

Original Research Article



Saudi Medical Journal of Students (SMJS)

Official Journal of Faculty of Medicine University of Tabuk

ISSN: 1658-8274 (Print version); 1658-8282 (Electronic version)

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PARENTS AWARENESS AND ATTITUDE TOWARDS MMR AND MEASLES VACCINE IN SAUDI ARABIA.

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ABSTRACT

Background: MMR vaccine has been faced by parents who refuse, delay, or are hesitant to vaccinate their children due to claims of an increased association between the MMR vaccine with autism spectrum disorder. Over the past years, Saudi physicians have been facing several parents who have a negative attitude towards the vaccine due to myths and misconceptions. Therefore, in this study, we aim to assess the knowledge, opinion, and attitudes toward the MMR vaccine among parents at the medical center of Al-Imam Mohammed Ibn Saud Islamic University in Riyadh, Saudi Arabia.

Materials and Methods: A cross-sectional questionnaire-based survey study was conducted from August 2019 to January 2020. Parents attending the clinics of Al-Imam medical center in Riyadh, Saudi Arabia. Data were collected through direct interview method using a pre-tested structured questionnaire.

Results: All statistical analyses were performed using the software R (Version 3.6.2.). A total of 356 parents completed the questionnaires. The average age of the included parents was 34.2 ± 7.11 years. The average age of children was 3.95 ± 2.95 years. The majority of children were up to date on vaccines ($n = 312$, 87.6%) and received the Measles or MMR vaccine ($n = 282$, 79.2%).

Conclusions: Although parents had good knowledge and positive attitudes on some aspects related to childhood immunization, gaps in the studied domains were identified.

To Cite This Article: Almansour Nm, Alsayahi Hs, Albarakah Nm, Almana Hs, Leheidan Sm, Almutairi Am. Parents Awareness And Attitude Towards Mmr And Measles Vaccine In Saudi Arabia. Saudi Med J Students. 2021;2(1):2-12

INTRODUCTION

Infectious diseases are one of the most common causes of morbidity and mortality worldwide. Vaccination shows a significant

impact on public health as well as the quality of life through reducing the spread of disease and the treatment cost. [1][2][3]

Assessing the knowledge and the attitude toward vaccination is an important indicator of the opinions concerning vaccine-preventable diseases such as Rubella, Measles, and Mumps. [3] [4] Measles is a viral disease that spreads from one person to another through the air. Measles is more serious in children younger than five years, who are also more prone to its complications such as ear infection, diarrhea, encephalitis, and rarely death. [5]

However, Measles could be prevented by having the single antigen Measles vaccine or the combined Measles, Mumps, Rubella (MMR) vaccine. It is recommended from the Centers for Disease Control (CDC) that children should get two doses of the MMR vaccine, which are effective for preventing measles by 97%, compared to 93% for a single dose. [5]

Recently, the MMR vaccine had faced refusal due to claims of an increased association between the MMR vaccine to autism. Parental negative attitudes and knowledge vaccine negatively influenced its uptake. Also, both the fear of the vaccine's side effects and worries about its safety had led to vaccine hesitancy. [6][7][8]

Recent studies have shown that some parents in Saudi Arabia believed that the vaccine could cause a severe problem for their children; thus, have a negative attitude towards it. Moreover, health care providers faced other issues with parents who believe that the vaccine is not essential. [3] Similarly, there are similar concerns and misconceptions about the safety of the MMR vaccine in other countries. [6]

Given the crucial role of parental knowledge and attitude regarding any vaccine in its

uptake; both domains should be studied. To our knowledge, the studies conducted in Saudi Arabia, so far, are mostly about vaccination, in general, and not focused on the MMR or Measles vaccines. Such focus is important to identify the possible sources of vaccination hesitancy and to contribute to the planning for improving the child's quality of life by eliminating measles.

Therefore, our study was carried out to assess parental knowledge and attitudes on MMR vaccine among parents attending Al Imam Mohammed Ibn Saud Islamic University Medical Center, also known as Imam Medical Center (IMC).

