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Original Article

Parents' knowledge, attitude and practice towards seasonal influenza vaccination in Riyadh region, Saudi Arabia

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Abstract

Introduction: Parents' knowledge and attitudes regarding influenza vaccine significantly determine whether or not their children will receive the vaccine. The objective of the present study was to evaluate the knowledge, attitude and practice among Saudi parents towards vaccinating their children against influenza.

Methodology: A descriptive cross-sectional study was conducted in multiple regions of Riyadh. We used a convenience sampling technique to enroll study subjects. Individuals who were Saudi nationals, with at least one child between 6 months and 14 years of age were included.

Results: Over half of the Saudi parents (53.8%) scored well on influenza and vaccine knowledge, while most of them (92.0%) showed positive attitude towards vaccination. Most of the children (87.9%) were immunized with national vaccination program and 63.6% of the parents were aware of the availability of seasonal influenza vaccines in primary healthcare centres (PHCs) and hospitals. However, only 28% of the parents and 18% of their children received the seasonal influenza vaccine between 2019 and 2020. High education level, high monthly household income and being part of a medical profession were statistically significant ($p < 0.05$) determinants of good knowledge. Similarly, male gender, younger parent, low monthly income, working in a medical profession and parents with one child aged between 6 months and 14 years were significant predictors ($p < 0.05$) of positive attitude.

Conclusions: Compliance of Saudi parents towards influenza vaccination is fairly poor despite positive attitude. Stringent efforts are needed to encourage the parents to actively ensure annual influenza immunization of their children.

Key words: Saudi parents; influenza; vaccination.

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Introduction

Influenza is a highly communicable viral disease that is most commonly known as "Flu". The respiratory droplets and resultant aerosols from coughing and sneezing are the main sources of transmission among individuals. The etiological factor of influenza is type A, type B or type C influenza virus and predominantly affects the upper (nose and throat) and lower (lungs) respiratory tracts. It frequently emerges in late fall, winter and early springtime and affects individuals of all age groups. The clinical manifestation spectrum ranges from self-limiting to severe disease, which may culminate in death, especially in a high-risk cohort [1-3].

Globally, the annual occurrence of seasonal influenza is 20-30% in children and 5-10% in adults [4]. Surprisingly, the epidemiology of severe influenza infection is approximately 3-5 million cases and about 0.5 million deaths [4]. Seasonal influenza contributes to substantial healthcare strain, and immunization and other pharmaceutical and non-pharmaceutical methods are available for intervention. However, it is limited by certain factors, most important being the annual mutations in the circulating strains of influenza virus that necessitates yearly genetic adjustments of vaccine strains to align with that of the influenza strains circulating globally [5].

Every year Saudi Arabia encounters a unique challenge of influenza upsurge owing to influx of people from round the globe for the purpose of Hajj, an annual Islamic pilgrimage, which coincides with the peak time for influenza epidemics. The Advisory Committee on Immunization Practices (ACIP) of the United States emphasizes that every individual over 6 months of age should get immunized through the annual influenza vaccine, unless otherwise contraindicated [6]. In Saudi Arabia, the national immunization coverage of is over 90% [7]. However, the number of Saudi children with influenza vaccine coverage is unidentified, despite strict recommendations of seasonal influenza vaccine from the Saudi Ministry of Health and the Saudi Thoracic Society [7,8].

Parents' knowledge regarding influenza vaccine and their attitudes could significantly determine

whether or not their children will receive the influenza vaccine. A recent study by Alabbad *et al.* (2019) demonstrated that parents' education level was the key predictor of positive attitude towards the influenza immunization [2]. In addition, recommendation from doctors is another navigating factor that could improve the attitude of parents towards the influenza vaccine, and in fact they play a dual role by also furthering parents' knowledge regarding influenza immunization, as documented recently [9,10]. The ever-growing news media such as newspapers, magazines, television and internet have also been proven to be dominant in bringing durable influence on parents' awareness about influenza vaccination [11,12].

