Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/17836
DOI URL: http://dx.doi.org/10.21474/IJAR01/17836

RESEARCH ARTICLE

UNDERSTANDING VACCINATION KNOWLEDGE, ATTITUDE, AND PERCEPTION AMONG WOMEN REGARDING IMMUNIZATION DURING PREGNANCY IN RIYADH, SAUDI ARABIA

Karam Basham, Adeebah Mahha and Bandar Alshehry

Manuscript Info

Manuscript History
Received: 10 September 2023
Final Accepted: 14 October 2023
Published: November 2023

Key words:-
Vaccine, Infectious Diseases, Risk, Pregnancy, Knowledge

Abstract

Introduction: Infectious diseases pose significant risks to pregnant women and their fetuses, often leading to increased hospital admissions. In Saudi Arabia, a substantial portion of females lacks awareness of crucial vaccines like pertussis and influenza during pregnancy. This study aims to assess women's knowledge of vaccination and investigate the factors influencing their immunization status.

Methodology:A cross-sectional study was conducted using Google Forms, enrolling 386 women in Riyadh, Saudi Arabia, who were selected through various social media platforms. Structured interviews and questionnaires were utilized to collect data on participants' sociodemographic backgrounds and knowledge. The questionnaire was designed to assess the participants' Knowledge, Attitude, and Perception (KAP) regarding pregnancy vaccination.

Results: Most participants were aged 25-33, married (76.7%), employed (60.1%), and highly educated, with 77.7% having at least a bachelor's or postgraduate degree. Over half had good knowledge of pregnancy vaccination, but gaps were observed, especially in understanding whooping cough vaccine benefits for children. Among sociodemographic factors, only education and employment significantly impacted KAP. Women with higher education and employment showed greater knowledge.

Conclusion: Our study highlights sociodemographic factors' impact on women's knowledge, attitudes, and perceptions regarding pregnancy immunization. There is increased awareness, resulting in a positive overall stance on immunization during pregnancy. Tailored interventions and awareness campaigns addressing sociodemographic variations in Saudi women are recommended to bridge knowledge gaps and foster positive attitudes toward pregnancy immunization.

Introduction:-

Infectious diseases can affect pregnant women and their fetuses, causing major complications, which can be prevented by vaccines that act as a guard for both the mother and fetus during pregnancy as well as after delivery (1). Over the past two decades, the world has faced several pandemic viruses, with studies finding that the consequences of these viruses increase the rate of hospital admission for pregnant women,compared to non-pregnant women (2). Moreover, newborns too have a higher rate of hospitalization because of infectious diseases, such as

Corresponding Author:- Karam Basham

COVID-19, Influenza, and Pertussis (3-5). CDC and WHO recommend that pregnant women receive the flu vaccine during the flu season, the Tdap vaccine during each pregnancy between 27 and 36 weeks, as well as the COVID-19 vaccine if they are at high risk of exposure (6-7). Thoma*et al.* reported that maternal death increased by 33% during the first 9 months of the COVID-19 pandemic (8). A cohort study in Norway concluded that mothers who received a second or third dose ofthe COVID-19 vaccine during pregnancy had an infant with a lower risk of a positive test than infants of unvaccinated mothers and lower risk during the delta variant-dominated period (9). The influenza vaccine is not recommended for less than 6-month-old infants; therefore, the best way to prevent influenza in infants is to administer the influenza vaccine during pregnancy (10). Benowitz*et al.* found that the influenza vaccine is effective(91.5%) in preventing hospitalization of infants with influenza during their first 6 months of life when their mothers received the vaccine during pregnancy (11). Pertussis is an infection that can cause mild to severe infection in infants, potentially resulting in death (12). Although the CDC and WHO recommend the Tdap vaccine for pregnant women, Lindley *et al.* observed that only 54.9% of pregnant women in the USA received the vaccine (13). A cross-sectional study in Iraq enrolled 400 women, of whom 186 did not receive the tetanus toxoid vaccine (TTV) during their last pregnancy. The main reasons cited for not taking the vaccine were lack of time (22.6%) followed by fear of harm to themselves or their baby (14.5%) (14). Aleid*et al.* and her colleagues reported that in Saudi Arabia, 45.2% of females are not aware of the pertussis vaccine that protects both mother and fetus during pregnancy, and 40.2% of them are not aware of the recommendation for pregnant women to receive the flu vaccine during the flu season (1). Generally, there is poor knowledge in Saudi Arabia about vaccines for pregnant women. Therefore, this study aims to assess mothers' knowledge of vaccines and explores the factors that affect their immunization status.

