



Parents' Knowledge and Attitude toward Childhood Vaccination in Qassim, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. Author MAM designed the study, performed the statistical analysis, wrote the protocol and approved the final manuscript. Author HEA wrote the first draft of the manuscript and managed the analyses of the study. Author WMA managed the literature searches and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2022/v34i40A36256

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/87814>

Original Research Article

Received 19 March 2022

Accepted 02 June 2022

Published 04 June 2022

ABSTRACT

Introduction: Childhood vaccination programs participate greatly in reducing the spread of vaccine preventable diseases. Beside the noticeable success of vaccination, there are still parents' questions and hesitancy regarding childhood vaccination.

Aims: This study evaluated the knowledge and attitude of parents in Qassim region towards childhood vaccination with the aim to measure the degree of the local community acceptance of childhood vaccination with aspiration to add an effective literature information in this field.

Study Design: A cross sectional survey study using a Google form designed questionnaire.

Place and Duration of Study: This study was conducted in Qassim in Saudi Arabia from October 2020 to December 2020.

Methodology: We included 403 parents. The data was collected using a questionnaire divided in to three parts; socio-demographic, knowledge and attitude, and side effects. The knowledge was evaluated by seven items with answers set in to 'Yes', 'No' and 'Don't know'. The attitude by seven items with fixed-answers of 'Agree', 'Neutral' and 'Disagree'. In the third part side effects like fever,

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pain, diarrhea, skin rash and seizures were directly asked. Descriptive and inferential statistics were used in the analysis of data.

Results: Among 403 participants, the majority were young adult female with a bachelor degree. The parents have good levels of knowledge and attitude towards childhood vaccination and the levels are significantly differed among various demographic variables. The parents' attitude is linearly influenced by their level of knowledge (P-value is <0.001).

Conclusion: Beside the good parents' knowledge that positively influenced by their attitude toward childhood vaccination with a considerable local public awareness in this field, parents recommended more awareness campaigns on vaccination's benefits and risks.

Keywords: Knowledge; attitude; childhood vaccination.

1. INTRODUCTION

Vaccination is one of the most effective way of controlling infectious diseases. The recommendations for vaccines are constantly expanding with the addition of new susceptible groups of population that need immunization protection and the development of greater evidence about the safety and benefits of vaccines [1]. Most people vaccinate according to recommended schedule and some people choose to delay the vaccination or reject it. Some patient become more critical about healthcare advice and some reject or can't accept the recommended vaccination [2].

Most vaccine-preventable illnesses are unfamiliar to modern parents, so parents ask many questions about necessity of vaccination and afraid of adverse effect or risks of complications. Some parents can't balance the potential adverse effects and benefits of vaccination [3].

Globally, childhood vaccination has contributed to a dramatic decline in morbidity and mortality associated with vaccine-preventable diseases (VPD). To increase vaccine acceptance and demand, interest has increment in developing methods to describe parents' vaccination beliefs and how they correlate and predict compliance to recommended childhood vaccinations. These methods could be used in routine monitoring of specific parental knowledge and attitude about vaccination that are consistently correlated with vaccine compliance [4]. In 2008, experts of WHO advisory group on vaccination ask for more information regarding reasons to not vaccinate children and to plan a strategy to improve acceptance of vaccination in general [5].

The necessary and safety regarding vaccines is a very doubtful and concerns for parents who represent heterogeneous group that vaccinate their children but still not sure about the safety of

vaccines. The term vaccine hesitancy was coined about 15 years ago and exists among a large percentage of parents [6]. This lack of confidence in vaccines probably linked to fear from possibly associated adverse events. Opel et al. found that 33% of parents defined themselves as vaccine hesitant and higher scores of vaccines hesitancy were associated with lower rates of vaccinated children [6].

In developing countries, little research has been done regarding parents' knowledge and attitude towards childhood immunizations. Surveying and investigating this field is an important first step towards understanding the factors that influence vaccine non-acceptance in a particular setting and to develop strategies that will improve vaccination rates [5]. This descriptive, cross-sectional, survey-based study was carried out in Qassim region with the aim to assess the parents' knowledge and attitude towards childhood scheduled vaccination in a local community setting.

2. MATERIALS AND METHODS

2.1 Study Design and Participants

Across sectional survey of the parents' knowledge and attitude towards childhood vaccination was conducted in Qassim region in Saudi Arabia in the period between 25th December 2020 to 5th February 2021.

