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COVID-19 Vaccine Hesitancy of Parents of Children with Type 1 Diabetes in Türkiye: A Mixed-Methods Study

Türkiye'de Tip 1 Diyabetli Çocukların Ebeveynlerinin COVID-19 Aşı Tereddütü: Karma Yöntemli Bir Çalışma

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Abstract

Objective: In this study, we aimed to investigate the attitudes of parents who have children with type 1 diabetes mellitus to get their children vaccinated against COVID-19.

Material and Methods: The target population of the study consisted of 124 parents of children followed in Çanakkale Onsekiz Mart University Hospital, Pediatric Endocrinology Clinic with the diagnosis of type 1 diabetes. We used an online questionnaire to determine the attitudes of parents.

Results: A total of 102 parents, 76 of whom were mothers, were included in the study. Mean age of the parents was 40.5 ± 7.27, and children were 12 ± 4.07. Mean duration elapsed since the diagnosis of type 1 diabetes was 4.5 ± 3.3 years. About half of the parents thought that type 1 diabetes mellitus was a risk factor for COVID-19. While the rate of parents who were not vaccinated for COVID-19 was 21.6%, 46.1% were hesitant to vaccinate their children. The parental-related factors causing vaccine hesitation were fathers, young parents, those who weren't worried about their children being infected with COVID-19, did not think children with type 1 diabetes mellitus were more at risk, or were unvaccinated. Child-related factors were young age or short duration of illness. In qualitative analysis, vaccination-hesitant parents' main concern was vaccine side effects, and they expected clear evidence-based confidence-building recommendations for vaccination.

Conclusion: In conclusion, it is seen that especially young parents, whose children are small or newly diagnosed, will have problems in their motivation about vaccination.

Keywords: Diabetes mellitus type 1, COVID-19, vaccination

Öz

Giriş: Bu çalışmada, tip 1 diyabetli çocuğu olan ebeveynlerin çocuklarına COVID-19 aşısı yaptırmaya yönelik tutumlarını araştırmayı amaçladık.

Gereç ve Yöntemler: Araştırmanın evrenini Çanakkale Onsekiz Mart Üniversitesi Hastanesi, Çocuk Endokrinoloji Kliniğinde tip 1 diyabet tanısıyla takip edilen çocukların 124 ebeveyni oluşturmuştur. Ebeveynlerin tutumlarını belirlemek için çevrim içi bir anket kullandık.

Bulgular: Çalışmaya 76'sı anne olmak üzere toplam 102 ebeveyn dahil edildi. Ebeveynlerin yaş ortalaması 40.5 ± 7.27, çocukların 12 ± 4.07 idi. Tip 1 diyabet tanısından itibaren geçen ortalama süre 4.5 ± 3.3 yıldı. Ebeveynlerin yaklaşık yarısı tip 1 diyabetin COVID-19 için bir risk faktörü olduğunu düşündü. COVID-19 aşısı olmayan ebeveynlerin oranı %21.6 iken, %46.1'i çocuklarına aşı yaptırmakta tereddüt etti. Aşı tereddütüne neden olan ebeveynle ilgili faktörler: babalar, genç ebeveynler, çocuklarına COVID-19 bulaşmasından endişe etmeyen, tip 1 diyabetli çocukların daha fazla risk altında olduğunu düşünmeyenler veya aşısız olanlardı. Çocuklarla ilgili faktörler, genç yaş veya kısa hastalık süresiydi. Nitel analizde, aşı konusunda tereddütlü ebeveynlerin ana endişesi aşının yan etkileriydi ve aşı için açık, kanıta dayalı güven arttırıcı öneriler bekliyorlardı.

Sonuç: Sonuç olarak, özellikle çocukları küçük veya yeni tanı almış genç ebeveynlerin aşıya yönelik motivasyonlarında sorun yaşayacakları görülmektedir.

