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Rubella Vaccination Needs among Saudi Women Attending Antenatal Care at Al-Wazarat Healthcare Center, Riyadh

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Abstract

***Introduction*:** Rubella can pose serious risks to pregnant individuals, especially during the first trimester, as maternal infection may lead to congenital rubella syndrome (CRS). Despite ongoing vaccination efforts, cases of rubella infection persist among women of childbearing age. This study aims to assess rubella susceptibility, vaccination coverage, and associated risk factors among pregnant women at Al-Wazarat Healthcare Center in Riyadh, Saudi Arabia. ***Methods*:** A cross-sectional study was conducted over 12 months, enrolling 300 pregnant women aged 18 to 45 years through convenience sampling. Demographic information, obstetric history, rubella vaccination status, prior infection, and laboratory data on rubella-specific immunoglobulin G (IgG) and immunoglobulin M (IgM) antibodies were collected from medical records. ***Results*:** The mean age of participants was 32.0 years, and 134 (44.7%) had given birth five or more times. Overall, 252 (84%) reported having received a rubella vaccination, although 153 (51%) had unknown vaccination timing. IgM positivity (n=70; 23.3%) indicated recent infection, while 241 (80.3%) tested positive for IgG, suggesting prior exposure or successful immunization. Documented vaccination was significantly associated with lower infection rates (p=0.011), age (p=0.0001), and congenital abnormalities (p=0.004). ***Conclusion*:** Although vaccination uptake was high, recent infections and incomplete vaccination records highlight ongoing vulnerabilities to rubella and CRS. Improved immunization tracking, comprehensive antenatal screening, and targeted education for both patients and healthcare providers may reduce rubella susceptibility and safeguard maternal and child health.

Keywords: Rubella Vaccination, Needs, Saudi Women, Antenatal Care, Al-Wazarat, Healthcare Center, Riyadh.

INTRODUCTION

Rubella, also known as German measles, poses significant risks to pregnant individuals, particularly during the first trimester, as maternal infection can lead to congenital rubella syndrome (CRS). CRS results in severe congenital disabilities, including cardiac anomalies, cataracts, and hearing loss [1 The World Health (WHO) considered rubella vaccination as a crucial public health intervention to prevent CRS, particularly in regions with low vaccine coverage [2]. In Saudi Arabia, the national immunization program, which includes rubella vaccination, has played a key role in reducing rubella incidence and CRS cases. However, high levels of rubella susceptibility among women of childbearing age necessitate regular evaluations of vaccination coverage among pregnant individuals attending antenatal care [3].

Despite improved population-wide immunity, epidemiological studies in Saudi Arabia indicate the presence of vulnerable groups, including immigrants and women who missed childhood vaccination [4]. Research suggests that many women attending antenatal clinics lack sufficient rubella immunity, highlighting the need for routine screening and vaccination programs [5]. Additionally, as vaccine-induced immunity wanes, postpartum vaccination initiatives are essential to ensure maternal protection before subsequent pregnancies [6].

This study aims to assess rubella susceptibility among Saudi women seeking antenatal care, evaluate the impact of suboptimal vaccine coverage, and explore preventive strategies. It seeks to determine the prevalence of rubella among Saudi women attending antenatal care at Al-Wazarat Healthcare Center and identify factors associated with their susceptibility to infection.

MATERIALS AND METHODS

Study Design

We conducted this cross-sectional study over 12 months, including Saudi women aged 18–45 years attending antenatal care at the center. Exclusion criteria include non-Saudi individuals, patients with incomplete medical records, and those with autoimmune diseases that may interfere with antibody titers. The study design was approved by the Institutional Review Board (IRB) of Prince Sultan Military Medical City. Data confidentiality was ensured through anonymization and secure storage. All data were used exclusively for research purposes and were destroyed upon study completion.

Sampling Method: A convenience sampling technique was used to recruit participants.

Sampling Methods

The study will use a convenience sampling technique to recruit participants. A convenience sampling

The required sample size was calculated using Cochran's formula:

$n = (Z^2 \times p \times (1-p)) / e^2$

- Z: Z-score for a 95% confidence interval (1.96).
- p: Estimated prevalence of Rubella (0.16, based on the Jeddah study).
- e: Margin of error (0.05).

