for diphtheria, acellular pertussis, tetanus, and hepatitis B is 99%, for measles, mumps, and rubella, 97%, and for Bacillus Calmette-Guérin, 96%.⁸

In primary care centers, these vaccines are administered free of charge to children.⁹ In Turkey, vaccines are administered by appointment. Parents who do not come to the health center for vaccine administration are either called or visited at home the same day. They will be asked the reason for not showing up for the vaccine appointment. A new appointment is made immediately for those who miss their appointment for various reasons. Parents who do not want their children vaccinated are asked to fill out a form stating why they do not want to be vaccinated.¹⁰

In the present study, it was aim to examine the effects of the pandemic on routine vaccination to 0-24-month-old children and to determine affecting factors on vaccination during the pandemic.

MATERIALS AND METHODS

Design and Setting

This study was conducted between July 17, 2020, and August 1, 2020, in Istanbul and was designed as a cross-sectional survey with a questionnaire. Ethical approval was granted by the local ethics committee (12/247) for the study. The study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Study Population

The study was to be conducted with parents who had registered with the Family Health Center between July 17 and August 1, 2020. Eight hundred twenty-four vaccination appointments for 0-24-month-old children were attended in March, April, and May. A minimum sample size of 263 was obtained using the Epi-Info program, with a 95% CI.

Five hundred seventy-four parents of children aged 0-24 months were among the applicants on these dates. After being informed about the study, 61 parents refused to participate in the study until August 1, when the study ended. At the end of the study, 513 individuals who agreed to participate in the study were interviewed by asking face-to-face survey questions.

Exclusion Criteria

- 1. Individuals with vaccination appointments outside working hours.
- 2. Individuals who had an appointment and had their vaccinations performed at another health facility.

Data Collection

After reviewing recent articles, a pediatrician and a family physician prepared the questionnaire for the study. The questionnaire included questions about parents' sociodemographic characteristics, status, and reasons for routine childhood vaccination, non-vaccination, and delayed vaccination, source of information about COVID-19, level of knowledge about the COVID-19 infection, routes of transmission and prevention, and fear of being infected. The survey was carried out face-to-face by researchers participating in the study. Those who fully completed the questionnaire were included in the study.

Procedures

Family health centers are centers where free vaccinations are offered in Turkey. Vaccinations are routinely given to children aged 0-2 years.

Children who come to the family health centers on the day of the appointment are vaccinated and a new appointment is made for the next vaccination. In the study, families who had their child vaccinated on the day of the appointment were designated as those who received the vaccine on time.

Families who did not show up for the scheduled vaccination appointment could be reached by telephone or a personal home visit on the same day. The reason for the no-show was learned, and if necessary, a new vaccination appointment was scheduled for a later date.¹⁰ In the study, parents who had their child vaccinated at a later time than the vaccination appointment were referred to as "delayed vaccinations."

When families who did not show up for their appointment despite being scheduled for vaccination are informed by phone or during a home visit that they do not want their child vaccinated, they are asked to come to the Family Health Center and sign the vaccination refusal report. The vaccination refusal report is sent to the relevant facilities, which forward it to the Ministry of Health.¹⁰ In the study, families who did not come to their child's appointment even though they had received a vaccination appointment, or who were not vaccinated even though they had received an appointment, were classified as those who did not have their child vaccinated.

Statistical Analysis

All statistical analyzes in the study were performed using the Statistical Package for Social Sciences version 25.0 software (IBM Corp.; Armonk, NY, USA) Descriptive data on the sociodemographic information of the participant groups are given in the form of frequency tables (N, %). To determine the effects of various factors on the variable "delayed vaccination," first univariate binary logistic regression and then multivariate binary logistic regression analysis was performed with variables with $P < .200$. 95% CI and odds ratio (OR) values were given in the regression table. $P < .05$ was accepted as statistically significant.