Anahtar Kelimeler: Tip 1 diyabetes mellitus, COVID-19, aşı

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Introduction

Since the first case reported from Wuhan, China in December 2019, the Coronavirus disease-2019 (COVID-19) pandemic has resulted in approximately 589 million infections and 6.5 million deaths worldwide as of August 2022 (1). Numerous risk factors have been identified in COVID-19 infection that worsens the prognosis. Complications develop more in patients with comorbidities (2). One of the well-known ones is diabetes mellitus (DM), which is one of the most common chronic diseases with a prevalence of approximately 9.3% worldwide (3,4). Studies have shown that patients with both type 1 and type 2 DM are more affected by complications from COVID-19. Considering that the epidemic will prolong further, it is predicted that diabetic patients will continue to face difficulties (4-7). Therefore, primary prevention remains the mainstay to reduce the risks associated with COVID-19 in patients with DM. The most important step in primary prevention is timely vaccination with available vaccines (4-8). It is estimated that 67% of the population needs to be vaccinated for vaccination to be effective in controlling the spread of COVID-19 (9). However, individuals who are "hesitant about vaccination" emerge due to reasons such as the efficacy, safety, duration of protection, health literacy, misinformation, and lack of confidence (10). Therefore, the rate of parents who find it necessary to vaccinate their child with type 1 DM will constitute the critical step in vaccinating these children.

Our study focused on identifying the percentage of parents who hesitated to vaccinate these children, their reasons for hesitation, and groups that might miss the opportunity to get vaccinated. The aim of this study was to investigate the attitudes of parents who have a child with type 1 DM to have their children vaccinated against COVID-19.

Materials and Methods

Study Design, Study Sample and Data Collection

The target population of this study consisted of 124 parents between the ages of 23-59 who had a child followed up with the diagnosis of type 1 Çanakkale Onsekiz Mart University Hospital, Pediatric Endocrinology Clinic in Çanakkale, Türkiye. Ethics committee approval dated 03.11.2021 and numbered 2021/08-08 was obtained from the local ethics committee. The Declaration of Helsinki was complied with.

Within the scope of the research, an online questionnaire form was used to determine the attitudes of parents on COVID-19 vaccination. Based on the literature, this questionnaire was developed to determine parents' attitudes towards COVID-19 vaccination (11,12). The questions in the created online survey form included family history of COVID-19, concern about COVID-19 transmission, whether children with type 1 DM are in the risk group, history of vaccination with vaccine in the national immunization program, history of influenza vaccination, vaccination status of the parent, and willingness to have their child vaccinated (Table 1). In addition, if the parent had not been vaccinated or was hesitant to have their child vaccinated, there were two open-ended questions "write the reason briefly" to explain the reasons. The questionnaire also included questions about the age and sex of the participants (parents), education level, child's age, and duration of type 1 diabetes mellitus to determine their socio-demographic characteristics.

An online questionnaire created using "Google Document" was used to collect the parents' responses. Participants were reached via the instant messaging/communication channel (WhatsApp) where all parents were registered. At the beginning of the study, the informed consent form was shared and explained on the instant messaging channel and the questions of the participants were answered. Then, the link containing the online questionnaire for those who accepted to participate in the study was shared. The answers to the survey questions were recorded anonymously. Participants who answered all the quantitative survey questions were included in the study.

Outcome Measures

The primary outcome was to determine the COVID-19 vaccine hesitancy rates of parents of children with type 1 DM, the secondary outcome was to identify risk factors for COVID-19 vaccine hesitancy, and the tertiary outcome was to identify causes of vaccine hesitancy.

Data Analysis

Data analysis was divided into two parts as both quantitative and qualitative data were obtained. In the first part, the SPSS program (version 23.0, IBM Company, SPSS Inc.) was used to analyze the quantitative data. While defining the participant baseline characteristics, descriptive statistics such as mean ± standard deviation (SD) were used for continuous variables, and frequency (n) and percent (%) for categorical variables. In multivariate analysis, independent predictors of COVID-19 vaccine acceptance were examined using logistic regression analysis using possible factors identified in previous analyses. Cases with a type 1 error level below 5% were interpreted as statistically significant.