Substituting these values yields an estimated sample size of 207 participants. The final sample size was increased to 384 participants to account for potential non-response or incomplete data.

Eligible participants were identified from antenatal care records, and all qualifying patients who visited during the study period were invited to participate. Data collection continued until the target sample size was reached. A structured data collection form was used to extract relevant information from medical records, including demographic details such as age and nationality. Obstetric history was recorded, including parity, gestational age, and any history of pregnancy complications. Rubella-specific data included vaccination history, previous rubella infection, and the presence of rubella-specific immunoglobulin G (IgG) antibodies. Additional factors, such as a family history of vaccine hesitancy and access to health education about rubella, were also documented.

Statistical Analysis

Collected data will be analyzed using SPSS (v.26) or RStudio. Descriptive statistics (frequencies, percentages, means, medians) will summarize demographic and referral patterns. Inferential statistics (Chi-square tests, logistic regression) will assess associations between variables (e.g., age/gender and referral likelihood). A p-value < 0.05 will be considered statistically significant.

RESULTS

Table (1) presents demographic parameters for the 300 participants, who had a mean age of 32.0 (SD=7.3). Overall, 134 (44.7%) participants had given birth to 5 or more infants, and 166 (55.3%) reported no history of abortion. Two hundred sixty-three participants (87.67%) responded "No" when asked if they would accept abortion in cases of congenital abnormalities, while 37 (12.33%) responded, "Yes."

Table (2) shows rubella-specific parameters and associated factors. In this cohort of 300 individuals, 267 (89.0%) babies were without congenital abnormalities, and 37 (12.3%) participants reported congenital abnormalities linked to abortion. Two hundred fifty-two (84%) participants reported receiving rubella vaccination. However, 153 (51.0%) had unknown vaccination timing. Immunoglobulin M (IgM) antibodies for rubella were detected in 70 (23.3%) participants, and 241 (80.3%) tested positive for IgG, suggesting previous infection or successful immunization. Two hundred forty-one participants (80.3%) tested positive for rubella IgG antibodies, while 59 (19.7%) tested negative.

Table (3) indicates that documented rubella infection had a statistically significant association with documented rubella vaccination (p=0.011). Participants who were not vaccinated against rubella were more likely to have documented infection. No significant relationships were observed between rubella infection and age, gravida (i.e., number of pregnancies), abortion, abortion due to congenital abnormality, baby congenital abnormality, or rubella IgG antibodies.

Table (4) shows a statistically significant association between documented rubella vaccination and age (p=0.0001), abortion due to congenital abnormality (p=0.004), rubella IgG antibodies (p=0.028), and vaccination timing (p=0.0001). No significant relationships were identified between rubella vaccination and gravida, abortion, or baby congenital abnormality.

Table (5) indicates that having rubella IgG antibodies was significantly associated with abortion due to congenital abnormality (p=0.003), baby congenital abnormality (p=0.0001), and previous rubella vaccination (p=0.028). No significant relationships were noted between IgG status and age, gravida, abortion, documented rubella infection, or vaccination timing.

Table (6) demonstrates that parity (i.e., number of births) was significantly associated with age (p=0.0001) and abortion (p=0.0001). Parity was not significantly associated with abortion due to congenital abnormality, baby congenital abnormality, documented rubella infection, vaccination timing, or documented rubella vaccination.

Table 1: Sociodemographic characteristics of participants (N=300)

Parameter	N (%)	No.	Percent (%)
Age Group in Years	18 to 26	77	77 (25.7%)
	27 to 32	78	78 (26.0%)
	33 to 38	75	75 (25.0%)
	39 to 45	70	70 (23.3%)
Gravida	1	44	44 (14.7%)
	2	39	39 (13.0%)
	3	49	49 (16.3%)
	4	34	34 (11.3%)
	5 or more	134	134 (44.7%)
Parity	0	109	109 (36.3%)
	1	32	32 (10.7%)
	2	37	37 (12.3%)
	3	31	31 (10.3%)
	4	32	32 (10.7%)
	5	24	24 (8.0%)
	6	35	35 (11.7%)
Abortion	No	166	166 (55.3%)
	Yes	134	134 (44.7%)