METHODS

A cross-sectional survey was conducted through the period August 2019 and January 2020. A convenient method of sampling was adopted. Parents with children of 0-12 years old attending the medical center at Al Imam Mohammed Ibn Saud Islamic University in Riyadh, were invited to participate. Verbal informed consent was taken from the participants after explaining the research purpose, reassuring them about the confidentiality of data, and confirming that their participation was voluntary. Data were collected by trained medical students from parents in the vaccination clinic. Direct interview method was used, and responses were recorded in a pre-tested structured questionnaire.

The questions were formulated and revised by three general pediatrics consultants for validity, comprehensiveness, and appropriateness to the targeted population. The questionnaire was composed of six main sections to collect data on parents'

demographics, immunization coverage and compliance, family and child medical history, parent's knowledge about measles disease, and parent's knowledge and attitudes towards measles or MMR vaccines, using both multiple-choice (MCQ) and open-ended questions. Three multiple-choice questions (MCQ) were used to assess the awareness of parents towards measles while seven MCQ were used to evaluate the knowledge and attitude towards the MMR vaccine. Responses to knowledge questions were documented as "Yes", "No", and "Don't know". A five point-Likert scale ranging from "Strongly agree" to "Strongly disagree" was used to assess parents' attitudes toward MMR vaccine. Compliance to vaccination was confirmed by checking the children's national vaccination cards.

Data were entered using Microsoft Excel and was processed using software R (Version 3.6.2.). Descriptive statistics were used to describe all variables. The Chi-square test of independence was used to test the association between dependent variables (knowledge, and attitudes) and independent ones (parents' demographics). P values of < 0.05 were considered statistically significant. Linear regression was used to assess factors associated with knowledge towards the MMR vaccine. Awareness and attitude regarding measles and the MMR vaccine (total score) were calculated as follows: Participants were awarded 1 point for each correct answer and zero otherwise. The number of correct answers was then calculated for each participant. One question was not included in the assessment of knowledge regarding the MMR vaccine (side effects of measles/MMR vaccine). A

maximum possible score of 9 (3 + 6) was possible for knowledge regarding measles and the MMR vaccine. Hypothesis testing was performed at a 5% level of significance. This study was ethically approved by Imam Mohammad Ibn Saud Islamic University, college of medicine ethics committee.

RESULT

Socio-demographic characteristics of the study population:

A total of 356 parents completed the questionnaires. The average age of the included parents was 34.2 ± 7.11 years. The majority of the fathers of mothers either completed university 52.8% (n=188), and 65.2% (n=232), respectively or post-graduate education 32.9% (n=117) and 15.7% (n=56), respectively. Half of the mothers were not currently working (n = 186, 52.2%). All included parents Except one lived in urban Area. The average age of the included children was 3.95 ± 2.95 years. Details of the remaining characteristics of the participating parents are shown in (Table 1).

Immunization coverage and compliance:

Results showed that the majority of children were up to date on vaccines (n = 312, 87.6%) as reported by parents. The majority also received Measles or MMR vaccine (n = 282, 79.2%). Further details are mentioned in (Table 2).

Family and child medical history:

Regarding the medical health conditions of the involved children (n = 34, 9.55%) of them suffered from an allergic reaction to vaccination, as reported by their parents. Only one child (0.28%) had epilepsy. Immunodeficiency and autism were reported

Variable	Number (n = 356)	Percentage (%)
Parent's age	34.2	(7.11)
Father's education:		
Illiterate	4	(1.12%)
Primary school	4	(1.12%)
Intermediate school	7	(1.97%)
Secondary school	36	(10.1%)
University or college	188	(52.8%)
Postgraduate	117	(32.9%)
Mother's education:		
Illiterate	1	(0.28%)
Primary school	4	(1.12%)
Intermediate school	9	(2.53%)
Secondary school	54	(15.2%)
University or college	232	(65.2%)
Postgraduate	56	(15.7%)
Mother's Occupation:		
Housewife	186	(52.2%)
Working	170	(47.8%)
Nationality:		
Non-Saudi	63	(17.7%)
Saudi	293	(82.3%)
Area of residence:		
In rural areas	1	(0.28%)
In urban area (city)	355	(99.7%)
Number of children:		
One child	61	(17.1%)
Two	93	(26.1%)
Three	82	(23.0%)
Four	61	(17.1%)
Five or more children	59	(16.6%)
Child's age	3.95	(2.95)

Table 1: Socio-demographic characteristics of the study population

11 (3.09%) and 2 (0.56%) children, respectively (Table 3).

