

Original Research Article

Knowledge and behaviors of parents towards child vaccination in Jazan, Saudi Arabia

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Sent for review: 24 July 2021

Revised accepted: 8 January 2022

Abstract

Purpose: To evaluate parental knowledge, attitudes and behaviors towards child vaccination in Saudi Arabia and to examine the factors associated with immunization.

Methods: An observational cross-sectional survey was conducted in Jazan, southwest Saudi Arabia. A total of 447 parents who visited the primary health care centers were enrolled using a multistage stratified random sampling method. A structured, self-administered questionnaire involving information on parental knowledge, attitudes, and practices towards childhood vaccination was used for data collection. Descriptive and inferential statistics were used to analyze and to interpret the data.

Results: The immunization knowledge level was 68.0 %, and most respondents had a positive attitude (86.6 %) toward child vaccination. Mothers (74.7 %) showed signs of a higher level of knowledge than fathers (60.5 %). In turn, fathers (91.9 %) had a significantly more positive attitude towards immunization than mothers (81.9 %). Parents working in the medical field showed a significantly high level of knowledge and a significantly positive attitude towards child immunization ($p < 0.05$). The logistic regression model suggested that the most important independent predictors of immunization compliance were being a mother and working in the health field.

Conclusion: The results show that most of the parents have acceptable levels of knowledge, attitudes, and practices. Health educational programs are needed to improve the levels of parental knowledge and practices.

Keywords: Vaccination, Knowledge, Attitude, Compliance, Health promotion, Saudi Arabia

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INTRODUCTION

Immunization is a very successful and cost-effective intervention that saves millions of lives

and dramatically improves global public health indicators [1]. Some diseases are becoming very rare globally (such as diphtheria and polio), mainly because of the developed vaccines [2].

Immunization currently prevents between 2 and 3 million deaths annually, and 1.5 million deaths can be avoided if the global coverage of vaccination is improved [3]. In 1967, Japanese children who received the pertussis (whooping cough) vaccination accounted for only 10% of those vaccinated after a period of complacency and rumors of vaccination safety. In 1979, Japan experienced a pertussis outbreak, with more than 13,000 cases and 41 deaths [4]. Newborn babies are immune to many diseases because of the antibodies from their mothers. However, this immunity fades away with aging in the first year [5]. Vaccination protects children from serious infectious diseases and complications of vaccine-preventable diseases. [1] Inappropriate vaccine coverage is associated with the high cost of the impact of vaccine-preventable diseases, resulting in premature deaths, hospitalizations, and doctor visits [6].

In Saudi Arabia, immunization coverage is comparable to that in developed countries [7]. One of the substantial contributing factors in achieving this immunization rate is that childhood vaccination is a prerequisite for school admission. However, some parents in Saudi Arabia have expressed concern about the safety and necessity of routine childhood vaccination. Misconceptions and negative beliefs towards vaccinations lead to decreased compliance and vaccination coverage. Recent research conducted in Saudi Arabia found that 20% of parents were hesitant to vaccinate their children [8] while 53% of parents showed concerns and negative beliefs towards vaccinations. Among the hesitant parents, 36% of their children had not completed their vaccination schedule at the time of interview. Parental knowledge, attitudes, and practices related to child vaccination influence decisions on vaccination. This study aims to assess the knowledge, attitudes, and practices of parents towards child vaccination in the Jazan region of Saudi Arabia.

METHODS

Study design, setting and participants

An observational, analytical, cross-sectional study was conducted among parents who attended the selected primary health care centers (PHCs) in the Jazan region. The region is located in the southwest corner of Saudi Arabia, and covers an area of 11,671 km². The total population of the region is estimated at 1.5 million, according to the 2010 population census. The study targeted parents who attended PHCs in the Jazan region during April 2019. The main inclusion criteria were that parents were over 18

years old and at least one child was younger than 12 years.