In the second part of our data analysis, we used a qualitative methodology to analyze responses to open-ended questions about vaccination hesitations. Thematic analysis was used to identify patterns of meaning among the data. Two researchers applied a three-stage method to analyze the topic according to its thematic content: a coding to identify themes, creation of themes, and detailed analysis of the data to understand the reasons for parents' hesitancy towards COVID-19 vaccination. At each stage, the researchers compared the analysis results and discussed and resolved any differences.

Table 1. Number and percentage of questions and overall recorded answers

Questions	Answers, n (%)	
Has anyone in your family had COVID-19?	**Yes**	**No**
	21 (20.6)	81 (79.4)
Has anyone in your family been hospitalized for COVID-19?	**Yes**	**No**
	7 (6.9)	95 (93.1)
Has anyone in your family died due to COVID-19?	**Yes**	**No**
	-	102 (100)
Are you worried about the transmission of COVID-19 to your child?	**Yes**	**No**
	94 (92.2)	8 (7.8)
Do you think that children follow for type 1 DM are at higher risk for COVID-19 than other children?	**Yes**	**No/Not sure**
	64 (62.7)	38 (37.3)
Have you completed your child's childhood vaccinations recommended by the Ministry of Health?	**Yes**	**No**
	98 (96.1)	4 (3.9)
Do you get your child vaccinated for seasonal influenza?	**Yes**	**No**
	12 (11.8)	90 (88.2)
Have you been vaccinated against COVID-19?	**Yes**	**No**
	80 (78.4)	22 (21.6)
If COVID-19 vaccination is recommended for children, would you have your child with type 1 DM do it?	**Yes**	**Hesitant**
	55 (53.9)	47 (46.1)
If you were asked to choose a vaccine, which would you choose?	**mRNA**	**Other**
	61 (59.8)	41 (40.2)

mRNA: Messenger ribonucleic acid, DM: Diabetes mellitus.

Results

Demographic Features

Out of 124 parents with a child diagnosed with type 1 DM followed in the pediatric endocrinology clinic, 105 (84.6%) participated in the study, and three (2.4%) were excluded because they did not answer all of the quantitative questions. Of the 102 participants included in the study, 76 (74.5%) were mothers (Figure 1). Mean age of the parents was 40.5 ± 7.27, and children was 12 ± 4.07. Disease duration of the children ranged from two months to 13.5 years, with a mean of 4.5 ± 3.3 years. Of the parents, 72 (70.6%) were secondary/high school and 30 (29.4%) were university graduates.

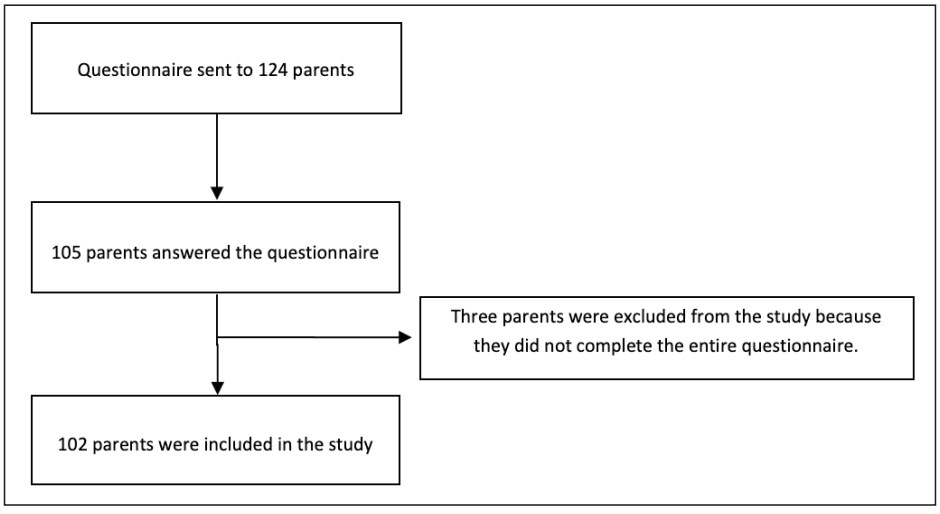

Figure 1. Flowchart showing the parents included in the study.