Table 2: Parameters related to rubella specific data and other factors (N=300)

Parameter	N (%)	No.	Percent (%)
Abortion-congenital abnormality	No	263	263 (87.7%)
	Yes	37	37 (12.3%)
Baby-Congenital abnormalities	No	267	267 (89.0%)
	Yes	33	33 (11.0%)
Documented Rubella Vaccination	No	48	48 (16.0%)
	Yes	252	252 (84.0%)
Time of vaccination	Post-partum	91	91 (30.3%)
	Unknown	153	153 (51.0%)
	Other	56	56 (18.7%)
Documented Rubella Infection (IgM)	No	230	230 (76.7%)
	Yes	70	70 (23.3%)
Rubella IgG Antibodies	Negative	59	59 (19.7%)
	Positive	241	241 (80.3%)

Abbreviations: IgM, immunoglobulin M; IgG, immunoglobulin G.

Table 3: Relation between documented: Documented rubella infection and, sociodemographic characteristics, and rubella -specific data

Parameters		Documented Rubella Infection (IgM)		Total (N=300), n (%)	P-Value*
		No, n (%)	Yes, n (%)		
Age in years	26 or less	59 (25.7%)	18 (25.7%)	77 (25.7%)	0.999
	27 to 32	60 (26.1%)	18 (25.7%)	78 (26.0%)	
	33 to 38	57 (24.8%)	18 (25.7%)	75 (25.0%)	
	39 or more	54 (23.5%)	16 (22.9%)	70 (23.3%)	
Gravida	1	33 (14.3%)	11 (15.7%)	44 (14.7%)	0.999
	2	30 (13.0%)	9 (12.9%)	39 (13.0%)	
	3	38 (16.5%)	11 (15.7%)	49 (16.3%)	
	4	26 (11.3%)	8 (11.4%)	34 (11.3%)	
	5 or more	103 (44.8%)	31 (44.3%)	134 (44.7%)	
Abortion	No	125 (54.3%)	41(58.6%)	166 (55.3%)	0.534
	Yes	105 (45.7%)	29 (41.4%)	134 (44.7%)	
Abortion: Congenital abnormality	No	202 (87.8%)	61 (87.1%)	263 (87.7%)	0.879
	Yes	28 (12.2%)	9 (12.9%)	37 (12.3%)	
Baby: Congenital abnormalities	No	205 (89.1%)	62 (88.6%)	267 (89.0%)	0.896
	Yes	25 (10.9%)	8 (11.4%)	33 (11.0%)	

Parameters		Documented Rubella Infection (IgM)		Total (N=300), n (%)	P-Value*
		No, n (%)	Yes, n (%)		
Rubella IgG Antibodies	Negative	46 (20.0%)	13 (18.6%)	59 (19.7%)	0.792
	Positive	184 (80.0%)	57 (81.4%)	241 (80.3%)	
Documented Rubella Vaccination	No	30 (13.0%)	18 (25.7%)	48 (16.0%)	0.011
	Yes	200 (87.0%)	52 (74.3%)	252 (84.0%)	

*P value was considered significant Abbreviations: IgM, immunoglobulin M; IgG, immunoglobulin G.
*Significant if ≤ 0.05., calculated using the Chi square test

DISSCUSION

This study aimed to determine the prevalence of rubella and the risk factors that predisposed pregnant Saudi women to infection at Al-Wazarat Healthcare Center in Riyadh. The findings indicate a high level of rubella susceptibility in this population, highlighting the need for more effective vaccination strategies and public health measures. Although 84% of participants reported receiving a rubella vaccine, 23.3% tested positive for IgM antibodies, suggesting a recent infection. This result aligns with evidence that awareness and timing of vaccination strongly influence immunity levels [7].

