

**DISSERTATION SUBMITTED FOR THE MASTER'S DEGREE IN
MEDICAL MICROBIOLOGY**



TITLE

**“SEROPREVALENCE OF ANTI-RUBELLA ANTIBODIES (IgM AND IgG)
AMONG PREGNANT WOMEN AND CONGENITAL RUBELLA
SYNDROME - A SYSTEMATIC REVIEW”**

SUBMITTED

BY

ZAINUL ABDEEN

2022

DEPARTMENT OF MICROBIOLOGY

INTEGRAL INSTITUTE OF MEDICAL SCIENCES AND RESEARCH

INTEGRAL UNIVERSITY

LUCKNOW-226026, U.P, INDIA

**INTEGRAL INSTITUTE OF MEDICAL SCIENCE AND RESEARCH
INTEGRAL UNIVERSITY, LUCKNOW**



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SYSTEMATIC REVIEW”**

DISSERTATION

SUBMITTED TO: -INTEGRAL UNIVERSITY

In partial fulfilment of the need for the award of degree of

Master of Science

In

Medical Microbiology

BY: - ZAINUL ABDEEN

Enrolment No: -1800101568

UNDER THE GUIDANCE OF

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DECLARATION OF CANDIDATE

I hereby declare that this dissertation entitled **“Seroprevalence of anti-Rubella antibodies (IgM and IgG) among pregnant women and congenital Rubella syndrome - A Systematic Review”** is bonafide and genuine research work carried out by me under the guidance of Dr. Noor Jahan Professor, Department of Microbiology, Integral Institute of Medical Sciences and Research, Lucknow.

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ENDORSEMENT BY THE HOD

This is to certify that the dissertation entitled “**Seroprevalence of anti-Rubella antibodies (IgM and IgG) among pregnant women and congenital Rubella syndrome - A Systematic Review**” is bonafide and genuine research work carried out by **Zainul Abdeen** under the guidance of Dr. Noor Jahan, Professor, Department of Microbiology, IIMS&R, Lucknow in partial fulfilment of requirement for the degree of Master of Science in Medical Microbiology. The research methods and procedure described have been done by the candidate and the results have been observed by the guide and co-guides periodically.

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I hereby declare that Integral Institute of Medical Sciences and Research, Integral University, Lucknow shall have the rights to preserve, use and disseminate this dissertation in print or electronic format for academic or research purpose.

I will publish the research paper related to my dissertation only with the consent of my guide.

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ETHICAL CLEARANCE CERTIFICATE

INSTITUTIONAL ETHICS COMMITTEE (IEC)

IIMS&R INTEGRAL UNIVERSITY, LUCKNOW

IEC/IIMS&R/2022/34



CERTIFICATE

This is to certify that research work entitled **“Seroprevalence Of Anti-Rubella Antibodies (IgM and IgG) Among Pregnant Women And Congenital Rubella Syndrome - A Systematic Review”** submitted by **Zainul Abdeen, Dr.Noor Jahan, Dr.Siraj Ahmad, Dr.Ausaf Ahmad** for ethical approval before the Institutional Ethics Committee IIMS&R.

The above mentioned research work has been approved by Institutional Ethics Committee, IIMS&R with consensus in the meeting held on **19 May 2022**.


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(Jt. Member Secretary)
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I express my heartfelt gratitude and regards to our esteemed teacher and my co- guide **Dr. Siraj Ahmad** Professor & HOD, Department of Community medicine and co-guide **Dr. Ausaf Ahmad**, Associate professor, IIMS&R, for providing excellent guidance, motivation and keep interest in my dissertation. It was a great opportunity and wonderful experience to work under their supervision.

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DATE: 15/07/2022

ZAINUL ABDEEN

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INTRODUCTION

INTRODUCTION

Rubella is a contagious, usually mild, acute illness brought on by the rubella virus (Tamirat et.al;2017).

Positive-polarity RNA virus known as the rubella virus is the only one in the Togaviridae family's Rubivirus genus (Taku et.al;2019).

A teratogen, the rubella virus has the potential to cause foetal death or congenital rubella syndrome in newborns (Agbede et.al;2011).

This virus usually affects children, and the illness it causes is characterised by a maculopapular rash coupled with a low-grade fever, lymphadenopathy, and malaise. Adults who have it may also experience headaches, conjunctivitis, and joint pain. Arthritis or transarthralgia can also happen (Wondimeneh et.al;2018)

First-trimester infection in the mother has been linked to a variety of birth defects, unwise abortion or miscarriage, and stillbirth (Alouci M.M.H.A et.al 2019). (Rubella is a TORCH complex biological teratogen. Rubella, Toxoplasma gondii, Cytomegalovirus, Herpes simplex virus types 1 and 2, and other (e.g., Syphilis etc.).