RESULTS

Mothers whose mean age ranged from 29.27 ± 5.27 years (min-max = 19-46) participated in the study. The number of mothers with a high school diploma or higher was $n = 166$ (41.5%), and there were $n = 230$ (57.5%) mothers with minimum wage and

Table 1. Sociodemographic Data of the Participants (n = 513)

Demographic Variables		N or X _{mean} (Min-Max)	% or Mean ± SD
Maternal age		29.00 (19.00-46.00)	29.33 ± 5.24
How old is the child?		6.00 (1.00-26.00)	8.43 ± 7.02
Vaccination Month	March	132	25.7
	April	191	37.2
	May	190	37.0
Where did you receive information about the COVID-19 epidemic?	TV	499	97.3
	Neighbor+friend	6	1.2
	Doctor	8	1.5
Is there a person who has had COVID-19 in your environment?	Yes	123	24.0
	No	390	76.0
Anxiety-fear	Yes	391	76.2
	No	122	23.8
Vaccination status	Yes, I was vaccinated	425	82.8
	I had a delayed vaccination	68	13.3
	No, I was not vaccinated	28	3.9

higher income. The number of those who had 2 children was 167 (41.8%). The sociodemographic data of the participants are shown in Table 1.

Table 2 shows the distribution of vaccination status by month. In March, 89.4% (n = 118) reported being vaccinated on time, 13.2% (n = 9) reported having a delayed vaccination, and 3.8% (n = 5) reported not being vaccinated. In April, 74.9% (n = 143) reported being vaccinated on time, 18.8% (n = 36) reported having a delayed vaccination, and 6.3% (n = 12) reported not being vaccinated. In May, 86.3% (n = 164) reported being vaccinated on time, 12.1% (n = 23) reported having a delayed vaccination, and 1.6% (n = 3) reported not being vaccinated.

When examining vaccination status by age of children, the rate of children vaccinated on time at month 1 was 97.1%, the rate of children who had a delayed vaccination at month 24 was 19.7%, and the rate of unvaccinated children at month 18 was

19.7%. The distribution of vaccination status by age of children is given in Table 3.

When participants were asked about the reasons for vaccinating their children during the pandemic, 43.9% (n = 340) said that "childhood vaccines are vital and must be administered," 23.9% (n = 183) said they received a vaccination appointment and were informed that "vaccination services would continue as usual during this time," 22.7% (n = 176) said they were informed that "necessary precautions were taken" at the health center, 8.4% (n = 65) said that "social media/television warnings from their favorite physicians not to delay childhood vaccinations" played a critical role in their decision, 0.9% (n = 7) decided to vaccinate because "the pandemic was brought under control," and 0.4% (n = 3) reported that they believed "coronavirus infection was exaggerated" (Table 4).

Parents' unwillingness to get vaccinated during the pandemic was due to "fear of COVID-19 infection" in 63.2% (n = 12), "

Table 2. Distribution of Vaccination Status by Month

Months			
Were you vaccinated on time?	March, N (%)	April, N (%)	May, N (%)
Yes, I was vaccinated	118 (89.4)	143 (74.9)	164 (86.3)
I had a delayed vaccination	9 (13.2)	36 (18.8)	23 (12.1)
No, I was not vaccinated	5 (3.8)	12 (6.3)	3 (1.6)

Table 3. Distribution of Vaccination Status by Age of Children

Vaccination Status			
Were you vaccinated on time?	Yes, I was vaccinated, N (%)	I had a delayed vaccination, N (%)	No, I was not vaccinated, N (%)
At month 1	34 (97.1)	0 (0.0)	1 (2.9)
At month 2	78 (90.6)	4 (4.6)	2 (4.8)
At month 3	20 (90.9)	1 (4.5)	1 (4.5)
At month 4	87 (87.8)	9 (9.1)	3 (3.1)
At month 6	60 (79.9)	14 (18.6)	1 (1.5)
At month 9	11(64.7)	5 (29.4)	1 (5.9)
At month 12	61 (75.3)	16 (19.7)	4 (5.0)
At month 18	43 (75.4)	8 (14.1)	6 (10.5)
At month 24	30 (71.4)	11 (26.2)	1 (2.4)

