

Vaccine Knowledge of Saudi Parents and Adherence to Immunization Schedule in Saudi Arabia

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Abstract

Objectives: Immunization is one of the best measures to limit the transition of infectious disease and disease severity. Despite that, vaccination programs are frequently affected by a delay in giving vaccines on time or ignorance and avoidance due to various reasons. Our study aimed to estimate the percentage of vaccination delay in our society and assess the level of parents' awareness about vaccine importance; finally, we will shed light on the effect of the coronavirus pandemic on the immunization schedule.

Methods: This cross-sectional study was conducted in Dawadmi, Saudi Arabia, from May 2022 to August 2022. Data were collected from parents using a structured questionnaire. Vaccinations were considered delayed if they occurred more than 30 days after the designated time. Parents residing outside Dawadmi or older than 65 years were excluded.

Results: Among 393 respondents, the majority were mothers, aged between 30-50 years. Overall, 88% adhered to the immunization schedule. Major reasons for delay were forgetting the vaccination date, unavailability of vaccines, and being busy at work. In comparison to the delayed group, parents who adhered to the immunization schedule were aware about its importance.

Conclusions: The majority of parents adhered to the immunization schedule. The most common reason was forgetting the vaccine date. Other reasons were the lack of vaccines in Primary Health Care. The commonly delayed vaccines were the 4 and 9-months vaccines. The pandemic affected adherence to vaccination schedules.

Keywords: vaccination, knowledge, Saudi parents, Immunization schedule

Introduction

Immunization programs are the cornerstone in fighting infectious diseases, and vaccines against infectious diseases are proven to reduce the severity of infections and limit the transmission of organisms. Therefore experts all over the world are encouraging health sectors to promote immunization programs and update them regularly. Vaccine-manufacturing companies are also being requested to supply enough quantities of vaccines worldwide. Despite all these efforts, there is a lack of vaccinations in certain countries. One of the major challenges to immunization programs is the adherence to the national immunization schedule by parents and caregivers. In Saudi Arabia, the aim of the National Immunization Program is specified in the vaccination certificate, from birth until the child starts his studying journey, to protect the children from various life-threatening diseases (1,2,3).

In this research, we aim to estimate the percentage of vaccination delays and to evaluate the parents' knowledge about vaccinating their children in the Dawadmi region. We also aimed to find out the obstacles to the children's timely primary vaccinations.

Methods

Study setting: This cross-sectional study was conducted in Dawadmi, Saudi Arabia between May 2022, to August 2022.

Study participants and Data collection: Parents residing in Dawadmi city were interviewed using a systematic questionnaire that included questions regarding socio-demographics, physical well-being of the child, status of vaccination, and the reasons for delaying vaccines. Parents were informed that any data supplied would be kept private. People residing outside Dawadmi or aged older than 65 years were excluded from participating in the survey.

The questionnaires used in the study were created using Google Forms and consisted of 40 items. The questions were written at a simple reading level in Arabic language. They contained 3 sections: (1) the child's personal information such as date of birth, gender, and nationality; (2) child vaccination status whether it is in regular time or delayed and if there is a delay, the reason for the delay; and (3) the parents' awareness of the type of vaccination for their child, the importance of vaccination, and the harmful effects of vaccination delay.

Assessment of delay: Vaccinations were considered delayed if they were received 30 days after the designated time, based on the national immunization schedule (3). This definition was similar to that used in other studies. Vaccinations in the first two years of life were assessed in this study. Parents were asked about the reasons behind each vaccine delay.

Sample Size: using Raosoft, Inc sample size calculator:

$$\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

N = population size • e = Margin of error (percentage in decimal form) • z = z-score
N= 314000 , e= 5% , Z= 95%=1.96 .This equal = 384

Analysis of data: IBM SPSS statistics, version 25, was used to enter and analyze data. Categorical variables were represented as percentages and frequencies. For comparisons, a Chi-square test of significance was used. P-values less than 0.05 were considered significant.

Ethical issues: the study protocol was evaluated and approved by the Biomedical Research Ethics Committee at Shaqra University. Approval Number (ERC_SU_20220056).

