Awareness and Knowledge Towards Pediatric and Adult COVID-19 Vaccination: A Cross Sectional Community-based Study in Saudi Arabia

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ABSTRACT

Background: As the covid-19 vaccination programs scaling up globally, there remains a growing concern about the community level awareness towards it. We aimed to assess the knowledge and awareness among general population towards covid-19 in adult and pediatric population. Objective: The aim of the study was to assess the knowledge and awareness among adult Saudi people toward covid-19 vaccine for adults and children. Methods: We conducted a cross sectional, community-based study among a representative sample (N=1373) of adult population in Saudi Arabia during October 2021. A structured, closed ended and pre-tested questionnaire was used online to collect the quantitative data through non-random sampling. Results: A great majority (91%) considered the seriousness of covid-19. About 80% perceived the available vaccines to be highly protective against the COVID-19 infection and complications. While about 69.7% agreed that pediatric vaccination will reduce the spread of covid-19, about 77.3% agreed on encouraging the parents to vaccinate their children. Only 43% were aware that vaccination is safe for breast feeding women and about 50.6% considered the vaccination to be safe in pregnant females. About 52.8% responded that the pediatric vaccine has same safety as efficacy as that in adults. The association with knowledge items was observed to be significant (p<0.05) with occupation, education, income and being previously affected with covid-19. Conclusion: Overall, a high level of awareness was observed in our study, however, there were factors observed to be taken care such as vaccination in breast feeding and pregnant females as well as concerns related to safety and efficacy for pediatric vaccination.

Keywords: COVID-19 vaccination, awareness, pediatric COVID-19 vaccination, Saudi Arabia.

1. BACKGROUND

Coronavirus disease 2019 (COVID-19) is a severe acute respiratory syndrome that is caused by a novel coronavirus 2 (SARS-CoV-2). It originated in China late December 2019 and was declared as “a public health emergency of international concern” by World Health Organization (WHO) on January 30, 2020, and “a global pandemic” on March 12, 2020 (1).

The virus is mainly spread through the respiratory droplet (2-7), or sometimes through fomites used by or used on the infected individual (3, 7, 8). The infected people can have no symptoms (5, 9-16). Meanwhile, symptomatic patients may present with, cough, myalgias, headache, diarrhea, sore throat, and smell or taste abnormalities (17-19). Furthermore, the infection is generally more fatal for the elderly and those with a history of comorbidity such as hypertension, obesity, renal disease and diabetes (20-21).

The number of cases continues to increase, by November 2021, approximately 251,788,329 confirmed cases have been reported worldwide, with more than 222 countries affected globally (1). In the Kingdom of Saudi Arabia (KSA), the first case was diagnosed on March 2nd 2020 and by November 2021 there were approximately 549,377 confirmed cases, with death numbers reaching 8,821 (1).
During this pandemic, data regarding the percentage of children infected with COVID-19 has varied among different countries. In KSA children aged <18 y constitutes 1–2% of the total cases, with similar but less severe symptoms (22, 25). In more than 72,000 total cases from China, only 1.2% were children aged 10–19 years, and 0.9% were in patients younger than 10 years (24). Similarly, data from the Netherlands, Italy, Spain, and the United States of America (USA) show that paediatric patients account for 0.8%–2% of confirmed cases (25–28). Most of these pediatric cases presented with mild symptoms, and some were asymptomatic and were identified by routine screening (28). However, the most common reported symptoms in pediatric population are fever or chills and cough (29–31). Vaccination against COVID-19 has been advocated to be the most important public health measure and most effective strategy to protect the population worldwide (32-34). In KSA, the COVID-19 vaccines were introduced to adult population in December 2020 (35) and Pfizer-BioNTech vaccine was approved for children aged between 12 and 18 years (36) in July 2021. More recently, in August 2021 Moderna vaccine was approved for same age group (36).

Meanwhile, with the availability of COVID-19 vaccines, little information is available on the public knowledge and awareness towards the COVID-19 vaccines for adults and for children. Therefore, identifying factors associated with vaccine acceptance is needed to help public health experts identify a conceptual framework and educational campaign aimed at increasing this awareness in the general population (37). Various studies have been conducted globally to assess the public awareness regarding Covid vaccine (38), and in Saudi Arabia (39, 40, 41) but there is paucity of study examining the vaccine awareness in paediatric and adult age group.