Unfortunately, only a small number of research studies in Saudi Arabia have investigated the factors that motivate or discourage administration of influenza vaccination to children [2, 13]. Hence, this study was intended to examine Saudi parents' knowledge and attitudes toward the influenza vaccine and to underscore potential hesitancy factors that deprive Saudi children from the vaccine. This study not only highlights parents' decision-making, but also provides a gateway to devise a strategy that could enhance parents' acceptability towards seasonal influenza vaccine and ultimately influence vaccination rates.

Table 1. Sociodemographic characteristics of study subjects.

Variables	*n* (%) (*N* = 539)
Gender	
Females	308 (57.1)
Males	231 (42.9)
Age groups in years	
18-24	50 (9.3)
25-34	119 (22.1)
35-44	178 (33.0)
45-54	142 (26.3)
55-64	44 (8.2)
65 and above	6 (1.1)
Education	
Below high school	21 (3.9)
High school graduate	85 (15.8)
College graduate	344 (63.8)
Masters or PhD	89 (16.5)
Monthly household income (Saudi Riyals)	
2000–6000	81 (15.0)
6001–10,000	100 (18.6)
10,001–15,000	105 (19.5)
Over 15,000	133 (24.7)
Did not know/Declined	120 (22.2)
Working in a medical profession	
Yes	65 (12.1)
No	474 (87.9)
Number of children aged between 6 months and 14 years	
One	177 (32.8)
Two	156 (28.9)
Three	111 (20.6)
Four	37 (6.9)
Five	23 (4.3)
Six or more	35 (6.5)
Children immunized under the National Vaccination Program	
Yes	474 (87.9)
No	7 (1.3)
I don't know	22 (4.1)
Not all my children (in case of more than one children)	18 (3.3)
Not all vaccines	18 (3.3)

Methodology

Study design, setting and population

A descriptive cross-sectional study was conducted between October 2020 and March 2021 in multiple regions of Riyadh to assess the knowledge, attitude and practice of Saudi parents towards influenza vaccination of their children. The Riyadh region has a population of over 8 million. We used a convenience sampling technique to enroll study subjects. Saudi national parents with at least one child between 6 months and 14 years of age were included. Saudi nationals without children and non-Saudi parents were excluded.

Study questionnaire

The research data were collected using a previously validated questionnaire from a study in Saudi Arabia [2]. The questionnaire comprised of following sections:

1. The first part consisted of nine statements on general information about seasonal influenza vaccination. The scores ranged from 0 to 9. Scores between 0 and 5 were considered as poor knowledge, whereas scores between 6 and 9 were regarded as good knowledge.
2. The second section contained seven statements (5-point Likert scale) about the subjects' attitudes toward seasonal influenza immunization. The options were: strongly disagree, disagree, neutral, agree and strongly agree. The scores ranged from 7 to 35. Scores between 7 and 21 were categorized as negative attitude, whereas scores between 22 and 35 were considered positive attitude.
3. The final part of the questionnaire was regarding hesitancy factors that lead parents to not vaccinate their child and were at the discretion of the faculty members and research team including the principal investigator.

Ethical considerations

Ethical approval was sought from Al-Imam Muhammad Ibn Saud Islamic University, Riyadh,

Saudi Arabia (Reference # 40-2020). Informed consents were obtained from the study participants. The objective of the study was clearly explained to the participants while highlighting the importance of the data and its confidentiality. Identifiers were removed from the data to avoid identification of subjects.

Statistical analysis

Data entry and analyses were performed using the Statistical Packages for Social Sciences (SPSS) software version 24 (SPSS Inc., Chicago, Illinois, USA). The normality of research data was explored through the Kolmogorov-Smirnov and Shapiro-Wilk test, with data deemed significant at p value > 0.05. Data were presented as mean ± standard deviation (SD) for continuous variables and as frequency and percentages for categorical variables. Dependent and independent variables were compared using the Mann-Whitney U test and the Kruskal–Wallis test. A p value < 0.05 was regarded as statistically significant.