Results

Among the 393 respondents, 101 (25.7%) were males parents and 292 (74.3%) were females parents. Out of them, 15.8% were in the age group 20-29, 39.9% were in the age group 30-39, 32.3% were in the age group 40-49, and 12% of them were aged more than 50 years old. 95.7% of the participants were married, 3.3% were divorced, and 1% of them were a widow. Most of them had a bachelor's degree (74.3%), only 15.5% had diplomas, 5.3% had a Ph.D., and 4.8% had high school degrees. 63.4% of the participants were employed and 36.6 were not. Regarding the number of kids, 37.4% had one or 2 children, 31.6% had 3 or 4 and only 31% have more than 5 children. The majority of respondents were female 74% between the age group of 30-50, almost 96% were married, 74% had a bachelor's degree and 63% were employed (Table 1). 37.6% of the adherent group and 36.1% of the delayed group had 2 children or fewer. The adherent parents knew the type of vaccine (79.2%) and the importance of the vaccination program (92.2%) and the complication of delaying or missing vaccines (81.5%); 57.4% of the delayed parents did not know the importance of the vaccine (Table 1).

Table 1: Demographics

Bio-Demographics Data:	Characteristics	Adherence n (%) 346 (88%)	Delay n (%) 47(12%)	Participants =393 (%100)
Gender of Parents	Male	84 (24.3)	17 (36.2)	101 (25.7)
	Female	262 (75.7)	30 (63.8)	292 (74.3)
Age in groups	20 -29	57 (16.5)	5 (10.6)	62 (15.8)
	30 -39	138 (39.9)	19 (40.4)	157 (39.9)
	40 -49	106(30.6)	21 (32.3)	127 (32.3)
	=> 50	45 (13)	2 (12)	47 (12)
Marital Status	Married	329 (95.1)	47 (100)	376 (95.7)
	Divorced	13 (3.8)	0	13 (3.3)
	Widow	4 (1.2)	0	4 (1)
Educational Level	High school	17(4.9)	2(4.3)	19 (4.8)
	Diploma	52 (15)	9 (19.1)	61 (15.5)
	Bachelor	261(75.4)	31 (66)	292 (74.3)
	Master Degree/PhD	16 (4.6)	5 (10.6)	21 (5.3)
Employed status	Employee	213 (61.6)	37 (78.7)	250 (63.6)
	Non-Employee	133 (38.4)	10 (21.3)	143 (36.4)
Number of Children	1 or 2	130 (37.6)	17 (36.2)	147 (37.4)
	3 or 4	106 (30.6)	18(38.3)	124 (31.6)
	=> 5	110 (31.8)	12 (25.5)	122 (31)
Give vaccine as scheduled	Yes	NA	NA	346 (88)
	No	NA	NA	47 (12)

346 (88 %) of the respondents gave the vaccines at the scheduled time without delay, and 47 (12%) of the total respondents were late in giving their children vaccination on time. The most frequent cause was a missed immunization date, lack of vaccines in primary health care (PHC), and being busy at work, as shown in (Table 2).

Table 2: Type of Vaccine Delay

Type of vaccine	Delay total 47	The first common cause of delay (%)	The second common cause of delay (%)
Birth	0	NA	NA
2 months	35	Forgot the vaccine date (51.4)	Busy at Work (25.7)
4 months	36	Forgot the vaccine date (44.4)	Other (25)
6 months	31	Forgot the vaccine date (34.4)	Lack of vaccine in PHC (28.1)
9 months	36	Forgot the vaccine Date (44.4)	Lack of vaccine in PHC (33.3)
12 months	30	Other (30)	Forgot the vaccine date (26.7)
18 months	28	Forgot the vaccine date (46.4)	Other (28.6)
24 months	34	Forget the vaccine Date (35.3)	Other (35.3)

PHC= Primary Health Care

Table 3 represents the assessment of parents' knowledge in each group (adherent and delayed). We asked several questions regarding the vaccine knowledge: first question was whether there was a delay of the vaccines during the COVID-19 pandemic. A total of 70 parents (20.2%) of the adherent participants said their children's immunization were delaying during the COVID-19 pandemic compared to the delay group in which 42 (89.4%) had delayed immunization during the covid-19 pandemic. 28.9% of the adherent and 31.9% of the delayed group reported side effects in their children after the previous vaccination. 79.2% of the respondents of the adherent group compared to 46.8% of the delayed group knew the type of each vaccine, 92.2% and 57.4% of adherent and delayed group, respectively knew the importance of each vaccine, 81.5% of adherent group compared to 36.2% of delayed group knew the complications of delaying vaccines, 9.5% of the adherent group and 27.7% of the delayed group were reluctant to give further immunization to their children (Table 3).