2. OBJECTIVE

The aim of the study was to assess the knowledge and awareness among adult Saudi people toward COVID-19 vaccine for adults and children.

3. MATERIAL AND METHODS

Study Design and Participants

It was a descriptive cross-sectional community-based study conducted among adult population in Saudi Arabia, during October 2021. The adult participants from the general population who are able to read and willing to participate were included in the study.

Sample size and sampling method

The minimum sample size was estimated to 384, based on assuming a proportion of 50% (as it gives the highest sample size), 95% confidence interval and 5% allowable error. A non-random sampling method primarily convenient sampling was adopted to collect the quantitative data.

Data Collection

The anonymous data was collected online through structured, closed ended questionnaire using Google forms in English and Arabic languages. The link to the questionnaire was distributed through different social media platforms. The responses were saved as data sheet which was secured in the researcher’s account. The responses were limited to one response option for each participant.

| Knowledge/awareness item | Response | Frequency | Percent (%) |
|--------------------------|----------|-----------|-------------|
| COVID-19 is dangerous and may have serious consequences | Strongly agree | 670 | 48.6 |
| | Agree | 479 | 34.8 |
| | Neutral | 182 | 13.2 |
| | Disagree | 37 | 2.7 |
| | Strongly disagree | 10 | 0.7 |
| Physical distancing can protect you and your family from contracting COVID-19 disease? | Strongly agree | 850 | 61.7 |
| | Agree | 409 | 29.7 |
| | Neutral | 93 | 6.7 |
| | Disagree | 19 | 1.4 |
| | Strongly disagree | 7 | 0.5 |
| COVID19-positive women are safe to breastfeed? | Yes | 335 | 24.3 |
| | No | 403 | 29.2 |
| | Don't know | 640 | 46.4 |
| Following precautionary measures on a personal-level would help the community fight against the COVID-19 pandemic? | Yes | 1253 | 90.9 |
| | No | 49 | 3.6 |
| | Don't know | 76 | 5.5 |
| The traditional remedies (i.e., herbs) may protect from Infectious diseases such as the COVID-19? | Yes | 343 | 24.9 |
| | No | 615 | 44.6 |
| | Don't know | 420 | 30.5 |
| Vaccines are important for the health of children and adults? | Strongly agree | 686 | 49.8 |
| | Agree | 392 | 28.4 |
| | Neutral | 225 | 16.3 |
| | Disagree | 43 | 3.1 |
| | Strongly disagree | 52 | 3.7 |
| | Strongly agree | 830 | 60.2 |
| | Agree | 442 | 32.1 |
| | Neutral | 87 | 6.3 |
| | Disagree | 14 | 1.0 |
| | Strongly disagree | 5 | 0.4 |
| Being vaccinated against infectious diseases reduces the mortality? | Strongly agree | 812 | 58.9 |
| | Agree | 476 | 34.5 |
| | Neutral | 69 | 5.0 |
| | Disagree | 16 | 1.2 |
| | Strongly disagree | 5 | 0.4 |
| Vaccination against infectious diseases is protective and improving the quality of life, especially for people with low immunity and those suffering from chronic diseases? | Strongly agree | 544 | 39.5 |
| | Agree | 525 | 38.1 |
| | Neutral | 242 | 17.6 |
| | Disagree | 46 | 3.3 |
| | Strongly disagree | 21 | 1.5 |

Table 1. Knowledge/awareness regarding COVID-19 among study participants (n=1378)
Survey Instrument
A structured, closed ended, self-administered questionnaire was used for quantitative data collection. The survey instrument was drafted based on review of literature (42-45), and expert consultations. The questionnaire was drafted primarily in English language and translated into Arabic and was validated through translation-retranslation back into English. It was pre tested through pilot survey. The instrument included the following sections: socio-demographic information, general awareness regarding COVID-19 and knowledge/awareness regarding the COVID-19 vaccine for both adults and children. The Knowledge items had "yes" and "no" responses while awareness/attitude items followed a Likert scale ranging from "strongly agree" to "strongly disagree". The positive responses (agree and strongly agree) were merged together to find out the association between variable.