Parents' knowledge about measles:

As previously mentioned, three questions were used to assess the knowledge of parents regarding measles and its risk. Only 47.2% (n

= 168) perceived measles as highly contagious while 23.3% (n = 83) perceived it as slightly contagious. Similarly, 50.8% (n = 181) perceived measles as highly dangerous while 29.2% (n = 104) perceived it as somewhat dangerous. The most commonly

Variable	Number (n = 356)	Percentage (%)
Child up-to-date on vaccines:	312	(87.6%)
Yes	40	(11.3%)
No	4	(1.12%)
I don't know		
Child received Measles or MMR vaccine:	282	(79.2%)
Yes	25	(7.02%)
No	49	(13.8%)
I don't know		

Table 2: Immunization coverage and compliance

chosen complication of measles was pneumonia (33.4%), brain inflammation (26.1%), and diarrhea (22.5%). None of the above was chosen by 25.8% (n = 92).

Knowledge and attitude towards MMR vaccine:

The most commonly selected side effect of measles/MMR vaccine was fever (n = 292, 82%). At least 72.8% of each question about MMR vaccine was answered correctly. Responses for the yes/no questions are shown in (Figure 1). Results showed that the child's doctor was the most common source of information regarding MMR vaccine (n = 248, 69.7%). Social media content and websites were the 2nd most common source (n = 99, 27.8 %).

Knowledge regarding measles and MMR vaccine:

Regarding the complications of measles, any answer other than "none" was considered as correct. Education was recorded as less than university education vs. university education or higher. Marital status and location (urban vs. rural) were not included in the analysis.

Source of information regarding measles and its vaccine was recorded as: None, Child's doctor (health care professional), friends (healthcare or non-healthcare professional) and social media and written information. Family history of autism, allergy, or epilepsy were dichotomized (No vs. Yes/I don't know).

Knowledge regarding measles:

Results showed that 15.7% (n = 56) of the participants failed to answer any questions correctly while all three questions were correctly answered by 30.6% (n = 109).

Knowledge regarding MMR/measles vaccine:

Results showed that approximately half of the participants (46.9%, n = 167) answered

Variable	Number (n = 356)	Percentage (%)
Allergy to vaccines:		
Yes	34	(9.55%)
No	318	(89.3%)
I don't know	4	(1.12%)
Immunodeficiency:		
Yes	11	(3.09%)
No	343	(96.3%)
I don't know	2	(0.56%)
Autism:	2	
Yes	350	(0.56%)
No	4	(98.3%)
I don't know		(1.12%)
Epilepsy:	1	
Yes	353	(0.28%)
No	2	(99.2%)
I don't know		(0.56%)