Sampling procedures

A sample size of 500 participants was proposed for conducting this survey. The sample size estimation was based on cross-sectional survey statistical equation (Eq 1).

$$\text{Initial sample size } (n) = (z^2 * p * q) / d^2 \dots\dots\dots (1)$$

The sample size calculation utilized the following indicators: p = prevalence of immunization coverage = 50 % (as no information was available about other related indicators that could be used for sample size calculation), Z = 95 % confidence interval, d = error not more than 5 %, and a 25 % nonresponse rate. For recruiting the study participants, a multistage stratified random sample was used. Jazan is divided into six health sectors, and using this classification, in the first stage, eight PHCs were randomly selected from Jazan's six health sectors (Jazan city, northern area, southern area, eastern area, western area, and middle sectors) in the first stage. Two PHCs were randomly selected from the middle and southern sectors, as they have the highest numbers of PHCs (31 and 38 PHCs, respectively). Furthermore, only one PHC was selected randomly from other health sectors, as they have fewer PHCs. In the second stage, a proportionate sample was used to determine the number of respondents from each selected PHC. In the final stage, one study team visited each chosen center for five days to collect data from the parents who agreed to participate in the study.

Data collection and study tool

The data were collected using an interview-based, pretested questionnaire formulated and based on published data and data from the Saudi Ministry of Health. The validity and suitability of the questionnaire was discussed and assessed by a panel of experts. The questionnaire consists of 30 questions divided into four sections. The first section of the questionnaire covered participant sociodemographic details (age, gender, education level, number of children). The second section measured parental knowledge about vaccination. The third section assessed parental attitudes towards vaccination and the last section assessed parental practices towards childhood vaccination.

Data management and statistical analysis

The data was analyzed using SPSS ver. 20 (SPSS, Chicago, IL, USA). Descriptive and

inferential statistics were used to analyze and interpret the data. Descriptive statistics based on simple tabulations, frequencies, and percentages were used. The differences in percentages of categorical variables between the two groups were assessed using a two-proportion z-test and the Chi-square test. A logistic regression model was used to assess the factors associated with immunization compliance among the parents. To assess the level of knowledge, the total knowledge score was calculated by assigning 10 points for each correctly answered question. Participants with scores less than two thirds of the total mark were classified as having a low level of knowledge. The total score for attitudes was recorded into two categories: "Positive attitudes" for respondents with an attitude score of 6 – 9 and "Negative attitudes" for respondents with an attitude score below 6 and $p < 0.05$ was considered significant.

Ethical considerations

Ethical approval was obtained from Jazan Research Ethics Committee (approval no. REC40/3-089), and the study followed international guidelines. Informed consent of the parents was obtained before data collection, and they were informed of the project's progress and their rights to withdraw. All information was kept confidential and was not accessed except for scientific research purposes.

RESULTS

Parents' characteristics, level of knowledge and attitudes

Table 1 presents parental levels of knowledge and attitudes according to selected characteristics. The study included 447 parents (response rate = 89.4 %), 237 (53 %) mothers, and 210 (47 %) fathers. The age of the participants ranged from 18 – 71 years, with a mean of 35.44 years. Approximately 41.8% of parents had one or two children, 34.7 % had three or four children, and only 23.5 % had more than four children. Fifty-one percent of the parents had a university education or higher. The level of immunization knowledge was 68 %, and most respondents had positive attitudes (86.6 %) towards child vaccination. Mothers (74.7 %) had a significantly higher level of knowledge than fathers (60.5 %) ($p = 0.001$). In turn, fathers (91.9 %) had a significantly more positive attitude towards immunization than mothers (81.9 %) ($p = 0.002$). Parental levels of knowledge significantly increased with the increase in level of education ($p = 0.02$). Parents working in the medical field showed a significantly higher level

of knowledge ($p = 0.036$) and a significantly positive attitude towards child immunization ($p = 0.027$).