Methodology:-

Study design:

In the Riyadh region of Saudi Arabia, a cross-sectional study was conducted between June 2023 and August 2023 to assess the Knowledge, Attitude, and Perception (KAP) of women regarding vaccination during pregnancy. Participants were selected through multiple social media platforms. Furthermore, the study examined the factors that impact their vaccination status. The study included women aged 18–40 residing in Riyadh, with women living outside Riyadh and those who declined to participate not being considered for the study

Study Sample and Setting:

The study population comprised individuals who met the inclusion and exclusion criteria. The sample size was calculated using statistical software designed for epidemiological analysis, considering a 95% confidence level, 5% margin of error, and the total population under consideration. The estimated sample size was 386. This study design, along with the determined sample size, ensured a strong representation of the target population and facilitated meaningful statistical analyses regarding the prevalence and factors influencing the health condition of interest.

Questionnaire and Data Collection:

This cross-sectional research was carried out by utilizing Google Forms as the data collection tool.The questionnaire's validation process was drawn from previous research findings. Section A of the questionnaire focused on collecting the participants' personal information, including age, marital status, and pregnancy history. Section B aimed to assess women's knowledge of vaccines through a series of questions covering vaccine safety and whether they had received vaccines during pregnancy. Originally, the questionnaire was developed in Arabic, and necessary adjustments were made to ensure its clarity and comprehensibility.

Data Management and Statistical Analysis:

The data collected were analyzed using SPSS Software, version 27.0.1 by IBM. To evaluate the participants' Knowledge Level, a scoring system was applied where correct answers were assigned a value of '1.' and incorrect answers a value of '0.' Subsequently, a total score was computed for each participant, with those scoring above 50% categorized as having a high knowledge level, and those scoring below 50% as having a low knowledge level. Quantitative data were presented through frequencies and percentages, while relationships were explored using the Chi-square test. A p-value of < 0.05 was considered indicative of statistical significance. In cases where the expected count in cells was less than 5, the Fisher Exact test was employed. The entire research process adhered to ethical guidelines.

Ethical Considerations:
Approval for this study was obtained from the Ethics Committee at King Saud Medical City. The study's purpose was transparently communicated to all participants, and only those who provided informed consent were included. Participants' confidentiality was guaranteed,and the questionnaire did not seek any personal information.

Results:-

This study primarily aimed to investigate the attitudes and knowledge of women concerning immunization during pregnancy in Riyadh, Saudi Arabia. We conducted both descriptive and inferential statistical analyses of the data. Simple frequencies and percentages for categorical variables were computed and presented in tables. Additionally, the Chi-Square Test was employed to assess the association between sociodemographic factors and participants' KAP regarding immunization. Statistical significance was determined at a p-value of 0.05 or lower, with a 95% Confidence Interval. All statistical calculations were performed using IBM's SPSS Software, version 27.0.1, and a total of 386 responses were collected.

Table 1:- Descriptive Statistics of Sociodemographic Characteristics of and Present Knowledge of Participants (n=386).

Sociodemographic variables	**n (%)**
Age	
18 - 24	95 (24.6%)
25 - 33	180 (46.6%)
34 - 40	111 (28.8%)
Educational Level	
Non-educated/Primary school	6 (1.6%)
Middle School/Secondary school	80 (20.7%)
Bachelor's/Post-graduate	300 (77.7%)
Marital Status	
Single	32 (8.3%)
Married	296 (76.7%)
Divorced	44 (11.4%)
Widowed	14 (3.6%)
Number of Pregnancies	
No history of pregnancy	69 (17.9%)
1 - 3	178 (46.1%)
>3	139 (36.0%)
Employment	
Employed	232 (60.1%)
Unemployed	154 (39.9%)

n: frequency, %: percentage

Table 1 presents the distribution of participants' sociodemographic factors. Concerning age, the participants are categorized into three groups: 18-24 (24.6%), 25-33 (46.6%), and 34-40 (28.8%). Regarding educational level, the participants are divided into non-educated/primary school (1.6%), middle school/secondary school (20.7%), and bachelor's/post-graduate (77.7%). In terms of marital status, the participants include single (8.3%), married (76.7%), divorced (11.4%), and widowed individuals (3.6%). As for the number of pregnancies, participants are categorized based on their history: 17.9% with no history of pregnancy, 46.1% with 1-3 pregnancies, and 36.0% with more than 3 pregnancies. Of the respondents, 60.1% were employed and 39.9% unemployed.