Data Analysis
The data was validated and cleaned through Microsoft excel 2016 and transported to IBM-SPSS version 21 for tabulating and data analysis. The data was described as frequency and percentage. Chi square and Fischer’s exact tests were employed to find out association between variables. All statistical tests were considered significant at 95% confidence interval with a p-value less than 0.05.

Ethical Consideration: The study was approved from Institutional review board of King Saud Medical City, (reference number: H1R1-01-Sep21-02). The participants were assured of the privacy and confidentiality of their responses.

4. RESULTS
Socio-demographic information of the study participants
Among the total of 1373 study participants included in the final analysis, almost equal proportion was noted for male and females (51.8% females vs. 48.2% males). Age wise highest participation was observed from age group 18-30 years (32.3%) followed by 31-40 years (29.2%), 41-50 years, while it lowest for age group higher than 50 years (16.7%). About 18.7% of study participants belonged to medical profession, while majority (63%) were educated up to university and college level. As for the economic status, 36.4% had monthly income of more than 15,000-20,000 SAR, followed by less than 5000 SAR (33.4%), 5000-1000 SAR (17.1%) and more than 20,000 SAR (13.1%). Majority (66.9%) of were married and from Riyadh City. About 76.3% of the respondents had reported to had infected with COVID-19 infection while about 59.7% reported to have had a family member affected with COVID-19 with about 18.3% had severe disease among family members.

Knowledge/awareness towards COVID-19
As shown in Table 1, about 85% of them agreed that of COVID19 infection is a serious condition while 91% agreed on the potential benefits of physical distancing. About 24.3% were agreed that it's safe to breast feed for COVID-19 positive females. About 90.9% of all responders agreed on following the precautionary measures as it helps the community fighting against the COVID-19 pandemic. About 44.6% participants didn't believe in using traditional remedies (i.e., herbs) that may protect them from infectious diseases such as the COVID-19. A great majority agreed (28.4%) and strongly agreed (49.8%) on importance of vaccination for health of adults and children. Also, about 95% agreed on the role of vaccines in reducing the morbidity and mortality from infectious diseases. Similarly, more than 90% agreed that vaccine improves the quality of life for chronic diseases and those who do not have any vaccination

Table 2. Knowledge/awareness regarding pediatric Covid-19 vaccine among study participants (n=1378)

| Knowledge component | Response | Frequency | Percent |
|---------------------|----------|-----------|---------|
| Are there any COVID19 vaccines approved for children from 12-18 years? | Yes | 1256 | 91.1 |
| | No | 28 | 2.0 |
| Giving COVID19 vaccine for children will reduce the spread of the infection to others | Strongly agree | 459 | 33.3 |
| | Agree | 502 | 36.4 |
| | Neutral | 325 | 23.6 |
| | Disagree | 53 | 3.8 |
| | Strongly disagree | 39 | 2.8 |
| Parents must be encouraged to give their children (12-18 years) the COVID19 vaccines as soon as possible | Strongly agree | 619 | 44.9 |
| | Agree | 447 | 32.4 |
| | Neutral | 223 | 16.2 |
| | Disagree | 52 | 3.8 |
| | Strongly disagree | 37 | 2.7 |
| The mothers who received COVID-19 vaccine can breast feed their babies safely | Strongly agree | 268 | 19.4 |
| | Agree | 326 | 23.7 |
| | Neutral | 664 | 48.2 |
| | Disagree | 82 | 6.0 |
| | Strongly disagree | 38 | 2.8 |
| Regarding safety of COVID19 in pediatrics compared to adults, it is considered to have same efficacy | 727 | 52.8 |
| | more efficacy | 77 | 5.6 |
| | less efficacy | 83 | 6.0 |
| | don't know | 491 | 35.6 |
| | strong disagree | 38 | 2.8 |
| Regarding efficacy of COVID 19 vaccine in pediatrics compared to adults, it is considered to have same efficacy | 727 | 52.8 |
| | more efficacy | 77 | 5.6 |
| | less efficacy | 83 | 6.0 |
| | don't know | 491 | 35.6 |
| The approved COVID19 vaccines are safe for pregnant women. | Strongly agree | 282 | 20.5 |
| | Agree | 415 | 30.1 |
| | Neutral | 543 | 39.4 |
| | Disagree | 88 | 6.4 |
| | Strongly disagree | 50 | 3.6 |
| | Strongly agree | 621 | 45.1 |
| | Agree | 508 | 36.9 |
| | Neutral | 184 | 13.4 |
| | Disagree | 43 | 3.1 |
| | Strongly disagree | 22 | 1.6 |
with low immunity. About 77.6% agreed that the benefits outweigh the risks of the vaccines.