Table 3: Reported medical and family history for the included children

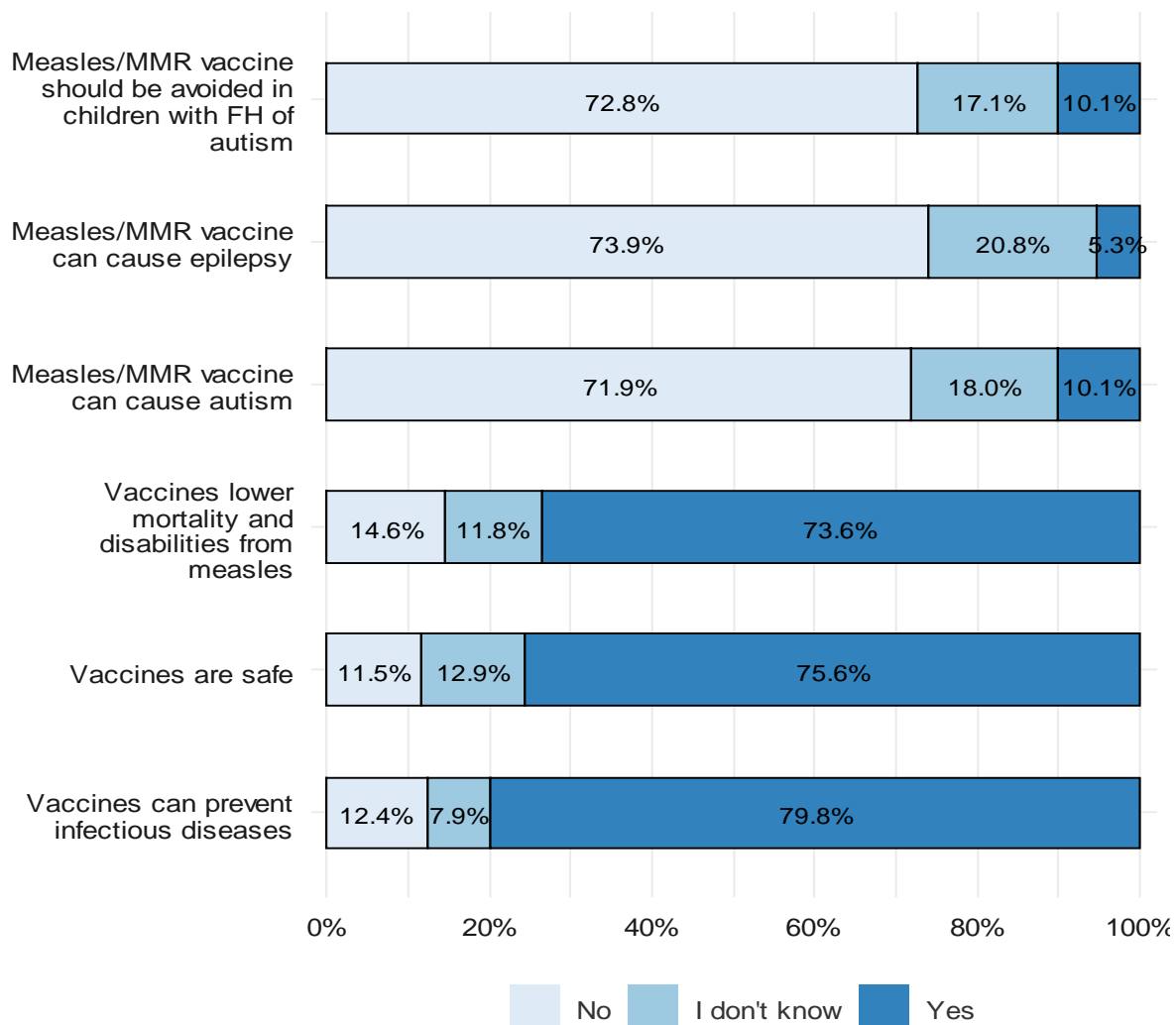


Figure 1: Knowledge regarding the MMR vaccine

four questions correctly, while 22.8% and 12.4% chose the correct answer for three and five questions, respectively (Figure 2).

Linear regression analysis:

Linear regression analysis was used to assess the association of demographic characteristics, family and child history, and source of information with knowledge

regarding measles and MMR vaccine. Backward stepwise elimination was used to eliminate non-significant variables. Education (father and mother), age, caregiver, nationality, source of information, family history of autism or epilepsy, and previous allergic reaction were initially included in the model (Table 4).