The effective sample size was calculated using the proportion formula: $n = z^2 p (1-p) / d^2$ with 95% confidence level and 5% margin of error. Where n = sample size, $z = 1.96$, $P = 0.5$, and $d = 0.05$. To guarantee accuracy and to escape non-reply or non-serious responses the sample was raised to 410 and 7 responses were excluded as they responded incorrectly to the inverted question. Finally, the study came up with a total of 403 parents. The study included all

Saudi parents in Qassim region and having children. Parents who haven't children and those who have only one newborn aged less than one month were excluded from this study. To ensure there was no duplicate in responses in this study, the researcher restricted participants to submit only one response via enabling 'one user per response' in google form which usually require from respondents to respond by logging with a Gmail account. Furthermore, before data analysis a sheets formula was used to sort duplicates entry from the final sheet.

2.2 Data Collection and the Questionnaire

The data was collected using Google forms that was distributed online via various social medias (WhatsApp, Facebook and twitter). The questionnaire was developed after an extensive literature review on related topics then face validity method was applied to the questionnaire and a group of experts in the field evaluated the questionnaire and based on their recommendations the modification was performed. For the seriousness of responses an inverted question was included in the study and missed responses were excluded in the final analysis. The questionnaire was designed in English then translated to Arabic and back translation method was used to ensure the quality of translation. The final approved form of questionnaire was distributed in Arabic language. The questionnaire was divided in to three parts namely, socio-demographic, knowledge and attitude, and side effects. In socio-demographic part, information about the parents such as age, gender and level of education was collected. While in the knowledge and attitude part, 7 items were related to knowledge with answers set in to 'Yes', 'No' and 'Don't know'. The questions related to attitude (7 items) had the fixed-answers such as 'Agree', 'Neutral' and 'Disagree'. In the third part side effects like fever, pain, diarrhea, skin rash and seizures were directly asked about.

2.3 Scoring Criteria

In the knowledge domain, correct answer to every question carried (+1) mark while wrong answers carried (-1) and don't know carried (0) mark. This gave a total score range of +7 to -7 for knowledge. In the 'attitude' domain, the responses were calculated as; 'Agree' = 3, neutral = 2 and Disagree = 1, giving score range from 7 to 21. If the scores were above 70%, then the response was categorized as 'Good',

between 51 – 69 % was categorized as 'Fair' and less than 50% was recorded as 'Poor'.

2.3 Scale Validity

To insure the validity of the questionnaire, two statistical analysis tests were applied; the internal validity and the structure validity.

The questionnaire's internal validity was evaluated after conducting the study by measuring the correlation coefficients between each item in one field and the whole filed.

The correlation coefficient for each item of the " knowledge of the parents' on vaccination`" and the whole item are located between (0.357) and (0.833) which are high enough to be valid. The p-values (Sig.) are less than 0.05, and the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the items of this field are consistent and valid to measure what it was set for.

The correlation coefficient for each item of the "beliefs and behaviors of the parent's concerning vaccination" and the whole item are located between (0.373) and (0.857) which are high enough to be valid. The p-values (Sig.) are less than 0.05, as the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the items of this field are consistent and valid to measure what it was set for.

2.4 Reliability of the Questionnaire

The Cronbach's Alpha statistical test was used to measure the questionnaire reliability. The Alpha values of each field and for all questionnaire items were calculated using Cronbach's Alpha test. The Cronbach's Alpha coefficient for all questionnaire items is high to ensure the reliability of the questionnaire (0.778 for knowledge and 0.708 for attitude) as for the most purposes reliability coefficient above 0.7 is considered satisfactory.

2.5 Statistical Analysis

The data was analyzed using descriptive statistics and the statistical significance of the results was done through One-way ANOVA followed by non-parametric post-hoc test and P value less than 0.05 was regarded significant. Mann-Whitney U was used to compare scores of each domain with binary demographic groups: (Gender). Kruskal-Wallis H was used to compare

scores of each domain with demographic having more than two categories (Age and level of education). Pearson correlation analysis was used to find the association between knowledge and attitude scores.