Table 3: Assessments of parent's knowledge in each group

Item	Adherence (%)	Delay (%)
Delay vaccines during COVID-19 pandemic	70 (20.2)	42 (89.4)
Child had side effects from previous vaccines	100 (28.9)	15 (31.9)
Parents know the type of each vaccine	274 (79.2)	22 (46.8)
Parents know the importance of each vaccine	319 (92.2)	27 (57.4)
Parents know the complication of delaying vaccines	282 (81.5)	17 (36.2)
Parents reluctant to give future vaccines	33 (9.5)	13 (27.7)

Table 4 represents the comparison between the knowledge of parents with respect to age, employment status, and education level. Among the parents 112 had delayed immunization during the COVID-19 pandemic; out of those, 81 (72.3%) were employed, 72 (64%) were 40 years old or younger, and 88 (78.5%) had high education levels. out of 393 respondents, 115 (29.3%) reported the previous occurrence of side effects to vaccines; out of those, 72 (62.6%) are employed, 69 (60%) were 40 years old or younger, and 88 (76.5%) had high education levels. 296 (75.3%) of the parents know each type of vaccine 61.4% were employed, 55% of them were 40 years old or younger, and 81% had high education level. 88% of the parents knew the importance of the vaccines; the majority of them were employed, and aged less than 40 years with high education levels. 76.1% of the parents reported that they know the complications of delaying the vaccines, 63.2% of them were employed and 80% of them had high education. 46 parents (11.7%) were reluctant to give further vaccines to their children; majority of them were highly educated, 82.6% employed (Table 4).

Table 4 Comparing Knowledge in relation to age, employment status and education.

	Total 393 (100%)	Employed 250 (63.6%) (%)	Non- Employed 143 (36.4%) (%)	<40y years 219 (55.7%) (%)	>40y 174 (44.3%) (%)	Low Education level 80 (20.4%) (%)	High Education level 313 (79.6%) (%)
Delay vaccines during COVID-19 pandemic	112 (28.5)	81 (72.3)	31 (27.6)	72 (64)	40 (36)	24 (21.4)	88 (78.5)
Child had side effects from previous vaccines	115 (29.3)	72 (62.6)	43(37.4)	69 (60)	46 (40)	27 (23.4)	88 (76.5)
Parents know the type of each vaccine	296 (75.3)	182 (61.4)	114 (38.5)	163 (55)	133 (45)	56 (18.9)	240 (81.1)
Parents know the importance of each vaccine	346 (88)	220 (63.5)	126 (36.4)	193 (78.4)	153 (21.5)	68 (19.6)	278 (80.3)
Parents know the complication of delaying vaccines	299 (76.1)	189 (63.2)	110 (36.7)	165 (55.1)	134 (44.8)	60 (20)	239 (80)
Parents reluctant to give future vaccines	46 (11.7)	30 (65)	16 (34.7)	29 (63)	17 (37)	8 (17.3)	38 (82.6)

Discussion

Immunization programs carry a critical role in preventing and limiting the spread of infectious diseases. Successful immunization programs help in implementing the awareness and knowledge of populations toward these aims. In our study, we focused on assessing the level of awareness and knowledge of parents in Saudi Arabia about the national childhood immunization program and the level of adherence to its scheduled vaccines, in case of delaying the vaccines we aim to evaluate the reasons for delaying the vaccines and the impact of the coronavirus pandemic on vaccination program.

In our study, 88% of parents reported giving vaccines as scheduled, while 12% were delayed. Compared to previous studies in Saudi Arabia we have a lower percentage of delayed immunization (20%) and a higher percentage than a study conducted in northern Saudi Arabia in 2019 (9%) (4). Also our study had a higher percentage of delayed immunization than a study in western Saudi Arabia in 2002 (9%) (5), while our result was similar to Missed Opportunities for Immunization (12%) (6).

Approximately 78% of respondents reported that their children's vaccinations were up to date (7). The other 26% of parents did not vaccinate their children on time according to the national immunization schedule (8). International reports showed that there are variations between middle-income countries and high-income countries based on the percentage of immunization delayed or missed (7.6% vs 3%) (9).