Table 2:- General Knowledge Regarding Immunization During Pregnancy (n=386).

Knowledge Questions	**Yes n (%)**	**No n (%)**
Do you think that vaccinations are a preventive method against infection?	296 (76.7%) *	90 (23.3%)
Do you think that pregnant women are more exposed to infectious diseases such as influenza, etc.?	236 (61.1%) *	150 (38.9%)
Did you know that there are vaccinations recommended during	286 (74.1%) *	100 (25.9%)

pregnancy?		
Are pregnant women at higher risk of influenza complications?	215 (55.7%) *	171 (44.3%)
Do you think that all pregnant women should get the influenza vaccine?	217 (56.2%) *	169 (43.8%)
Is the influenza vaccine recommended only during the flu season for pregnant women?	221 (57.3%) *	165 (42.7%)
Is it better to avoid vaccinations during pregnancy?	175 (45.3%)	211 (54.7%) *
Do you know that there is a vaccine to prevent whooping cough?	161 (41.7%) *	225 (58.3%)
Is it safer to wait until the seventh month of pregnancy or beyond (the third trimester) to get the whooping cough vaccine?	239 (61.9%) *	147 (38.1%)
Will getting the whooping cough vaccine protect your child from contracting this disease?	175 (45.3%) *	211 (54.7%)
Would getting the recommended vaccinations during pregnancy cause birth defects?	162 (42.0%)	224 (58.0%) *
Do some vaccines have specific indications for uptake during pregnancy, such as hepatitis B?	237 (61.4%) *	149(38.6%)
In case you are required to get measles, rubella, and mumps vaccinations, should they be taken at least a month before pregnancy?	223 (57.8%) *	163 (42.2%)
Are some vaccinations to be taken in certain circumstances, such as Hajj and Umrah, even during pregnancy?	230 (59.6%) *	156 (40.4%)
When you travel to an area where certain diseases are common during pregnancy, are there some vaccinations that need to be taken?	243 (63.0%) *	143 (37.0%)

*n: frequency, %: percentage, *: Correct Answers*

Table 2evaluates the KAP of the respondents concerning immunization. For instance, a significant proportion of participants (76.7%) recognized vaccinations as a preventive measure against infections, and 63% were aware of the vaccinations required when traveling to regions with pregnancy-related diseases. Similarly, a substantial number of women acknowledged that pregnant individuals are more susceptible to infectious diseases (61.1%) and were familiar with disease-specific vaccines like Hepatitis B (61.4%).

Further, more than half of the participants reported engaging in informative discussions with their physicians regarding the importance of immunization throughout their pregnancy. They also expressed their willingness to participate in any planned health education campaigns on this topic. Importantly, most participants demonstrated a good understanding of the significance of vaccinations during pregnancy. However, there was a notable lack of awareness regarding the whooping cough vaccine and its protective effect on children's health.

Table 3:- Knowledge, Attitude, and Perception (KAP) regarding Immunization II (n=386).

Questions for Previously Pregnant Women (n=318)	**Yes n (%)**	**No n (%)**
Would you follow your doctor's recommendation to receive the Influenza vaccine?	229 (72.0%)	89 (28.0%)
If there were events to promote awareness about pregnancy vaccinations, would you attend them?	188 (59.1%)	130 (40.9%)
Have you ever participated in any events or received information from your doctor about vaccinations during pregnancy?	175 (55.7%)	139 (44.3%)
Did you find your doctor's explanation of the benefits of vaccinations during pregnancy easy to understand?	186 (59.4%)	127 (40.6%)
Do you believe that how your doctor delivers information about the benefits of vaccinations during pregnancy could change your mind if you were initially hesitant?	201 (64.8%)	109 (35.2%)
Did the information provided by your doctor about vaccinations during pregnancy address most of your questions?	192 (61.3%)	121 (38.7%)
During your pregnancy, did your doctor encourage you to engage in discussions or ask questions about vaccinations for pregnant women?	219 (70.2%)	93 (29.8%)

Table 3examines women's awareness of immunization benefits during conception. Noteworthily, a significant portion responded "yes" to all questions about pregnancy immunization, indicating a strong awareness of its positive impact on their health. Among 318 women who were pregnant or are currently pregnant, 286 (74.1%) were knowledgeable about recommended pregnancy vaccinations, 229 (72%) were interested in taking the influenza vaccine during pregnancy, and 219 (70.2%) were encouraged by their doctors to learn more about pregnancy vaccinations. Further, just under two-thirds of the women acknowledged the crucial role of healthcare providers in convincing and enhancing their awareness about the significance of vaccination during pregnancy, with percentages of 64.8% and 61.3%, respectively.