Table 4. Factors Affecting Routine Childhood Vaccination During the Pandemic

What factor(s) played a role in your decision to have your child vaccinated during the pandemic?	n	%
Pediatric vaccines are vital and must be administered	340	43.9
The health care worker made an appointment and informed us that vaccination services would continue as usual during this time.	183	23.6
I was informed by the nurse/doctor that the necessary precautions were taken to prevent COVID-19 at the health center.	176	22.7
Social media/television warnings from my favorite physician not to delay childhood vaccinations	65	8.4
The number of new cases has decreased and the pandemic is now under control. I believe that going to the health center for vaccination would not cause any problems.	7	0.9
COVID-19 is not such a big deal and I think the pandemic is exaggerated	3	0.4
For what reasons did you delay vaccinating your child?		
Because of the risk of contracting coronavirus, we decided to be vaccinated when the number of infected cases decreased.	46	67.6
One of our family members was infected with COVID-19, and we were vaccinated when our isolation period ended	17	25
Since my child was infected with COVID-19, we delayed the appointment date.	4	5.9
I forgot about my appointment date.	1	1.5
What were your reasons for not having your child vaccinated?		
Out of concern that my child or I would get infected during the pandemic at the health center, I decided not to get vaccinated.	12	63.2
We had a family member infected with COVID, so we were quarantined as the whole family.	3	15.8
I have concerns about the vaccines. Even if there was no pandemic, I would not have my child vaccinated.	2	10.5

being quarantined as the whole family” in 15.8% (n = 3), and “reluctance to have children vaccinated “ in 10.5% (n = 2) (Table 4).

In our study, the reasons given for delayed vaccination during this period were “67.6% (n = 46) chose the time when cases tended to decline for fear of contracting coronavirus,” “25% (n = 17) were quarantined as the whole family because a family member was infected with coronavirus,” “5.9% (n = 4) had child infected with coronavirus and delayed the appointment date,” and “1. 5% (n = 1) had forgotten their appointment date” (Table 4).

As a result of the univariate analysis in Table 5, the factors of anxiety-fear and having a person who has had COVID-19 in their environment were statistically significant (P < .05). The variables vaccination month, number of children, income status, education, maternal age, and where they had received information about the COVID-19 epidemic were not statistically significant, but these variables were included in the multivariate logistic regression model according to P < .200.

Looking at the multiple regression analysis results in Table 6, we can see the regression equation and the significance levels of

the variables. According to the model, the likelihood of having a delayed vaccination was 24.94 times higher among individuals with anxiety-fear (OR = 24.94, P = .02) than among individuals without anxiety-fear. Among those having a person who has had COVID-19 in their environment, the likelihood of having a delayed vaccination was 2.63 times higher (OR = 2.63, P = .001) than among those not having. Those vaccinated in April were 9.09 times more likely to have a delayed vaccination (OR = 9.09, P = .046) than those vaccinated in March. It was determined that only 20% of the factors determining delayed vaccination could be explained by the variables in the model (R² = 0.20, -2 loglikelihood = 337.11).

DISCUSSION

The present study showed that 3 out of 4 mothers had anxiety and fear of being infected with COVID-19 when their children were routinely vaccinated. On the other hand, we also found that parents tend to have their children vaccinated and that there was no significant decrease in vaccination rates. The 3 most common factors that affected vaccination during the pandemic were awareness of the importance of childhood vaccination, giving an appointment date and vaccination service continued, and being informed that the necessary precautions

Table 5. Univariate Logistic Regression Analysis Results of Various Factors on Delayed Vaccination Status