The 4 months and 9 months vaccines were the most delayed vaccines 76.6% then the 2 months vaccine 74.5% , whereas the most missed or delayed vaccinations were at 24 months followed by the 9-month vaccinations in previous reports (7) and 18 months followed by 12months vaccines in other report (10) .

In one research conducted in Canada, we found overall 72.5% of all 2 years old with the incomplete immunization status, 16% of them in 2 months, 10.6% are in 4 months, 14% at 6 months, and 31.8% at 12 months (11) most of the previous reports shows that parents tends to delay their children's immunization when they get older. Most on-time vaccines were the first dose vaccines and the delay started from 12-24months of age (12).

The most common cause of delayed vaccination was a forgotten vaccine date, followed by a lack of vaccines in primary health care centers and unavailability of time due to parents' employment, while in the other region of Saudi Arabia the most common cause was difficulties in the appointment (5).

Some studies investigated the effect of social media and information gathered from these platforms on immunization status and found that it has increased the odds of vaccines delay compared to official healthcare websites and institutions (7). Forgotten the vaccines time

is one of the major causes of vaccines delay followed by unavailability of the vaccines (13).

Marital status and the level of education did not impact the vaccination schedule in our study as most of our respondent had a bachelor degree. Our finding were aligned with earlier reports that shows no statistical significance between the level of educations and vaccination delay (14), whereas in International studies there were correlation between lower level of educations and increase in vaccines missing or delay (15).

There was no statistically significant deference in regard to vaccine delay and parental employments. Some international reports showed that maternal unemployment was associated with vaccines delay (15).

The majority of participants with delayed vaccination had 3 or more children (38.3%), while most of the non-delayed had 2 or less children (37.6%), which is consistent with several international and national reports that investigated the number of kids in relation to vaccination delay. Missed childhood vaccination was more common in households with more children. (8-10,15)

It was clear that the COVID-19 pandemic affected the health system worldwide including routine immunization and clinic visits (9, 16, 17) In our study the COVID-19 pandemic affected the parent's adherence to the immunization schedule. 89.4% of the delayed immunization occurred at the time of the COVID-19 pandemic.

Fear of contracting covid 19 during lockdown was one of the reasons for vaccine delay (10,14) , 38% of the parents were afraid of covid-19 [8] finding that was consistent in middle- and high-income countries (9).

Previous bad experience with vaccines was one of the reasons for delaying vaccines. In our study, we found that almost one-third of delaying vaccines was due to the previous side effect of vaccines. At the same time, almost a third of the children non- delayed group also developed some sort of side effect from vaccines. Comparing with a study conducted in the Aseer region shows that 42.8% of participants admitted that their children had side effects. Fear of the side effects of vaccines played a major role in the reluctance and delay in immunization. In one Italian study, 6% of parents refused to give their children vaccines because of the fear of side effects (13).

We found that almost half of the delayed group did not know the importance of immunization, and a third of them knew what are the complications and consequences of delaying the vaccines. Compared to a study conducted in Aseer, Saudi Arabia, shows a lower percentage of good awareness 75.5% (6).

When we asked about reluctance to give future vaccines, only 9% of the non-delayed group had no reluctance to give further vaccination but almost one-third of delaying parents were reluctant to give. No major difference was found in vaccine delay among the parents with respect to age.

Conclusion

In this study, we analyzed the parents' adherence to their children's immunization and the role of the Covid-19 pandemic in affecting the parents' adherence to child immunization. Most of the parents were adherent to the scheduled immunization program, but there was some delay in the immunization. The most encountered reason was forgetting the vaccine date. Other reasons were the lack of vaccines in PHC. The most delayed vaccines by the parents were the 4 and 9-months vaccines. The pandemic affected the adherence to immunization where nearly one-fifth of the adherent parents delayed the immunization because of the pandemic and almost all the delayed parents continued to delay during the pandemic. Poor knowledge about vaccine type was prevalent among the delayed parents. No major differences were found with respect to the different educational levels. More than half of the delayed parents did not know the complication of delaying the immunization and approximately more than two-fifths did not know its importance.

A noticeable low awareness from delayed parents, as well as the effect of the COVID-19 [Pandemic on the adherence of parents to their children's vaccines, was seen in our study. There is a need to increase the parents' awareness about vaccines, namely the types of vaccines, their benefits and how it is important to protect the child from serious infectious diseases and complications of delaying immunization.

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