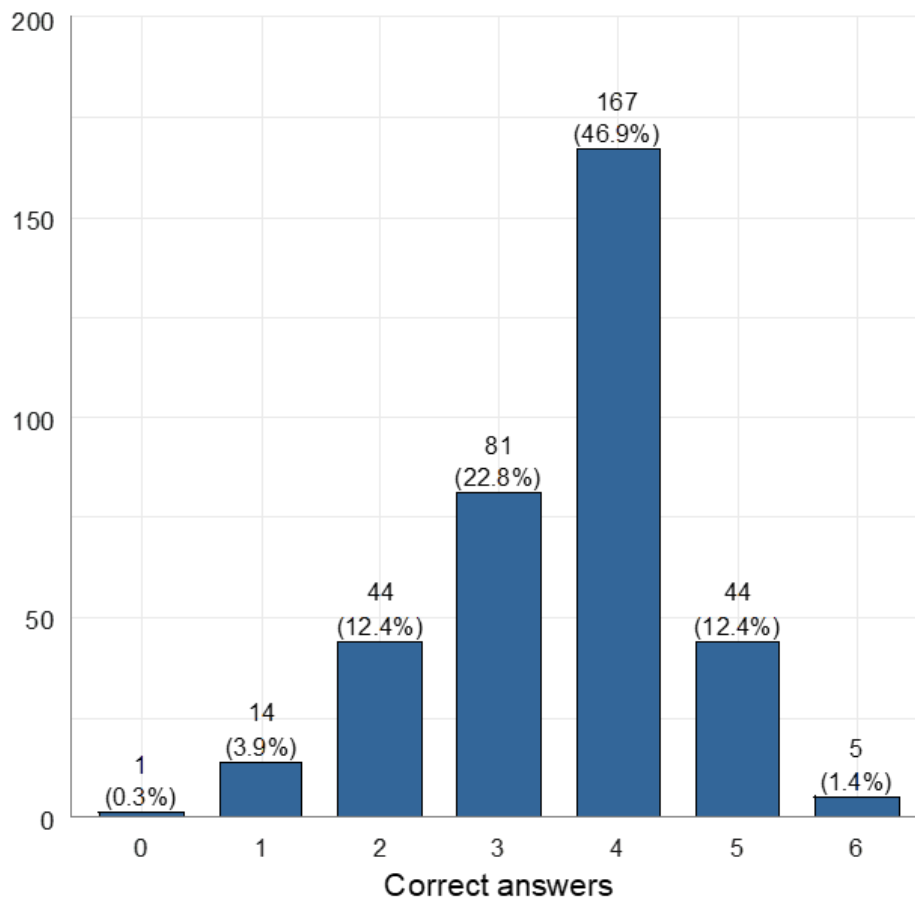


Figure 2: Knowledge regarding MMR/Measles vaccine

Results showed that source of information, positive history of autism, and previous allergic reaction to vaccine were associated with worse knowledge regarding measles and MMR vaccine. Parents that did not report any source of knowledge (None) had an average knowledge score that was lower by 0.87 points compared to parents that obtained their knowledge from a HCP ($\beta = -0.87$, $P < 0.05$). Parents that obtained information through written sources had an average knowledge score that was lower by -0.8 points compared

to parents that obtained their knowledge from a HCP. Thus, source of information was a statistically significant predictor of knowledge regarding measles and MMR vaccine. Parents who have a child diagnosed with autism or reported not knowing autism status in their children had a significantly poor knowledge score (1.59 points) compared to those that reported no children with autism ($\beta = -1.59$, $P < 0.05$). Parents of children with an allergic reaction to one of the vaccines had significantly lower knowledge

Predictors	Estimates	CI	p
(Intercept)	5.31	5.03 – 5.59	<0.001
Child's age	0.05	-0.00 – 0.10	0.060
Source of information: HCP	Ref		
Source of information: Friend/SM	-0.17	-0.56 – 0.23	0.413
Source of information: None	-0.87	-1.59 – -0.15	0.018
Source of information: Written information	-0.80	-1.40 – -0.19	0.010
FH of autism: No	Ref		
FH of autism: Yes/Don't know	-1.59	-2.79 – -0.40	0.009
Previous allergy to a vaccine: No	Ref		
Previous allergy to a vaccine: Yes/Don't know	-0.78	-1.28 – -0.28	0.002
HCP: Healthcare professional CI: 95% confidence interval			

Table 4: Factors associated with knowledge regarding measles and MMR vaccine

score compared to those who did not report an allergic reaction in their children ($\beta = -0.78$, $P < 0.05$).

DISCUSSION

Socio-demographic characteristics of the study population:

Analysis of the demographic features of the parents involved in the present study showed that most of them had a higher education (university, college, or postgraduate). About half of the mothers were working, which may contribute to the level of their knowledge

about and compliance to vaccines, which is found to be high for most of the parents.

Immunization coverage and compliance:

Assessment of the parents' knowledge and attitude in the current study showed variations in responses to questions. In the present study, there is a small percentage (40, 11.2%) of the parents who did not vaccinate their children up to date, citing reasons related to the unavailability of that vaccine at that time, obstacles in getting appointments, and differences in vaccination schedules among different countries. Other parents-related reasons included limited time or

transportation issues while others missed the vaccination date.