**Knowledge/awareness towards COVID-19 vaccination**

While a great majority (91.1%) were aware about the availability of the covid vaccine among 12-18 years age groups, however, about 69.7% agreed that pediatric vaccination will reduce the spread of COVID-19 and about 77.3% agreed on encouraging the parents to vaccinate their children. Only 43% agreed that vaccination is safe for breast feeding women. About 52.8% responded that the pediatric vaccine has same safety as efficacy as that in adults. About 50.6% considered the vaccination to be safe in pregnant women. About 52.8% responded that the pediatric vaccination will reduce the spread of the infection and complications (Table 2).

**Association of knowledge/awareness towards COVID-19 vaccination with certain socio-demographic variables**

For estimating the association between socio-demographic factors, certain knowledge/awareness items were selected. As shown in Table 3, the association with knowledge items was observed to be significant (p<0.05) with occupation, education, income and being previously affected with COVID-19. While the association between the knowledge items with age, gender and marital status was not observed to be significant (p>0.05) except one knowledge item was found to be significantly associated with gender (<0.05). As expected, the knowledge/awareness items were found to be significantly higher (<0.05) in females compared to males (Table 3).

**Table 3.** Association of knowledge/awareness towards COVID-19 vaccination with certain socio-demographic variables, among study respondents (n=1378)

| Socio-demographic factor | Knowledge/awareness response item* | p-value |
|--------------------------|-----------------------------------|---------|
| Age                      | Vaccines are important for the health of children and adults? | χ²=3.96, p<0.05 |
| 18 to 30 years           | The available vaccines are highly protective against the COVID-19 infection and complications? | χ²=4.48, p<0.05 |
| 31 to 40 years           | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=3.4, p<0.05 |
| 41 to 50 years           | Parents must be encouraged to give their children (12-18 years) the COVID19 vaccines as soon as possible | χ²=4.4, p<0.05 |
| >50 years                | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=4.4, p<0.05 |
| Gender                   | Knowledge/awareness response item* | p-value |
| Male                     | Vaccines are important for the health of children and adults? | χ²=4.36, p<0.05 |
| Female                   | The available vaccines are highly protective against the COVID-19 infection and complications? | χ²=4.48, p<0.05 |
| Marital status           | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=4.4, p<0.05 |
| Married                  | Parents must be encouraged to give their children (12-18 years) the COVID19 vaccines as soon as possible | χ²=4.4, p<0.05 |
| Occupation               | Knowledge/awareness response item* | p-value |
| HCW                      | Vaccines are important for the health of children and adults? | χ²=4.4, p<0.05 |
| Non-HCW                  | The available vaccines are highly protective against the COVID-19 infection and complications? | χ²=4.48, p<0.05 |
| Educational status       | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=3.4, p<0.05 |
| Elementary               | Parents must be encouraged to give their children (12-18 years) the COVID19 vaccines as soon as possible | χ²=3.4, p<0.05 |
| High-school              | Knowledge/awareness response item* | p-value |
| Graduated                | Vaccines are important for the health of children and adults? | χ²=4.4, p<0.05 |
| Post-graduate            | The available vaccines are highly protective against the COVID-19 infection and complications? | χ²=4.48, p<0.05 |
| Monthly income (SAR)     | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=3.4, p<0.05 |
| <5000                    | Parents must be encouraged to give their children (12-18 years) the COVID19 vaccines as soon as possible | χ²=3.4, p<0.05 |
| 5000-10000               | Knowledge/awareness response item* | p-value |
| 15000-20000              | Vaccines are important for the health of children and adults? | χ²=4.4, p<0.05 |
| >20000                   | The available vaccines are highly protective against the COVID-19 infection and complications? | χ²=4.48, p<0.05 |
| Were you affected with COVID-19? | Vaccinating Children with anti-COVID vaccines will reduce the spread of the infection | χ²=3.4, p<0.05 |

Table 3. Association of knowledge/awareness towards COVID-19 vaccination with certain socio-demographic variables, among study respondents (n=1378)
5. DISCUSSION