Variables	I Had a Delayed Vaccination	
	OR (95% CI)	P
Anxiety-fear	0.03 (0.00-0.27)	.001
Is there a person who has had COVID-19 in your environment?	2.33 (1.35-4.01)	.002
Where did you receive information about the COVID-19 epidemic?	1.30 (0.56-3.04)	.200
Vaccination Month	1.17 (0.84-1.62)	.144
Number of children	1.09 (0.78-1.52)	.111
Income status	0.85 (0.57-1.25)	.126
Education	0.86 (0.57-1.28)	.151
Maternal Age	0.98 (0.93-1.03)	.165

Table 6. Multivariate Logistic Regression Analysis Results of Various Factors on Delayed Vaccination Status

Variables	I Had a Delayed Vaccination	
	OR (95% CI)	P
Anxiety-fear (no)	24.94 (3.39-183.46)	.002
Is there a person who has had COVID-19 in your environment? (no)	2.63 (1.44-4.78)	.001
Where did you receive information about the COVID-19 epidemic? (doctor)		
TV	0.27 (0.46-1.66)	.160
Neighbor-friend	0 (0-)	1.000
Vaccination month (March)		
April	3.79 (1.66-8.67)	.002
May	2.25 (0.96-5.27)	.061
Number of children (1 child)		
Two children	1.29 (0.65-2.54)	.459
Three children and above	1.51 (0.64-3.59)	.342
Income status (below minimum wage)		
Minimum wage	0.44 (0.16-1.21)	.115
Minimum wage and above	0.46 (0.16-1.29)	1.141
Education (literate)		
Primary education	1.32 (0.47-3.68)	.591
High school and above	1.13 (0.34-3.80)	.834
Maternal Age	0.97 (0.91-1.03)	.335
$R^2 = 0.20$, $-2 \log\text{likelihood} = 337.11$		

were taken at the health center. It was determined that the 2 most common reasons for delaying vaccination or not vaccinating during the pandemic were fear of COVID-19 infection and being quarantined for the whole family.

Routine childhood vaccination was reported to be the most adversely affected, especially during the initial phase of the pandemic.³ In the United States, a 21.5% decrease in measles vaccinations was noted from January 2020 to April 2020 compared with 2019.¹¹ A similar decline in MMR vaccinations was noted in England during the first 3 weeks of the lockdown.¹² Declining vaccination rates were also observed during the pandemic in Pakistan, Senegal, Indonesia, Vietnam, and many other countries.^{3,13} A study from Saudi Arabia reported that during the first 3 months of the pandemic, the delay in routine vaccination by more than 1 month was approximately 24%.¹⁴ Declining vaccination rates and delayed vaccination are important. In particular, for diseases such as measles, mumps, and pertussis, it is imperative that vaccination rates reach 90-95% to achieve herd immunity.³ Vaccination rates below this threshold may not provide adequate protection against pandemic diseases.

This study found that parental awareness of the "vitality and importance of childhood vaccines" was the most common factor influencing vaccination during the pandemic. Nearly half of the parents who had their children vaccinated stated that "childhood vaccines are vital and must be administered." In addition, 1 in 10 mothers indicated that "warnings from favorite physicians on social media or television not to delay childhood vaccinations" influenced their decision to vaccinate. Parents' level of knowledge about vaccines, their agreement with the vital need and benefits of vaccination, and their positive attitudes toward vaccines determined their attitudes toward vaccination during nonpandemic periods.¹⁵⁻¹⁷

Because of the pandemic, mass vaccination campaigns were postponed in many countries to prevent the transmission of COVID-19 and routine vaccinations were interrupted by problems with access and providers.^{3,18} A study involving 48 people from 18 countries found that lack of access to services was a major factor in declining vaccination rates.¹⁶ The results of our study were consistent with the above study. Influencing parents' willingness to vaccinate by offering them vaccination appointments and informing them that vaccination services would continue as usual during the pandemic proved effective.