3. RESULTS AND DISCUSSION

3.1 Demographic Variables of the Study Participants: (Table 1)

A total of 403 parents were participated in this study, 61% of them were female and 39% were male. which was similarly reported in previous studies in Saudi Arabia [7]. Although the fathers are also involved in the child’s vaccination status, the investigation of mothers’ knowledge and attitude towards immunization is of greater importance [8] so the greater participation of female represents a positive finding. The majority (50.6%) of parents were young adult aged 18-30 years followed by 20.6% aged 31- 40 years while, the least (10.4%) were 50 years or more. In a study done in Saudi Arabia the majority of parents (38.6%) were aged 26 to 35 years and 36% were aged 36 – 40 years [9]. In a similar study done in Medina in Saudi Arabia the majority of parents (43.3%) were aged 31 – 40 years followed by 40.4% aged 20 – 30 years [10]. These findings reflect the clustering of parents’ age in Saudi Arabia around 20 to 40 years. More than three quarters (76.2%) of participants have a bachelor level of education, 16.6% have Intermediate/Secondary school level, 6.7% have master or above and only 0.5% have Primary school level. Recently reported studies in Qassim

region showed that the majority of parents have bachelor degree or diploma representing 73% in one study [11] and 59.2% in another study [12]. The increased level of education positively impacts the knowledge and attitude of parents toward childhood vaccination.

3.2 Frequency of Parents’ Knowledge on Vaccination: (Table 2 and Fig. 1)

The total score of parents’ knowledge on vaccination” was 5.72 ± 1.59 (81.7%). In a study done in Medina region in Saudi Arabia, the results showed half of parents (n=310) had adequate knowledge regarding child vaccination [10]. Another Study done in Saudi Arabia showed 38% of the parents had excellent knowledge about childhood vaccination while, 38% had good knowledge [9]. The highest mean score was 0.963 (96.3%) to the item “Childhood vaccination is free”. Realization of this point greatly eliminate the financial barrier that may negatively impact childhood vaccination. In Bangladesh, vaccination cost approximately 73 million dollars annually for under five-year age, the government insurance covers 65% of the total cost, delivery of vaccine cost one dollar in each time [13]. Most of the parents (94.1%) know that “Vaccination can lead to immunization” and grasping of this concept will further encourage parents to continue and adhere to childhood vaccination schedule. The majority of participant (86.6%) know that “Immunization is more beneficial than Harmful” and understanding of this point significantly reduce vaccination hesitancy. A previous study, reported that

Table 1. Demographic variables of the study populations (n=403)

Gender distribution		
Gender	Frequency	Percentage
Female	245	61%
Male	158	39%
Age distribution		
Age group	Frequency	Percentage
18-30 years	204	50.6%
31-40 years	83	20.6%
41-50 years	74	18.4%
More than 50 years	42	10.4%
Education level		
Education level	Frequency	Percentage
Master or above	27	6.7%
Bachelor degree	307	76.2%
Intermediate/Secondary School	67	16.6%
Primary School	2	0.5%

48.1% of participants lack the knowledge about benefits of vaccine [14]. Three quarter of parents (75.2%) know that vaccination is safe for their children. In comparison to results from Taif in Saudi Arabia 38.3% of parents strongly agree and 34.7% agree to this point [15]. Increasing the parents' awareness regarding safety is farther important in eliminating vaccination hesitancy. In Poland, they reported that (91.8%) of participants believed on vaccination is safe [16]. The results also revealed two third of parents (67.1%) know that most of the diseases against which children are vaccinated occur during the first years of life. Although, it is fair response but in comparison with the total knowledge score it is considered as unsatisfactory response that need more awareness campaign. However, in Najran only 41.02% of parents know this fact [14].

By using one-way ANOVA followed by non-parametric post-hoc test there was no statistical significant difference between parents' knowledge score and the demographic variables (gender, age groups and education levels as *p* values were 0.655, 0.559 and 0.669 respectively). Among different age groups the highest knowledge score (6.07) was achieved by people aged 50 years and above. While in different groups of education levels the highest knowledge score (6.07) was achieved by those with master degree and above. These findings may indicate good public awareness and general population knowledge regarding childhood vaccination. However, in a study done in Jeddah showed that the higher knowledge attitude and practice level was significantly associated with female gender, higher educational degree and those having higher number of children [17].