Results

In the present study, a total of 539 subjects were enrolled. The majority of the participants (57.1%) were females. The study sample comprised mainly of middle aged (35-44 years) Saudi parents (33.0%). Over half of the study participants (63.8%) were college graduates; however, only 12.1% of the participants belonged to a medical profession. All the participants had at least one child aged between 6 months and 14 years. Most of the children (87.9%) of Saudi parents were vaccinated under the national vaccination program. The detailed sociodemographic characteristics of the study subjects are presented in Table 1.

Nearly two-thirds (63.6%) of the participants were aware of the availability of seasonal influenza vaccines in primary health centers (PHCs) and hospitals. Despite the fact that 94.1% of the Saudi parents had knowledge of the seasonal influenza vaccine, merely 28% of the parents themselves and 18% of their children received the vaccine between the years 2019 and 2020. According to the parents, PHCs (59.2%) are the best places to vaccinate, followed by hospitals (28.6%). Surprisingly, a large number of participants believed that seasonal influenza is a minor disease and the influenza vaccine could be harmful. Therefore, they themselves and their child did not get vaccinated against seasonal influenza.

The level of awareness among Saudi parents regarding seasonal influenza and its vaccine is presented in Table 2. A relatively high proportion of the parents provided accurate responses to the survey questions regarding knowledge about the disease and vaccine: influenza is a common disease (95.0%), influenza is transmitted through coughing and sneezing (90.9%), and aim of the influenza vaccine is to prevent influenza (78.7%). The main sources of information regarding seasonal influenza vaccine were medical staff, family and friends, internet, television and awareness campaigns.

The attitudes and behaviors of Saudi parents with at least one child aged ≥ 6 months regarding the influenza vaccine is presented in Figure 1. There was a high level of consensus (either agreed or strongly agreed) among study participants regarding the following: vaccinations are important to keep children healthy (24.7% agreed and 67.9% strongly agreed), I trust the information given by Saudi Ministry of Health [MOH] (33.2% agreed and 55.8% strongly agreed) and I trust the information given by my doctor (49.7% agreed and 33.4% strongly agreed).

The knowledge and attitude of Saudi parents towards seasonal influenza vaccine are presented in Table 3. Almost half of the Saudi parents (53.8%) scored well on knowledge of seasonal influenza and its vaccine, while most of the Saudi parents (92.0%) demonstrated positive attitude towards seasonal influenza vaccination for their children.

The Table 4 compares the knowledge and attitude scores based on sociodemographic characteristics of participants. No statistically significant gender-based difference in knowledge scores was observed. Interestingly, males had statistically higher ($p < 0.0001$) overall positive attitude towards seasonal influenza vaccination compared to females. While there was no

Table 2. Knowledge of parents regarding seasonal influenza and its vaccine.

Questions	Accurate answers (n, %) (N = 539)
Influenza is a common disease	512 (95.0)
Influenza is highly contagious	341 (63.3)
Influenza is transmitted through coughing and sneezing	490 (90.9)
Influenza can lead to hospitalization and death	275 (51.0)
Influenza vaccine is recommended for all children > 6 months	176 (32.7)
Aim of the influenza vaccine is to prevent influenza	424 (78.7)
Influenza vaccine will not cause influenza	129 (23.9)
Influenza vaccine should be given every year	380 (70.5)
Antibiotics cannot treat a viral influenza infection	256 (47.5)

statistical difference in knowledge scores for Saudi parents stratified in multiple age groups, young adult Saudi parents had significantly higher positive attitude ($p < 0.0001$). Higher education levels (college graduate and Master's or PhD) were associated with high knowledge scores ($p < 0.0001$). Subjects with higher income (> 15,000 Saudi Riyals) scored significantly higher ($p = 0.032$) on seasonal influenza vaccine knowledge-related statements, whereas subjects with low income (2000-6000 Saudi Riyals) scored significantly higher in attitude ($p < 0.0001$). As expected, being in medical profession was associated with both good knowledge ($p < 0.0001$) and positive attitude ($p < 0.0001$). Saudi parents with one child were more inclined ($p < 0.0001$) to show positive attitude towards seasonal influenza vaccine. Saudi parents with good knowledge and positive attitude were considerably more likely to have heard about the seasonal influenza vaccine ($p = 0.001$ and 0.029), be immunized themselves ($p < 0.0001$ and < 0.0001) and have immunized their children ($p < 0.001$ and <0.0001) with the yearly seasonal influenza vaccine.