Moreover, there were other reasons related to misinformation about mild illness, flu, and premature birth being contraindications to vaccination. A minority of them intentionally avoid and believe it is harmful to their children. To our knowledge, this is the first cross-sectional study that aims to report the coverage and compliance of the MMR vaccine in Riyadh city, which contributes to some limits regarding comparing our results with other studies. On the other hand, there is a local study that aims to investigate the compliance to all the mandatory vaccinations, and it shows a positive result with the majority of participants up to date regarding their vaccine. [2] [3] [4] Similar findings were found in other countries' experiences regarding compliance with Measles vaccination in which more than 90% of parents either have vaccinated their children or have a plan to vaccinate their children. [6] [7]

Knowledge and attitude towards Measles and the MMR vaccine:

The majority of the parents agreed about the effect of vaccinations in disease prevention, including measles infection, which is consistent with the results of other studies conducted in different areas in Saudi Arabia. [2][3][4] In addition, around three-quarters of the parents, agreed that the measles vaccine is safe. A similar finding among Australian parents, where 10% and 35% of immunizers and non-immunizers respectively have vaccine safety concerns. [6] According to this study, almost 74% of parents correctly knew that MMR vaccines lower mortality and disabilities from measles, which is consistent

with the finding that the majority of parents vaccinated their children. Caregivers need reliable and accurate information on absolute contraindications to vaccination and the side effects of the MMR vaccine from their child's pediatrician. Out of the participated parent, only 18% knew it could cause an allergic reaction and skin rash. Moreover, out of 356 participants, only 7% knew that convulsion is one of the MMR side effects. In contrast, 61.2% of participants didn't know about the side effects of the MMR vaccine in a study in Australia. [6] The consequence of this finding is that unawareness of the real side effect can affect the decision of acceptance or refusal of the vaccine.

The study also found that 71.9% of our participants believe that the MMR vaccine doesn't cause autism, which is similar to a survey conducted in Taif, Saudi Arabia (9). Furthermore, there was a study conducted in the UK showed that 66% of MMR vaccine acceptors and refusers were aware that there was no link between the MMR vaccine and autism. [10] MMR vaccine can trigger febrile convulsions like other vaccines, especially if combined with varicella vaccine (MMRV). Still, regarding epilepsy, there is no enough evidence to suggest that the MMR vaccine can cause it. [11] [12] Most of the recruited parents (74%) knew that there is no causal relation between MMR vaccine and epilepsy. As well, most of the parents reported that the MMR vaccine should not be avoided in children with a family history of autism, which is consistent with their knowledge that MMR vaccine is not related to autism.

Half of the participants considered measles as very dangerous and highly contagious with pneumonia and brain inflammation as the

most reported complications. CDC reported that ear infections and diarrhea are the most common complications of measles (1 in 10 patients), followed by pneumonia, 1 out of every 20 children with measles gets, while encephalitis might affect about one child out of every 1,000 who get measles. [13] It is worth noting that half of the recruited parents reported that Measles is either not a contagious disease or slightly contagious, with 18% of whom answered that they do not know. This is particularly significant and necessitates more attention regarding awareness.

Study limitations:

The findings reported in the current study is limited to a single center in one region. The recruited parents were mainly Riyadh residents. However, Riyadh is the most populated Saudi city and enjoys a wide variety of socio-economic and educational backgrounds, which renders it reasonably representative of the target population. To this end, the study did not exclude non-Saudi parents. Future studies on the topic should preferably use a multi-center, multi-region approach.

Lastly, this study sample included parents visiting the vaccination clinic. However, we did compensate by collecting data from parents visiting other clinics in the medical center.

CONCLUSION

In conclusion, the results showed acceptable level parents' knowledge about and positive attitude toward MMR vaccine, but some gaps were identified in both domains. Knowledge regarding measles and the MMR vaccine is significantly associated with the source of

information. Parents who reported obtaining their information from the child's doctor had significantly higher levels of knowledge compared to those who received their information from other sources or had not stated their source of information. Parents who reported having children with autism or prior exposure to an allergic reaction from the vaccine had lower knowledge regarding measles and the MMR vaccine. Educational interventions are needed to enhance parents' knowledge with particular emphasis on the role of the doctors working at the vaccination clinics.

ACKNOWLEDGMENT

The authors thank all survey participants, and we would like to thank Alanoud Alkhalifa, Manar Alotaibi, Juhainah Alshehri, Modhi Bin Asker, Rawan Binkhunayn, Alhanouf Bin Dakhil, and Samar Zarnoog for their help in data collection. We are also grateful to Dr.Khaled Aloskish and Dr.Esam Barnawi for their assistance.

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