Table 2 reflects the participants' levels of knowledge of child vaccination according to gender. Most parents (91.5 %) knew that the first dose of vaccination was given at birth, but only 33.8% realized that most diseases against which children were vaccinated occurred during the first five years of life. Nearly half of the parents (47.7 %) declared that more than one vaccine at the same time had negative impacts on the child. The majority of participants suggested that even healthy children need vaccinations (94 %), and that there are different types of child vaccination (86.4 %). Approximately half of the participants were unsure whether there was a link between autism and child vaccinations. There was no significant difference in parental responses according to gender in five of nine knowledge questions. The main source of parental information on vaccination was physicians (54.1 %), followed by social media (17.2 %) (Figure 1).

Table 3 shows that the parental attitudes towards child immunization were generally positive among most parents involved. Most parents agreed that child vaccination is essential (96.6 %), more beneficial than harmful (89.5 %), and safe (86.8 %). Approximately 85 % of the parents disagreed that vaccination is prohibited for religious reasons and 62.6 % agreed that immunization is associated with side effects. The majority of parents agreed that it is necessary to follow the immunization schedule (95.1 %) and that immunity keeps the child healthy (96.9 %).

Parental practices regarding child immunization

Parental practices regarding child immunization were assessed by asking parents about the immunization status of their children according to the immunization schedule and whether or not they are giving their children seasonal influenza vaccines.

Approximately two thirds (66.7 %) of parents had children who had completed their vaccines according to the vaccination schedule. Approximately one third of parents (31.3 %) had one or more children who has not completed their vaccines, and 1.8 % were uncertain.

The results of the univariate and multivariate logistic regression analyses for factors associated with vaccination program compliance are presented in Table 4. Univariate analysis revealed that the most important factors

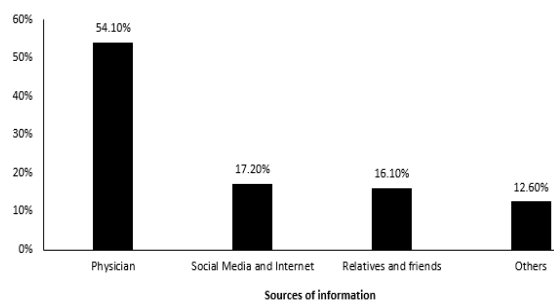
Table 1: Participant characteristics, knowledge levels and attitudes towards immunization according to selected characteristics

Variable	N (%)	Knowledge level			Attitude		P-value
		Low	High	p-value	Negative attitude	Positive attitude	
Gender							
Father	210(47)	83(39.5)	127(60.5)	0.001	17(8.1)	193(91.9)	0.002
Mother	237(53)	60(25.3)	177(74.7)		43(18.1)	194(81.9)	
Age (years)							
18–29	124(25.1)	29(25.9)	83(74.1)	0.176	13(11.6)	99(88.4)	0.803
30–39	215(44.1)	63(32.0)	134(68.0)		28(14.2)	169(85.8)	
40+	75(30.9)	51(37.0)	87(63.0)		19(13.8)	119(86.2)	
Level of education							
Primary school or less*	25(74)	16(48.5)	17(51.5)	0.020	5(15.2)	28(84.8)	0.205
Intermediate school	42(9.4)	16(38.1)	26(61.9)		10(23.8)	32(76.2)	
High school	144(32.2)	52(36.1)	92(63.9)		18(12.5)	126(87.5)	
University and higher levels	215(51.0)	59(25.9)	169(74.1)		27(11.8)	201(88.2)	
Number of children							
1–2	187(41.8)	56.0(29.9)	131(70.1)	0.176	31(16.6)	156(83.4)	0.071
3–4	155(34.7)	51(32.9)	104(67.1)		13(8.4)	142(91.6)	
> 4	105(23.5)	36(34.3)	69(65.7)		16(15.2)	89(84.8)	
Works in the medical field							
Yes	74(16.4)	16(21.6)	58(78.4)	0.036	4(5.4)	70(94.6)	0.027
No	373(83.4)	127(34.0)	246(66.0)		56(15.0)	317(85.0)	
Total number of parents	447(100)	143(32.0)	304(68.0)		60(13.4)	387(86.6)	