Slightly over half the study population (51%) had unknown vaccination timings, which may hinder targeted public health interventions. This outcome is consistent with prior work showing that self-reported vaccination histories do not always match actual immunity status [8]. Incomplete vaccination records limit the ability to respond swiftly to potential outbreaks and underscore the need for accurate immunization tracking.

Documented rubella infection showed a significant association (p=0.011) with vaccination status, underscoring the protective role of immunization against rubella. A study in Turkey similarly demonstrated that unvaccinated pregnant women were at higher risk of rubella infection [9]. Also, maternal IgG antibody status was strongly associated with abortion due to congenital anomalies (p=0.003), emphasizing the importance of maternal antibodies in preventing adverse outcomes, including CRS [10].

No significant relationship emerged between rubella infection and factors such as age, gravida, or abortion history. However, studies in Ethiopia have reported that women in urban areas often exhibit stronger rubella immunity than those in rural regions, possibly due to better healthcare access and socioeconomic advantages [11]. Research from rural China further demonstrated that socioeconomic conditions can affect rubella preparedness in pregnant women [12].

Participants aged 27 to 32 who reported fewer abortion-related congenital abnormalities exhibited higher rubella vaccination rates. An Italian study similarly showed that multiple pregnancies in women with rubella infection represent missed opportunities for postpartum vaccination [13]. Targeted educational programs for women of reproductive age could enhance vaccine awareness and uptake.

Numerous studies have examined rubella susceptibility among pregnant women to identify key factors influencing immune protection. In Malaysia, high rates of rubella-susceptible pregnant women underscore the need for prenatal screening and postpartum immunization [14], while Nigerian research highlights suboptimal antibody levels and the importance of focused vaccination strategies [15]. These findings align With WHO recommendation to test and vaccinate women of childbearing age to prevent CRS [16].

A study from Jeddah, Saudi Arabia, revealed that many pregnant women were unprotected against rubella, indicating an urgent need for antenatal screening [17]. Some women remained unaware of their immunization status, although research from Egypt suggests that educational interventions can significantly improve rubella vaccine acceptance [18]. Taiwan-based studies have shown that immunity can wane over time in vaccinated individuals, raising concerns about potential outbreaks [9]. Routine antenatal screening helps identify susceptible women and facilitates timely vaccination [19].

Healthcare providers play a critical role in promoting rubella vaccination. Their expertise and attitudes directly impact patients' vaccination willingness [20]. In Tanzania, limited awareness among healthcare workers contributed to reduced vaccine uptake [21]. Poor vaccine coverage increases the risk of rubella outbreaks and CRS, particularly in settings with constrained public health resources [22, 23]. Repeated immunizations for pregnant women remain essential in Saudi Arabia to prevent future outbreaks [24].

Limitations

Our study has several important limitations. Its cross-sectional design limited our ability to determine whether specific factors directly influenced rubella susceptibility. Reliance on self-reported vaccination histories may have introduced recall or reporting biases. Conducting the study at a single healthcare center further constrained the generalizability of our findings to the broader population of Saudi women seeking antenatal care. In addition, incomplete documentation of vaccination timing for many participants hindered the evaluation of vaccination schedules and their potential

impact on immunity. We also did not account for other possible influences, such as socioeconomic status or healthcare access, which could affect vaccine uptake and overall susceptibility. Finally, we did not perform follow-up testing to confirm ongoing immunity or infection, precluding any assessment of changes in rubella antibody levels over time.

CONCLUSION

The study highlights the need for improved rubella vaccination strategies among Saudi women attending antenatal care at Al-Wazarat Healthcare Center in Riyadh. Despite a high vaccination rate, the detection of IgM antibodies indicates an ongoing vulnerability to infection and underscores the importance of ensuring women are fully informed about their vaccination status. A substantial proportion of participants had unknown vaccination timing data, creating challenges for preventing rubella and its associated complications, including CRS. These findings reveal strong associations between documented rubella vaccination and reduced infection rates, emphasizing the protective role of immunization. The correlation between maternal IgG antibody status and congenital abnormalities further highlights the necessity of robust maternal immunity. Targeted educational initiatives and training programs for healthcare providers may address knowledge gaps and increase vaccination rates, ultimately improving maternal and infant health outcomes.

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