Discussion

This study explored knowledge, attitudes and practices of Saudi parents toward the seasonal influenza vaccine. Our findings demonstrate that the overall knowledge of Saudi parents regarding seasonal influenza and its vaccine is quite poor, despite strong positive attitude. In the present study, most children had been administered vaccines according to the national vaccination program and a large majority of Saudi parents had heard about the seasonal influenza vaccine.

Table 3. Knowledge and attitude level scores of Saudi parents towards seasonal influenza vaccine.

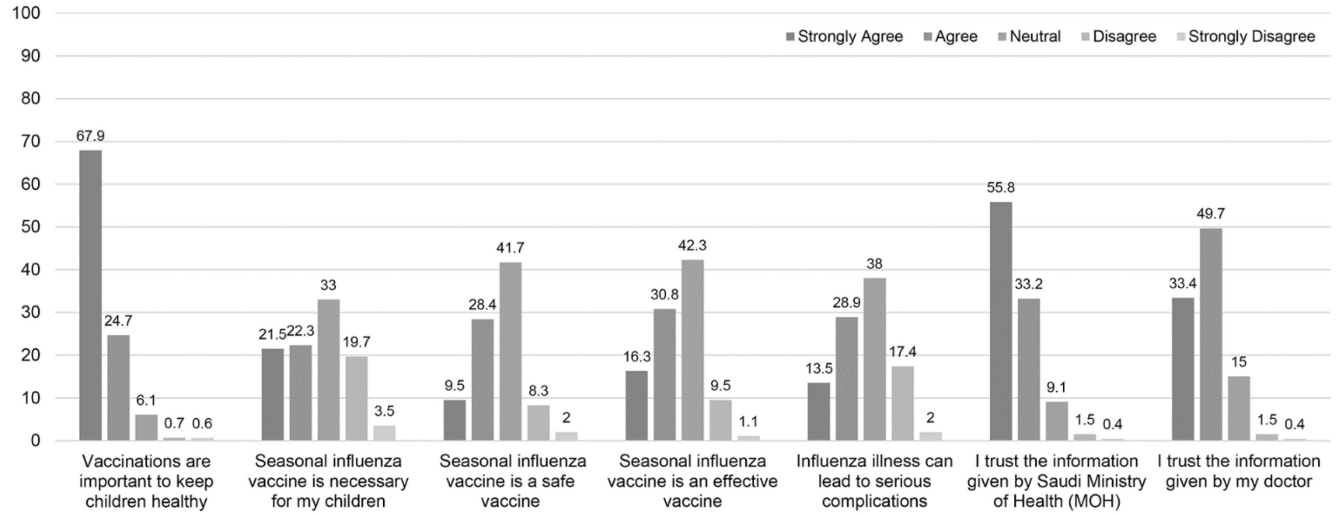
Variable	(*n*, %) (*N* = 539)
Knowledge Score [Median (IQR)]*	6 (4-7)
Knowledge	
Poor	249 (46.2)
Good	290 (53.8)
Attitude Score [Median (IQR)]*	27 (24-30)
Attitude	
Negative	43 (8.0)
Positive	496 (92.0)

IQR: Interquartile Range; *Median and IQR were reported because of non-normal distribution of data.

These findings were closely mirroring with that of two recently published reports. Alabbad *et al*. reported 89% and Alolayan *et al*. reported 85.5% awareness about the seasonal influenza vaccine [2,13]. It should be noted that the former study had three cohorts; parents, adult patients and healthcare workers, whereas the latter study and our report focused specifically on the parents.