Including eight illiterate participants; p-value based on Chi-square test

Table 2: Parental knowledge about childhood vaccination according to gender

Statement	Correct responses N (%)			p-value
	All parents	Fathers	Mothers	
First dose of vaccination is given at birth	409 (91.5)	184 (87.6)	225 (94.9)	0.006
Most diseases against which children are vaccinated occur during the first years of life	151 (33.8)	62 (29.5)	89 (37.6)	0.073
More than one vaccine at the same time has negative impacts on the child	213 (47.7)	97 (46.2)	116 (48.9)	0.561
There are additional vaccinations given to children with sickle cell anemia	100 (22.4)	57 (27.1)	43 (18.1)	0.023
Contraindication of vaccination	282 (63.1)	119 (56.7)	163 (68.8)	0.013
Healthy children need vaccination	420 (94.0)	195 (92.9)	225 (94.9)	0.357
There are different types of child vaccination	386 (86.4)	186 (88.6)	200 (84.4)	0.198
Immunization is associated with side effects	340 (76.1)	145 (69.0)	195 (82.3)	0.001
Child immunization is associated with autism	222 (49.7)	115 (54.8)	107 (45.1)	0.095

**Figure 1:** Sources of information about vaccination

associated with vaccination compliance were being a mother (OR = 2.30, 95 % CI, 1.5 – 3.4, $p = 0.001$), age more than 30 years (OR = 1.8, 95 % CI, 1.1 – 3.0, $p = 0.019$), working in the health field (OR = 2.2, 95 % CI, 1.2 – 4.1, $p = 0.013$), and a high level of knowledge (OR = 1.7, 95 % CI, 1.1 – 4.1, $p = 0.015$). The multivariate logistic regression analysis suggested that the most important independent predictors of immunization compliance were being a mother

(OR = 2.3, 95 % CI, 1.5 – 3.6, $p = 0.001$) and working in the health field (OR = 2.1, 95 % CI, 1.1 – 3.9, $p = 0.028$).

DISCUSSION

The study revealed that parental levels of knowledge about child immunization significantly increase with the increase in level of education. These results are consistent with a study conducted among 447 participants from different Saudi cities, which found that higher levels of education were among other factors that were significantly associated with better knowledge scores regarding child immunization [1]. In contrast, no similar relationship was observed in this study or the study conducted in the Hail region [9]. The main factor that seemed to be significantly associated with parental knowledge, attitudes, and practices regarding child vaccination in this study was working in the medical field.

Table 3: Parental attitude regarding child immunization according to gender

Statement	All Parents			Fathers	Mothers	p-value*
	Agree N (%)	Not sure N (%)	Disagree N (%)	Agree N (%)	Agree N (%)	
Child immunization is important	432(96.6)	15(3.4)	0 (0.0)	205(97.6)	227(95.8)	0.292
Immunization is more beneficial than harmful	400(89.5)	34(7.6)	13 (2.9)	195(92.9)	205(86.5)	0.028
Child immunization is safe	338(86.8)	54(12.1)	5 (1.1)	188(89.5)	200(84.4)	0.112
Child immunization is prohibited for religious reasons	10(2.2)	56(12.5)	381(85.2)	3(1.4)	7(3.0)	0.255
Immunization associated with side effects	280(62.6)	95(21.3)	72(16.1)	127(60.5)	153(64.6)	0.372
A child can become infected after immunization with the disease/s against which they were vaccinated	154(34.5)	186 (41.6)	107(23.9)	71(33.8)	83(35.0)	0.790
It is necessary to follow the vaccination schedule	425(95.1)	12 (2.7)	10(2.2)	205(97.6)	220(92.8)	0.020
Immunization keeps your child healthy	433(96.9)	13 (2.9)	1(0.2)	207(98.6)	226(95.4)	0.052
You will advise your friends and family to immunize their children	436 (97.5)	6 (1.3)	5 (1.1)	208(99.0)	228(96.2)	0.058

*p-value is based on two proportion z-test

Table 4: Factors associated with immunization program schedule compliance among the study participants