Table 4:- Association between Different Sociodemographic Factors and Participants' Knowledge, Attitude, and Perception (KAP) regarding immunization during conception (n=386).

Sociodemographic variables	**Knowledge Level**		**Sig. [1]**
	Low (n= 105)	**High (n= 281)**	
	n (%)	**n (%)**	
Age			
18-24	32 (33.7%)	63 (66.3%)	0.195[a]
25-32	48 (26.7%)	132 (73.3%)	
33-40	25 (22.5%)	86 (77.5%)	
Marital status			
Single	9 (28.1%)	23 (71.9%)	0.828[b]
Married	78 (26.4%)	218 (73.6%)	
Divorced	13 (29.5%)	31 (70.5%)	
Widowed	5 (35.7%)	9 (64.3%)	
Educational level			
Non-educated/Primary school	4 (66.7%)	2 (33.3%)	**< 0.001*[b]**
Middle School/Secondary school	33 (41.3%)	47 (58.8%)	
Bachelor's/PG	68 (22.7%)	232 (77.3%)	
Employment Status			
Yes	47 (20.3%)	185 (79.7%)	**<0.001*[a]**
No	58 (37.7%)	96 (62.3%)	

*p<0.05, significant
[1] p-value
[a] Chi-square test
[b] Fisher Exact test

Table 4explores the relationship between varioussociodemographic factors andKAP regarding immunization during conception. Educational level is significantly associated with the knowledge level ($p < 0.001$), with those holding bachelor's degrees exhibiting the highest knowledge level, *vis-a-vis* individuals with primary and secondary school education (77.3% vs. 33.3% and 58.8%, respectively). Employee status is also significantly associated with knowledge level ($p < 0.001$), with employees demonstrating a higher knowledge level than non-employees (79.7% vs. 62.3%). Conversely, age and marital status do not have a significant impact on women's knowledge level regarding pregnancy-related immunization status.

Discussion:-

In our study, 76.7% of participants agreed that vaccinations are a preventive method against infection, while 23.3% disagreed. Similarly, 61.1% agreed that pregnant women are more exposed to infectious diseases, and 38.9% disagreed. In another study conducted in Saudi Arabia, most women (91.7%) agreed that vaccinations are effective in preventing disease, and 64.6% agreed that pregnant women are more vulnerable to infection. More than half (62%) agreed that some vaccinations are safe for pregnant women to receive, whereas 31% were against being vaccinated while pregnant (1). Similarly, in another study, 39% of the respondents had favorable intentions toward vaccinations during pregnancy. Women with a positive attitude to receiving immunizations during pregnancy were more likely to agree with claims of pregnant women being more susceptible to infections and their effects (15).

A comparison of the findings of our study with those of a study conducted in Saudi Arabia reveals notable similarities in terms of awareness and perceptions related to whooping cough and flu vaccination during pregnancy. In our study, 45.8% believed that the whooping cough vaccine protected their child from contracting this disease. In another study in Saudi Arabia, 32% knew about a vaccine for whooping cough during pregnancy, and only 6.2% believed vaccination against cough during pregnancy to be unnecessary (16). Nearly mirroring our results, the Saudi study showed thathalf (49.8%) of the participants were unaware of the disease, nearly half (45.2%) were unaware that a vaccination exists to protect against it, and the vast majority (76.6%) were unaware that the vaccine is recommended during every pregnancy (1).

Regarding flu vaccination, our study showed that 56.2% would get influenza vaccine during pregnancy. Compared to our study, the Saudi study reported that 42% of women donot believe that being vaccinated against the flu is a must for pregnant women, and almost as many donot realize that it is (1). In a study conducted in Riyadh, most (91.3%) of the pregnant women surveyed correctly stated thatinfluenza infection is highly contagious, although 46.0%wereunaware that pregnant women are at a higher risk of flucomplications than non-pregnant women (17). In addition,only 29.9% of pharmacists indicated not having any knowledge about vaccination during pregnancy, whereas 52.2% and 31.4% of pharmacists believed that tetanus and influenza vaccines should be administered during pregnancy, respectively(18).