The coverage of the seasonal influenza vaccine among children differs significantly between countries: Pakistan 6.6% [1], Turkey 21.1% [14], Jordan 29% [15] and United States of America (USA) 57% [16]. In this study, 63.6% of the Saudi parents were aware of availability of the seasonal influenza vaccine at either PHCs or hospitals; however, slightly over one-quarter of the parents and 18% of their children had been vaccinated against seasonal influenza. Therefore, awareness regarding availability of seasonal influenza vaccine and vaccination rates among parents are key predictors in refining coverage of seasonal influenza vaccine among children.

Figure 1. Attitudes and behaviors of Saudi parents with at least one child aged 6 months or above regarding the influenza vaccine



* Percentages of all the responses (agree, disagree, neutral, strongly agree and strongly disagree) are shown.

Misinformation such as seasonal influenza is a minor disease, the influenza vaccine could be harmful, and that the vaccine may not be required were prevalent in our study sample and were the primary reasons for not vaccinating their children. These findings are in line with a recently published report [2]. Furthermore, incomplete and inappropriate knowledge regarding the grave consequences of seasonal influenza could be contributing to vague concepts and practices [15]. There is significant diversity in factors associated with refusal of seasonal influenza vaccine. Lack of recommendation from doctors, concerns regarding adverse effects of vaccines and skepticism towards its effectiveness contribute towards low adoption of seasonal influenza vaccine [15,17,18]. Therefore, beliefs and misconceptions regarding seasonal influenza and its vaccine need to be addressed through multiple media, awareness campaigns and physicians.

Physicians and other medical personnel play a crucial role in boosting knowledge and clearing myths regarding seasonal influenza and its vaccine. In the present study, medical staff were the most dependable source of information about the disease and its vaccine, which is in line with previous research communications [2,13,15,18]. Hence, Saudi MOH and hospitals management should consider educating doctors and

Table 4. Comparison of knowledge and attitude scores based on sociodemographic characteristics of participants.

Variables	Knowledge score out of 9 [Median (IQR)]	*p* value	Attitude score out of 35 [Median (IQR)]	*p* value
Gender				
Females	6 (5-7)	0.754	26 (24-29)	**< 0.0001**
Males	6 (4-7)		28 (25-31)	
Age groups in years**				
18-24	5 (4-6)		29 (27-32)	
25-34	6 (5-7)		28 (25-32)	
35-44	6 (4.75-7)	0.110	26 (24-29)	**< 0.0001**
45-54	6 (5-7)		26 (24-29)	
55-64	5 (4-6.75)		27 (25-28)	
65 and above	6 (5.25-7)		20 (19.50-21.25)	
Education**				
Below high school	4 (3-6)		27 (23.50-29)	
High school graduate	5 (4-6)	**< 0.0001**	27 (24-30)	0.605
College graduate	6 (5-7)		27 (24-30)	
Masters or PhD	6 (5-7)		26 (24-29)	
Monthly household income (Saudi Riyals)**				
2000–6000	5 (5-7)		28 (26-32)	
6001–10,000	5.50 (4-7)		26 (24-30)	
10,001–15,000	6 (5-6)	**0.032**	27 (24-30)	**< 0.0001**
Over 15,000	6 (5-7)		27 (24.50-29)	
Did not know/Declined	6 (5-8)		25 (22-28)	
Working in a medical profession*				
Yes	6 (6-7)	**< 0.0001**	29 (26-32.50)	**< 0.0001**
No	6 (4-7)		27 (24-29)	
Number of children aged between 6 months and 14 years**				
One	6 (4-7)		28 (25-32)	
Two	6 (5-7)		26 (24-28)	
Three	6 (4-7)	0.149	26 (24-30)	**< 0.0001**
Four	6 (5-8)		26 (24-29)	
Five	6 (5-7)		27 (25-31)	
Six or more	5 (4-7)		27 (22-29)	
Heard about seasonal influenza vaccine*				
Yes	6 (5-7)	**0.001**	27 (24-30)	**0.029**
No	5 (4-5)		26 (23-27)	
Received influenza vaccine as a parent*				
Yes	6 (5-7)	**< 0.0001**	29 (26-31)	**< 0.0001**
No	5 (4-6)		26 (24-28)	
Children received influenza vaccine**				
Yes	6 (5-7)		30 (27-33)	
No	6 (5-7)	**0.001**	26 (24-28)	**< 0.0001**
I don't know	5 (3-6)		29 (26-32)	