Factors	Univariate				Multivariate			
	P-value	COR	95% CI OR		P-value	AOR	95% C.I. OR	
			Lower	Upper			Lower	Upper
Parent (Mother)	<0.001	2.3	1.5	3.4	<0.001	2.3	1.5	3.6
Age (> 30 years)	0.019	1.8	1.1	3.0	0.448	1.2	0.7	2.1
Education (university and above)	0.933	1.0	0.7	1.5	0.169	1.4	0.9	2.1
Working in the health field	0.013	2.2	1.2	4.1	0.028	2.1	1.1	3.9
High level of knowledge	0.015	1.7	1.1	2.6	0.148	1.4	0.9	2.2
Positive attitude	0.121	1.6	0.9	2.7	0.091	1.7	0.9	3.1

Abbreviations: CI = confidence interval; AOR = Adjusted Odds Ratio; COR = Crude Odds Ratios

The primary source of parental information about immunization was healthcare providers, which was in line with many similar studies [10–13]. Results from an Australian study, which conducted a national online survey among Australian parents in 2012, showed that the majority of the parents obtained information about immunization from their general practitioner [11]. A similar result, to a lesser extent, was obtained among parents in this study, where 54.1 % of parents indicated that healthcare workers have a crucial role in educating parents about vaccination in addition to administering the vaccinations themselves.

Generally, good knowledge of child vaccination was reported in this study, as in most previous studies in Saudi Arabia [8,9,14–16]. Most of the parents in this study knew that there were multiple types of child vaccinations, and that even healthy children needed vaccinations. Similar results were found in a study in Arar in 2018 [15]. The majority of parents in this study knew that the first dose of vaccination was given at birth, which is comparable to a study conducted in the Taif region [17].

Some deficits in knowledge were evident in this study. Only about a third of the parents realized that most diseases against which children are vaccinated occur during the first year of life. Approximately one third of parents declared that more than one vaccine at the same time had negative impacts on the child. This is similar to a study conducted in the Taif region, where only one third of the study participants knew that administration of more than one vaccine at the same time had no adverse effect on immunity [17].

The attitudes regarding child immunization were positive among most of the parents involved. Most parents agreed that child vaccination is essential, more beneficial than harmful, and safe. A large proportion of parents disagreed that vaccination is prohibited on religious grounds, but two thirds agreed that immunization is

associated with side effects. The majority of parents agreed that following the immunization schedule keeps the child healthy. Similar results were obtained in many previous studies. For example, the majority of parents agreed that child vaccination is not prohibited on religious grounds and that vaccination is associated with side effects in a study carried out in the Taif region, Saudi Arabia [17].

The analysis produced results in agreement with vaccination compared to a study conducted in Yemen [10]. Among parents who participated in this study, two thirds had children who had completed their vaccines and one third had one or more children who had not completed their vaccines. This pattern is prevalent in many countries. In a study involving 110 parents from rural areas of Bangalore, two thirds of the children were vaccinated fully and eight had not completed their immunization [19]. Similarly, regular child immunization was reported in most cases in a study involving 390 Saudi parents [8]. Alabadi and Aldawood (2000), in their systematic review on child immunization in Saudi Arabia, suggested that a significant percentage of Saudi children are only partially immunized [20]. These authors cited many factors influencing this, including inappropriate education [21] and parental negative beliefs regarding immunization [22].

Limitations of the study

The study has some limitations. First, it was conducted in one region of Saudi Arabia; therefore, the results cannot be generalized for the whole country. Second, the study is based on a cross-sectional study design, so the relationship and association should be interpreted with care. Despite these limitations, our study provided an updated profile of parental knowledge and attitudes towards childhood vaccination, which can be utilized in designing interventional programs.

CONCLUSION

The results obtained show that most parents have an acceptable level of knowledge, attitudes, and practices towards child vaccination. Health educational programs are needed to improve the levels of parental knowledge and practices regarding child vaccination.

DECLARATIONS

Acknowledgement

We would like to acknowledge all of the parents who participated in this survey and the staff of the primary health cares (PHCs) in the Jazan region, Saudi Arabia, for their cooperation and support.

Conflict of interest

No conflict of interest is associated with this study.

Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. The authors contributed equally to this research.

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