Quantitative Assessment of Vaccination Requests

Of the participants, 92.2% were worried about their children being infected with COVID-19, while 62.7% thought that children with type 1 DM were at greater risk. COVID-19 infection in the family of 20.6% of the participants; 6.8% of them had a history of hospitalization for this reason. While 96.1% of the parents had their children fully vaccinated by the Ministry of Health, only 11.8% had seasonal influenza vaccination. While the rate of parents who were not vaccinated for COVID-19 was 21.6%, 46.1% were hesitant to get their children vaccinated (Table 1).

In the logistic regression analysis evaluating the relationship between demographic characteristics and parental attitudes; fathers (OR= 1.84, 95% CI= 0.59-5.66, p= 0.287), young parents (OR= 1.08, 95% CI= 1-1.15, p= 0.042), and parents with a young (OR= 1.02, 95% CI= 1.04-1.28, p= 0.018) or newly diagnosed child (OR= 1.05, 95% CI= 0.93-1.19, p= 0.361) were more hesitant to get their children vaccinated. Parents who weren't worried about their children being infected with COVID-19 (OR= 9.45, 95% CI= 1.11-79.9, p= 0.039), did not think children with type 1 DM were more at risk (OR= 3.05, 95% CI= 1.32-7.03, p= 0.009), or had not been vaccinated for COVID-19 were more hesitant to get their children vaccinated (OR= 4.9, 95% CI= 1.23-20.2, p= 0.024) (Table 2).

Qualitative Assessment of Vaccination Intentions

We analyzed the answers given to open-ended questions by parents who were hesitant about vaccination. Of the 22 parents who were not vaccinated and were hesitant to vaccinate their children, 16 (72.7%) answered these questions, half of them gave the same answers to the open-ended question about their children. Of the 29 parents who were vaccinated but were hesitant to vaccinate their child, 19 (65.5%) answered open-ended questions. After thematic analysis, we identified two separate themes for vaccine hesitancy: side effects and trust (Table 3).

Side effects

The parents' main concern with vaccination was its "forward-looking" side effects. Some parents suggested reasons such as "vaccines are the cause of autoimmune diseases in them" or "type 1 diabetics have weak immunity, the vaccine will increase this even more", especially because the pathogenesis of type 1 DM is not well known. On the contrary, a vaccinated father, who was worried about side effects, cited the "very strong immunity" of children with type 1 DM as one of the reasons for not vaccinating. This concern about vaccine side effects seems to shift parents' attitudes towards vaccinating their child against COVID-19 towards vaccine hesitancy.

Trust

Some of the parents who were hesitant about vaccinating their children against COVID-19 expected clear recommendations such as "I'll get it done if it's safe" and "when the effect on children becomes clear". They also needed confidence-building discourse or observation, such as "I don't want to have it done because there are no guarantees" and "I wanted to see the results of children of the same age around us". Some of the parents were hesitant to vaccinate for reasons such as "rumors about it being bad" and "social media news" that led to a loss of trust. These findings suggest that parents of these medically vulnerable children need evidence-based information from available sources.

Discussion

To the best of our knowledge, this is the first study in our country in which qualitative results are presented together with quantitative data to determine the attitudes of parents of children with type 1 DM about pediatric COVID-19 vaccination. We conducted the study at a time when COVID-19 vaccines were only administered to children aged ≥12 years in a risk group such as type 1 DM. One-fifth of the participants had a family history of COVID-19 infection. About half of the parents were hesitant about vaccinating their children. Parental-related factors causing vaccine hesitation were fathers, young parents, those who weren't worried about their children being infected with COVID-19, didn't think children with type 1 DM were more at risk, or were unvaccinated. Child-related factors were young age or short duration of illness. In addition, our qualitative data provided important information about the reasons for parents' hesitations about vaccination.