IQR: Interquartile Range. **Bold** values are statistically significant (Median and IQR were reported because of non-normal distribution of data); **p* values were calculated using the Mann-Whitney U test; ***p* values were calculated using the Kruskal-Wallis test.

other healthcare personnel with adequate and updated knowledge regarding the consequences of seasonal influenza and how poor outcomes can be averted through vaccination.

The majority of the parents in our study showed positive attitude and behavior regarding the seasonal influenza immunization. Similar observations were made in a recent study by Alolayan *et al*. [2]. Negative attitudes in some of our study participants were due to poor knowledge regarding the safety profile and efficacy of the seasonal influenza vaccine. A study conducted in Riyadh, Saudi Arabia identified that over 90% of their participants exhibited confidence in the Saudi MOH and trusted information given by their physicians [13]. Another study in Jordan suggested that providing accurate information regarding the beneficial effects of seasonal influenza vaccine led to positive parental attitude towards influenza vaccination [15].

Interestingly, we observed that males demonstrated stronger positive attitude regarding seasonal influenza vaccination than females, which is in contrast to the earlier report [2]. This could be due to the higher ratio of working males in Saudi Arabia, which could result in increased knowledge and awareness and therefore strong positive attitude. Subjects working in the medical profession displayed better knowledge and optimistic attitude. In fact, medical profession acts as a hub for propagating precise information related to seasonal influenza vaccine in the Saudi population. While our results are in agreement with that of Alolayan *et al.* [2], employment in the medical profession may not guarantee better knowledge and/or positive attitude regarding seasonal influenza immunization, as demonstrated in other research studies [19,20].

Awad *et al.* and Alolayan *et al.* reported statistically significant association between parents' seasonal influenza vaccination status and child vaccination [2,15]. They concluded that children were more likely to get seasonal influenza vaccine if their parents themselves were vaccinated. Our analyses led to similar conclusions. It highlights the importance of enhancing the knowledge and attitude of parents regarding seasonal influenza vaccine in order to achieve higher vaccination status among children. As expected, parents who were aware of the seasonal influenza vaccine, vaccinated themselves and their children, and showed good knowledge and positive attitude towards the seasonal influenza immunization program. These findings were relatively consistent with the report published by Alolayan *et al* [2].

Our study has several limitations: 1) The study was conducted in only one region of Saudi Arabia and therefore findings may not be representative of other regions of Saudi Arabia; 2) The study was conducted between 2019 and 2020 and some of the parents may not have vaccinated their child because of the ongoing pandemic; 3) The cross-sectional nature of the study may hamper drawing causality; and 4) Convenience sampling method was used and hence it may have led to sampling bias. Regardless of these limitations, the sample size of the present study is fairly large and the findings of this study could complement other results regarding seasonal influenza vaccination. Moreover, our findings also give insight on parental knowledge, attitude and adoption of seasonal influenza immunization by Saudi parents. Our conclusions highlight the need to educate and encourage parents to embrace seasonal influenza vaccination.

Recommendations

Based on the above findings, educational and awareness programs are of utmost importance to improve the knowledge of parents regarding the importance of seasonal influenza vaccine. Furthermore, the consequences of denying seasonal influenza vaccine by parents to their children must be emphasized through social media and awareness movements. Persistent measures can eventually raise awareness and sense of responsibility among parents towards the well-being of their children.

Conclusions

Notwithstanding the positive attitude shown by Saudi parents towards influenza vaccination, compliance to seasonal influenza vaccination was fairly poor. One of the reasons could be the ingrained misconceptions and lack of knowledge. Stringent efforts are needed to encourage Saudi parents to actively practice annual influenza immunization for themselves and for their children.

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