Present study has been conducted among general population to assess their knowledge and awareness regarding covid vaccine in adults and paediatric age group. Although, similar studies have been undertaken previously but no study has attempted to assess awareness on adult and paediatric vaccine combined. We have found a high level of awareness on COVID-19 and anti-covid vaccine among our study participants. More than three-fourth of study participants agreed that covid and its consequences are a serious concern. A great majority (more than 90%) agreed on potential benefits of physical distancing and other precautionary measures in preventing spread of covid. These findings are corroborated with the studies done in China (46) and Europe (47) where more than 90% study participants agreed on the potential benefits of physical distancing and precautionary measure. However, another study conducted in Libya, has reported a lower level of awareness and adherence to physical distancing and precautionary measures, as compared to our study, whereby, about 63% agreed on potential benefits of social distancing as protective measure (38).

We found high level of positive attitude among study participants towards role of vaccines in reduction of morbidity and mortality, protection from infectious diseases and improving the quality of life. Three-quarter of our participants believed that benefits from vaccines outweighs the risk, which is quite high as compared to that reported by study conducted in Libya, where this variable has been reported to be only 14.9% (38). The vaccine acceptability in Saudi Arabia has been reported to be 48-64% (39-41). In general, the vaccine acceptability has been reported to be low in Kuwait (23.6%) and Jordan (28.4%), moderate in Italy (53.7%), Russia (54.9%) and Poland (56.3%), while it has been reported to high in Indonesia (93.5%), China (91.3%), and Malaysia (94.3%) (38).

About half of our study participants believed that covid vaccine is safe for pregnant females, while 45% considered it to be safe for breast-feeding mothers. This finding is corroborated with another study conducted in New York, where the acceptance rate of vaccines among pregnant and breast-feeding females has been reported to be about 44% and 55%, respectively (48). Similarly, another study conducted in 16 countries between October 28 and November 18, 2020, also reported that about 52% pregnant females indicated an intention to get vaccinated (49). Pregnant women affected with COVID-19 have been found to be at increased risk for adverse pregnancy outcomes such as preterm birth (50), which led various health authorities to issue guidance indicating that the COVID-19 vaccines should not be withheld from pregnant women (51-55). Furthermore, recent studies have suggested that vaccination of pregnant women builds antibodies that might protect the unborn child also (53). It has also been shown that breastfeeding mothers who have been vaccinated with mRNA COVID-19 vaccines have antibodies in their breastmilk, that can protect their babies (54-57).

Slightly less than three-fourth of the study participants agreed that paediatric vaccination will help reduce the spread of covid. About 77% accepted they would agree to go for vaccination for their children. Contrary to our finding, in a study, conducted in England, only 48% respondents agreed to accept the vaccination for their children (58).

We found a significant association between knowledge/awareness towards covid vaccination and occupation, educational status, monthly income and positive history of past COVID-19 infection. Similar to our finding, these association have also been reported by various studies (58, 59–64). For instance, Srichan et al have reported occupation, education, annual income and marital status to be significant factors associated with more accurate knowledge of COVID-19 (59). The willingness to accept the COVID-19 vaccine in Saudi Arabia was reported to be relatively high among married responders with education level postgraduate degree or higher, older age groups and those employed in government sector (39). We also found a significantly higher level of knowledge/awareness among health care workers as compared to non-health care workers. A study done among nurses has reported excellent level of knowledge towards COVID-19 (40).

We have managed to achieve a large sample size; however, the findings may not be amenable for generalization as the composition of our sample may not be representative of the general population. Nevertheless, present study found an overall view of the prevalent in the community at large, that is indicative of the current level of concerns in the general community. For instance, the issue of vaccination for pregnant and breast-feeding mothers in not clear for many of the study respondents. The possibility of social desirability bias cannot be ruled as it relates to overall good attitude reported in our study. Another limitation is not using the quantitative scores for knowledge/awareness levels, which might have been a good measure instead.

6. CONCLUSION

Understanding and acceptance the COVID-19 vaccines is an essential determinant that affects the general vaccines uptake and the likelihood of controlling the COVID-19 pandemic. Our study showed a promising level of knowledge and awareness of adult Saudi community about vaccination for adults and pediatrics. However, the health communication should incorporate the new guidelines, such as that related to vaccination among pregnant and breast-feeding mothers.

• Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms.
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