Vaccination of children during the pandemic period is critical both to prevent the spread of the disease to high-risk adult populations and to reduce COVID-19 related complications in children in the risk group (13,14). Vaccination of children with type 1 DM is of great importance due to the susceptibility of these patients to vaccine-preventable infectious diseases (15). Although studies have shown that patients with DM are more affected by serious complications from COVID-19, the exact cause has not been determined yet (4-7,16). As possible causes, hypotheses such as the direct effect of hyperglycemia, DM related immune dysregulation (decreased phagocytic activity, neutrophil chemotaxis, and T cell function), and tendency to thrombosis (changes in both coagulation and fibrinolysis) have been suggested (3,16). Glycemic control is often not achieved in children with type 1 DM, only <50% of children can lower HbA1C ≤7.5%. It has been reported that COVID-19 may further impair glycemic control and result in diabetic ketoacidosis (17). In studies evaluating patients with type 1 DM followed up in the pediatric intensive care unit for COVID-19, it has been reported that 75% of them applied with diabetic ketoacidosis, needed respiratory support, and mortality increased 2.5 times (18-20).

Table 2. Logistic regression analysis results showing predictors of parents' decision to adopt the COVID-19 vaccine for their children

Risk factors	OR (95% CI)	p
Parent		
Father	1.84 (0.59-5.66)	0.287
Mother	Reference	
Parent age	1.08 (1.00-1.15)	**0.042**
Child age	1.02 (1.04-1.28)	**0.018**
Duration in type 1 DM	1.05 (0.93-1.19)	0.361
Parent's education level		
Secondary/High school	1.06 (0.37-3.03)	0.904
University	Reference	
COVID-19 contagion concern		
Yes	9.45 (1.11-79.9)	**0.039**
No	Reference	
Type 1 DM risk factor for COVID-19		
Yes	3.05 (1.32-7.03)	**0.009**
No/Not sure	Reference	
Child vaccinated for seasonal influenza		
Yes	1.40 (0.24-2.76)	0.566
No	Reference	
Family history of COVID-19 infection		
Yes	0.57 (0.21-1.50)	0.257
No	Reference	
Family history of COVID-19 hospitalization		
Yes	0.86 (0.18-4.09)	0.859
No	Reference	
Parent's COVID-19 vaccination status		
Vaccinated	4.9 (1.23-20.2)	**0.024**
Unvaccinated	Reference	

OR (95% CI): Odds ratio (95% confidence interval), DM: Diabetes mellitus.

In our study, nearly half of the parents thought that type 1 DM was a risk factor for COVID-19, and this increased their willingness to be vaccinated. Vaccine acceptance rates in this study were higher than the 10.4-42% vaccine acceptance rate reported in studies conducted with the parents of previously healthy children in Türkiye when vaccination was just beginning (21-25). We attributed this to the fact that parents who see the results of national adult or international child vaccinations are more willing to vaccinate their children over time. Consistent with our study, it is reported that parents who are elderly or whose children are six years or older are more willing to accept childhood COVID-19 vaccines (13,26). For this reason, it is important to increase the motivation of parents about vaccination, especially young parents whose children are young or newly diagnosed.