3.3 Frequency of Parents' Attitude on Childhood Vaccination: (Table 3 and Fig. 2)

The total score of parents' attitude towards childhood vaccination was 18.67 ± 2.3 (88.9%). These findings indicate that parents have good positive attitude towards childhood vaccination. The highest positive response (97%) was to the item "I follow Ministry of Health recommendation on vaccination. In a previous study in Saudi Arabia 92% of parents follow the obligatory vaccination programs according to the MOH vaccination schedule [9]. Adherence to Ministry of Health recommendation ensures adequateness and maintenance of childhood vaccination. In other hand, a study done in Netherlands among parents, only 28 % had a positive intention to vaccinate their child [18]. More than half (57.1%) of parents in this study disagree with the item "Children receive more immunizations than necessary" and 56.5% also disagree with the item "The child's immune system could be weakened by too many immunizations" In another study done in Saudi Arabia 51.1% of parents disagree with a similar a statement that "children receive more immunization could affect their immune system" [9]. The majority of parents (90.1%) agreed to encourage and recommend to their relatives and neighbors the need for vaccination. This peer expansion of practices is expected to participate effectively in increasing community acceptance and awareness. However, most of them (96%) agreed that "Ministry of Health should campaign more on vaccination to know more of its benefits and risks to children" which was also recommended by 93.9% of parents in a previous study [9].

Table 2. Frequency of Parents' knowledge on childhood vaccination (n=403)

Items	Yes n (%)	No n (%)	Don't Know n (%)	Mean	SD
Vaccination can lead to immunization	380 (94.1)	5 (1.2)	18 (4.5)	0.931	0.299
Vaccination is more beneficial than Harmful	350 (86.6)	13 (3.2)	40 (9.9)	0.836	0.449
Vaccines for immunization are safe	303 (75.0)	17 (4.2)	83 (20.5)	0.710	0.540
Compliance to vaccination schedule is important	378 (93.6)	13 (3.2)	12 (3.0)	0.906	0.388
Childhood vaccination is free	389 (96.3)	1 (0.2)	13 (3.2)	0.963	0.202
First dose of vaccination is given at birth	329 (81.4)	16 (4.0)	58 (14.4)	0.777	0.503
Most diseases against which children are vaccinated occur during the first years of life	271 (67.1)	31 (7.7)	101 (25.0)	0.596	0.629

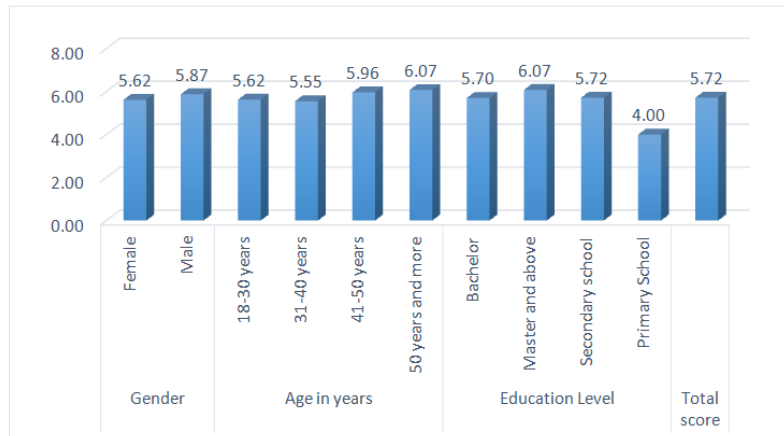


Fig. 1. Parents' Knowledge score compared to demographic variables; One-way Anova test; Gender (p value = 0.655), Age groups (p value = 0.559), Levels of education (p value = 0.669)

By using one-way ANOVA followed by non-parametric post-hoc test there was no statistical significant difference between parents' attitude compared to the demographic variables (gender, age groups and education levels as p values were 0.561, 0.968 and 0.208 respectively) Among different ae groups the highest positive score (19.12) was achieved by people aged 50

years and above. While, in relation to education levels the highest positive score (19.0) was seen among participants with primary school level. In study done in Taif city there was a statistically significant difference ($p < 0.001$) between males and females in all aspects of knowledge and attitude toward vaccination [19].

Table 3. Frequency of Parents' attitude on childhood vaccination (n=403)

Items	Agree n (%)	Neutral n (%)	Disagree n (%)	Mean	SD
Children should be vaccinated against diseases in general	346 (85.9)	29 (7.2)	28 (6.9)	2.789	0.553
Children receive more immunizations than Necessary	82 (20.3)	91 (22.6)	230 (57.1)	2.367	0.801
The child's immune system could be weakened by too many immunizations	65 (16.1)	112 (27.8)	226 (56.1)	2.400	0.751
Ministry of Health should campaign more on vaccination to know more of its benefits and risks to our children	387 (96.0)	0 (0)	16 (4.0)	2.921	0.391
Advertisements on vaccination changed my perspective/ idea on vaccination	283 (70.2)	0 (0)	120 (29.8)	2.404	0.916
I follow Ministry of Health recommendation on vaccination	391 (97.0)	0 (0)	12 (3.0)	2.940	0.340
I encourage and recommend to my relatives and neighbors to the need for vaccination	363 (90.1)	18 (4.5)	22 (5.5)	2.846	0.490