There has been little research on routine vaccination during the pandemic. It has been reported that during this time, parents' "fear of COVID-19 infection" and "concern about contagion" were critical factors in the decline in vaccination rates.¹⁶ Similarly, our study concluded that the most influential factor for not vaccinating or delaying vaccination during the pandemic was "fear of COVID-19 infection." During this study's 3-month period, rates of unvaccinated children and vaccination delay peaked in April. It is noteworthy that the highest percentage of participants who reported "fear of COVID-19 infection" occurred during the April vaccination service.

Nevertheless, it is important to remember that complete and uninterrupted vaccination is critical for infectious disease prevention.³ Because of the decline in vaccination rates during the pandemic, the World Health Organization, Centers for Disease Control and Prevention, and related organizations have made suggestions for safe continuation of vaccination (e.g., scheduling appointments for vaccination, social distancing in the waiting room, parents wearing the mask, attention to hygiene, only 1 parent should go to the clinic with the child).^{19,20} Following these recommendations in health centers would not only prevent the spread of COVID-19 but also increase parents' confidence in the lower risk of infection during vaccination. In the

present study, it was also found that informing participants that “the necessary precautions to minimize the spread of infection have already been taken” was another effective factor in vaccination rates.

It is suggested that persons suspected of COVID-19 infection or infected persons and close contacts of infected persons should postpone their vaccination appointment date until the end of their isolation period.²⁰ In our study, the second reason for non-vaccination and vaccination delay was that the child or the child’s family was in quarantine. Therefore, it is important that health care workers reschedule for these children after the end of the isolation period to ensure continuity of vaccination service. Previous studies have shown that good communication between physicians and health care workers with the individuals to be vaccinated and their parents, as well as building trust, is one of the most effective ways to eliminate hesitation to vaccinate.²¹

There are only a limited number of studies on routine childhood vaccination during the pandemic, and there has not yet been a single study examining parents’ attitudes toward routine childhood vaccination during the pandemic. The unique feature of this study is that parents were personally interviewed during this period to analyze parental attitudes. However, the limitations of this study are the insufficient number of participants and the fact that the study is based on data from only 1 center. The results of this single study are not representative of vaccination hesitancy or refusal and cannot be extrapolated to the entire population. In the pre-pandemic period, other limitations of the study are that the rates and reasons of families vaccinating or not vaccinating their children and the rates and reasons for delaying vaccination are not known and were not included.

CONCLUSION

In the present study, we demonstrated that the vast majority of parents had “fear of getting COVID-19 infection” during the vaccination period. Nevertheless, we detected that parents tended to have their children vaccinated. It was determined that the 3 most common factors that influenced parents’ vaccination decision were awareness of the importance of childhood vaccination, the fact that they received an appointment and the vaccination service was performed as usual, and the fact that they were informed that the necessary precautions were taken at the health center. It was found that fear of COVID-19 and of being quarantined because of a family member infected with coronavirus were influential factors in not being vaccinated or delaying routine vaccination during the pandemic.

The present study results suggest that health care providers should inform parents that vaccination during the pandemic is vital and that, as always, vaccination must be timely. In addition, during a pandemic, maintaining vaccination service appointments, informing parents by telephone that the necessary precautions to minimize the spread of infection have already been taken, and reassuring parents could prevent a decline in vaccination rates during this time.

Ethics Committee Approval: This study was approved by the Ethics Committee of Bezmiâlem University (Approval Number: 12/247).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – S.B.A., G.K.E.; Design – S.B.A., G.K.E.; Supervision – S.B.A., G.K.E.; Materials – S.B.A.; Data Collection and/or Processing – S.B.A., G.K.E.; Analysis and/or Interpretation – S.B.A., G.K.E.; Literature Review – S.B.A., G.K.E.; Writing – S.B.A., G.K.E.; Critical Review – S.B.A.

Declaration of Interests: The authors have no conflict of interest to declare.

Funding: The authors declared that this study has received no financial support.

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