When examining age-based variations in our study and a previous study, intriguing insights emerge regarding the perception of vaccination as a preventive measure against infectious diseases. In our study, 55.7% gained information about vaccination from their healthcare provider during their visits to a primary healthcare center. A significant difference was observed in a Saudi study, where only 18.8% of care centers received any information about vaccines during pregnancy during their healthcare facility visits (1). In another study, 66.6% of pharmacists indicated having received information and/or training about vaccination during pregnancy, with the main sources of information being undergraduate education (33.9%), followed by drug companies (29.9%), and various other sources (18).

In the context of exploring diverse perspectives across different age groups in our study, we observed no statistically significant differences among any of the age groups concerning their knowledge level (p-value=0.195). Interestingly, in the age group of 25-32, we found the highest knowledge level, with nearly 47% of women of that age falling into this category. Moreover, women below 24 had the lowest knowledge level. Previous research has provided interesting insights into how age can influence opinions about the preventive effectiveness of vaccinations and their significance in averting serious diseases. For instance, in a study involving 14% of women under 30, a substantial 93.7% believed in the effectiveness of vaccines in preventing life-threatening diseases. Additionally, 91.5% of pregnant women aged 35-40 considered vaccination important in preventing lethal diseases (19).

In our study, we investigated the relationship between educational levels and knowledge of immunization during pregnancy. Our findings consistently indicate that educational levels significantly influence participants'KAP regarding immunization during pregnancy. For instance, a substantial 82.5% of women who demonstrated a high level of knowledge had at least a university degree, while those who were uneducated or had not pursued education beyond primary school exhibited the lowest knowledge scores. This observation aligns with the findings of a similar study in Thailand, which suggested that having a bachelor's degree or higher was possibly associated with knowledge of immunization (p-value = 0.061) (20). Conversely, another study revealed that nearly 37% of participants with post-secondary and higher educational backgrounds were less inclined to accept vaccines (odds ratio 0.75) than their illiterate counterparts (21). Additionally, in a different study, high school participants had lower odds (odds ratio 0.67) of being aware of influenza vaccination (22).

In our investigation, we have effectively demonstrated the relationship between marital status and knowledge, attitude, and practices regarding vaccination during pregnancy. Among our participants, 73.6% of married women exhibited high knowledge scores. A study conducted in Thailand that explored a similar relationship found that marital status had an odds ratio of 6.321 when calculated for KAP related to vaccination during pregnancy (19). Another study conducted in Riyadh, which focused on knowledge about influenza vaccination with 55% of married participants, found that 71.5% of the participants considered vaccines, especially the influenza vaccine, to be safe (23).

In our study, we established a statistically significant correlation between employment status and knowledge of the importance of prenatal immunizations (p-value = 0.001). Our findings indicate that participants' KAP toward immunization during pregnancy was positively influenced by having a job. These results contradict data from another study, which reported an odds ratio of 0.30 for KAP regarding influenza vaccination during pregnancy for jobless individuals, compared to 0.63 for employedindividuals (22).

Finally, our study reveals similarities with another Saudi research in terms of awareness, perceptions, and sociodemographic factors related to pregnancy vaccination, extending across various age groups, educational levels, and marital and employment status, emphasizing the universal importance of these factors in shaping participants' KAP (1).Due to the unique demographics of our study participants, one limitation of our research is the potential for selection bias, which could limit the generalizability of our findings to broader populations. The cross-sectional design of the study also makes it challenging to establish causal relationships. Self-reported data may be subject to biases related to social desirability and recall. Moreover, relying solely on a questionnaire may not fully capture the complex factors influencing participants' KAP. Finally, external variables such as cultural influences and evolving medical advice may impact participants' responses and outcomes.

Conclusion:-

This study examines participants' KAP regarding immunization during pregnancy, with a specific focus on sociodemographic factors. The findings reveal that education level and employment status significantly influence KAP. Higher education levels are associated with more informed views on vaccination's preventive effects and specific vaccines. Employment status also impacts awareness of vaccination recommendations during pregnancy. Conversely, age and marital status do not appear to influence women's knowledge levels regarding preventive effects. The study suggests that targeted interventions and awareness initiatives should be tailored to individuals' sociodemographic characteristics to address knowledge gaps and promote positive attitudes towards immunization during pregnancy.

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