Table 3. Excerpts showing themes related to COVID-19 vaccine hesitation

Themes		Sample quotes
Side effect	**Child**	"**P3**: I think vaccines cause autoimmune diseases", mother (unvaccinated)
		"**P21**: Currently, most phase 3 studies of COVID-19 vaccines are in progress and most of them are available with immediate use approval. I am concerned about any future side effects. Side effects experienced in viral vector vaccine groups increase this concern. Considering that children and people with type 1 diabetes who have very strong immunity are less affected by this disease, I am undecided for now", father (vaccinated)
		"**P55**: I think that people with type 1 diabetes already have weak immunity and the vaccine will increase this even more", mother (unvaccinated)
		"**P73**: Because he has diabetes and he is still a child", father (vaccinated)
	Parent	"**P33**: I didn't because of the side effects", mother
		"**P87**: I do not want to have it because I do not know what kind of side effects I will face in the future", father
Trust	**Child**	"**P29**: Because the vaccination results are not clear", father (vaccinated)
		"**P35**: We want to have it done in the hope that it is protecting, but we still did not hurry. I wanted to see the results of the same age children around us", mother (vaccinated)
		"**P54**: If the safety of the vaccine is proven, I will get it", mother (unvaccinated)
		"**P57**: When its effect on children becomes clear, I can get my child to vaccinate", mother (vaccinated)
		"**P61**: Not disclosing vaccine-related mortality rates", mother (unvaccinated)
		"**P72**: Because there are different opinions", mother (vaccinated)
		"**P76**: I cannot trust the vaccine because of the social media news", mother (unvaccinated)
		"**P82**: Frankly, I am a bit hesitant about the vaccine because there are rumours that it's bad", mother (vaccinated)
		"**P91**: I don't want it to be done by force with the emergency code in a short time and because the responsibility has fallen on me and I don't want to take this responsibility", father (unvaccinated)
	Parent	"**P3**: I don't want to receive a vaccine of which you suspect the contents", mother
		"**P33**: I was not vaccinated because the phase studies of the vaccines were not completed and their safety was not proven", mother
		"**P55**: I think the phase 3 trials were done before they were completed", father
		"**P91**: I don't want to have it done because I don't believe it protects and because I see regret in people who have been vaccinated around me", father

Note. Quotes are written, P: Participant.

The fact that parents have a history of vaccinating their children in the risk group for preventable infections other than COVID-19 may enable us to predict their request for COVID-19 vaccination. However, the number of children who received seasonal influenza vaccine in our study was very small. Parents who had their children vaccinated against influenza were not in the group that was more willing to vaccinate against COVID-19. A similar situation has been reported in the adult population with DM (27). In a previous study from Türkiye, parents (26.2%) who vaccinated their children with vaccines other than the National Vaccination Schedule, similar to our study, were not in the group that was more willing to vaccinate against COVID-19 (25). The reason for this is that parents who are hesitant about vaccination may be afraid of the side effects of vaccines and have concerns about vaccine safety since it is a new vaccine with limited data (24,28). Our qualitative analysis allowed us to see in detail the concerns of parents about vaccination, including concerns about possible side effects and long-term consequences of the vaccine. Parents were concerned about long-term vaccine side effects for their children with DM. One parent who was hesitant about vaccination thought that "vaccines are the cause of autoimmune diseases". However, it has been reported that in healthy children, COVID-19 may trigger autoimmunity, leading to the development of both autoantibody-negative and autoantibody-positive insulin-dependent diabetes (17). For these reasons, we consider it important to inform parents about possible COVID-19 vaccine-related side effects through publicly available sources.

Our study has some potential limitations. First, it was done in a single centre with a small sample. Second, because we use an online survey, we cannot ignore response or selection bias. Third, because data on vaccines continues to be published, parents may have different perspectives depending on when our survey took place. Fourth, we do not know the COVID-19 vaccines that parents were vaccinated with.

Conclusion

In conclusion, it is seen that especially young parents, whose children are small or newly diagnosed, will have problems in their motivation about vaccination. Therefore, special practices are needed to raise awareness about COVID-19 vaccination and to prevent vaccination hesitations. The parents of children with type 1 DM need the opinion and approval of the pediatric endocrine team in cases of vaccination, intervention, and drug use. For this reason, it is critical for physicians following children with diabetes and parents to be aware of their COVID-19 vaccination attitudes or concerns to increase the vaccination rates of children. Especially, considering that diabetic ketoacidosis is the most common expected complication, the focus should be on improving the vaccination acceptance rates of parents of children with poor glycemic control.

Ethics Committe Approval: This study was approved by Çanakkale Onsekiz Mart University Rectorate Clinical Research Ethics Committee (Decision no: 2021-08, Date: 03.11.2021).

Informed Consent: Patient consent was obtained.

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