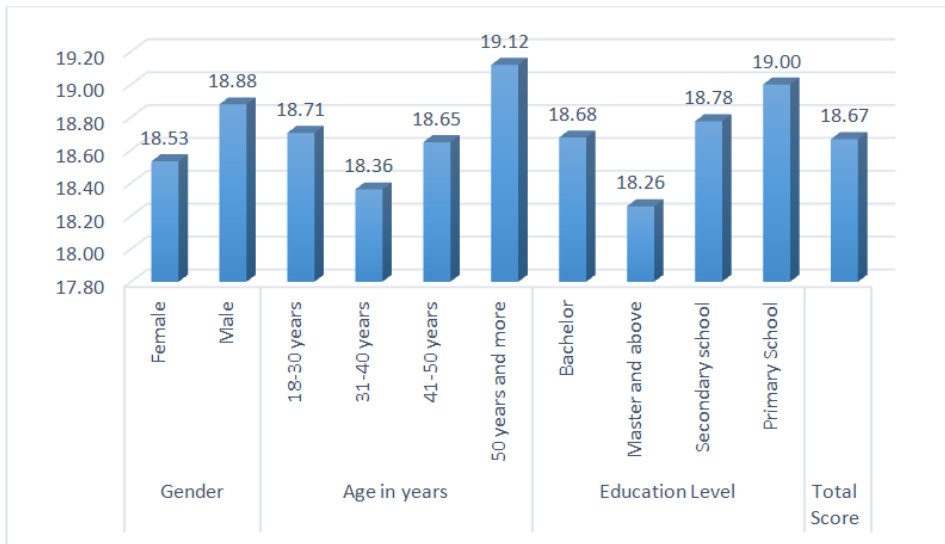


Fig. 2. Parents’ attitude score compared to demographic variables; One-way Anova test; Gender (p value = 0.561), Age groups (p value = 0.968), Levels of education (p value = 0.208)

3.4 Correlation Analysis between Scores of Knowledge and Attitude

The correlation analysis between knowledge and attitudes as seen in Table 4 the knowledge

response is strongly correlated with the attitude and the variation was found to be significant (r = 0.602, p-value <0.001). Similar results were reported previously [9,20].

Table 4. Correlation between Knowledge and attitude scores

Variables	Knowledge		Attitude	
	Correlation coefficient (r)	P-value	Correlation coefficient (r)	P-value
Knowledge	1	--	0.602	< 0.001
Attitude	0.602	< 0.001	1	--

3.5 Responses to the Question “What are the Side effects after Getting the Vaccine?”

As shown in Table 5 majority of participants (87.1%) reported "Fever" and approximately third of them (31.1%) reported pain as side effects. Diarrhea and rash were reported by 20.1% and 16.1% respectively. None side effect was reported by 9.7%. The least side effect was seizure reported in 5.7% of participants. In a previous study done in Najran in Saudi Arabia the participants fail to detect side effect correctly except for fever [14]. Another study in Saudi Arabia reported that “the majority (70%) of parents reported fever as the main side effect of vaccination, 16% of them reported pain at the vaccination site, and 13% of them reported swelling and redness at the vaccination site” [9].

Table 5. Responses to the question “What are the side effects after getting the vaccine?”

Side effects	Frequency	percent
Fever	351	87.1
Pain	126	31.3
Diarrhea	81	20.1
Skin rash	65	16.1
None	39	9.7
Seizure	23	5.7

4. CONCLUSION

The parents in Qassim region have considerable parents' knowledge that positively influence their attitude towards childhood vaccination reflecting a significant public awareness on childhood vaccination. However, minor knowledge points need to be addressed specially when majority of parents recommended more awareness campaigns on vaccination's benefits and risks.

5. LIMITATION OF THE STUDY

As a result of lockdown and compulsory movements' restricted measures of COVID-19 protection at the time of this study most of the parents approached were from urban areas it was hard to deal with many rural areas thus the results can't be generalized to the whole population

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

ETHICAL APPROVAL AND CONSENT

This study was ethically approved from Qassim Regional Research Ethics Committee, registered at National Committee of Bio and Med. Ethics (NCBE), (numbered: 85224-1442 and dated 17th December 2020) and agreement consent for participation was obtained from the parents before participation in this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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The peer review history for this paper can be accessed here:
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