Immunity lasts a lifetime after both vaccination and unintentional infection. Globally, the Measles, Mumps, and Rubella (MMR) vaccine and a monovalent (inactivated) vaccine have been accepted as effective methods of preventing CRS (Congenital Rubella Syndrome) (Agbede et.al 2011)

Rubella is a common rash disease in children. The most serious complications of rubella occur during the first trimester of pregnancy, including miscarriage, foetal death, and congenital anomalies **(Banatvala Et.al.2004)**. Congenital rubella syndrome affects up to 90% of infants born to mothers who were infected during the first 11 weeks of pregnancy (CRS) **(Brooks, G.F.; Carroll et.al. 2007, De Santis, M.; Cavaliere, A.F. et.al.2006)**.

As a result, it is critical to assess women's susceptibility (anti-rubella IgG seronegative) during their reproductive years in order to develop a CRS prevention strategy. **(Morbidity Mortality Weekly Report, 2001, Langford KS. Et.al. 2002)**

Antirubella IgG seropositivity rates in pregnant women have been determined in a variety of studies (86.5 percent -100 percent). The relationship between seropositivity rate and age, residency, mother occupation, number of previous pregnancies, number of household contacts, economic status, and level of education has produced contentious results. A previous study on pregnant women in Iraq discovered that seroprevalence was 88.2 percent. **(El-Mekki.et.al 1998, Tamer, G.S.; Dundar, et.al.2009, Pehlivan.et.al.2007, Giraudon et.al.2009, Aksakal.et.al.2007)**.

The relationship of seropositivity rate with age, residency, mother occupation, number of previous gestations, number of household contacts, economic status, and levels of education has produced contentious results. **(Bamgboye.et.al.2004, Barreto.et.al.2006, Majlessi.et.al.2008, Ferrer-Gomez.et.al.1999, Ahmed, M.U.1992, Jarour.et.al.2007,)**. A previous study on pregnant women in Iraq discovered that seroprevalence was 88.2 percent. **(Saleem, F.et.al)**.

The seropositivity rate among childbearing women, on the other hand, was reported to be between 90.9 percent and 100 percent. A rubella susceptibility rate of more than 10% of all women in a community was considered a risk factor for CRS by the World Health Organization, and a value of more than 20% was considered very high risk. **(Geneva-Switzerland.et.al.1999).**

Congenital Rubella syndrome causes blindness, deafness, congenital heart disease, and mental retardation. The global rubella pandemic in Europe and the United States (1962-1965) highlighted the significance of CRS. It also emphasised the importance of developing a rubella vaccine to prevent foetal infections and the resulting CRS. According to Cutts et al, more than one million infants worldwide are born with CRS each year, with 1.1 million affected in developing countries in 1996. Serosurveys from 45 developing countries revealed a wide range of susceptibility to rubella ranging from 10% to 25%.

At a WHO-organized international conference on CRS prevention in 2000, cost-effectiveness studies revealed that rubella immunisation was a cost-effective way of reducing the impact of CRS.

If health care providers are not immune to rubella, they are vulnerable to contracting it from their patients. Another factor that increases the risk of contracting rubella infection in the hospital setting is occupational exposure (doctors, nurses, lab technicians, etc.). Because there have been few studies in our state on rubella immunity in the medical community, this sero-survey was conducted to assess the rubella burden among health care professionals. **(Sangeetha, S., P. Seema.et.al (2012)).**

Because of its ability to cause congenital rubella syndrome (CRS), abortion, and stillbirths, the virus is of high public health importance. Complete or partial blindness, sensorineural hearing defects, mental retardation, psychomotor delay, and cardiac defects are all part of the clinical spectrum of CRS. professionals in health care (**Dewan P, Gupta P et.al. 2012**). Although rubella vaccination has significantly reduced the incidence, the World Health Organization estimates that 100,000 children are still born with CRS worldwide. (**Ravindran M, et al. (2004)**).

Using a seroprevalence-based statistical model, 46,621 infants with CRS were born each year in the South-East Asian Region (SEAR) between 2000 and 2009. (**Morb Mortal wkly.et.al.2010**). Regional rubella surveillance data is critical for developing a national strategy to reduce morbidity caused by rubella virus infection.

Rubella virus was considered a relatively benign infection after its discovery in 1881 until its association with congenital defects was recognised by an Australian ophthalmologist, N McAlister Gregg, in 1941. (**Hesketh LM.et.al. 2012**)

Rubella is an acute, usually mild viral disease that is spread through airborne droplets when infected people sneeze or cough. It traditionally affects vulnerable children and young adults worldwide. (**Willey J, McGraw-Hill.et.al. 2011, Kimberlin WD.et.al, Haaheim LR.et.al.2002**).

The highest risk of CRS is found in countries with high rates of rubella susceptibility among women of childbearing age, and an estimated 110,000 babies are born with CRS each year worldwide. **(World Health Organization *Rubella: fact sheet 367*. 2012).**

Epidemics occur every 6-10 years, while explosive pandemics occur every 20-25 years. Tropical epidemics frequently go unnoticed due to the absence of significant clinical symptoms in affected children. **(Brooks GF. et.al. 2013).** Rubella is associated with two specific antibodies. The first to appear is immunoglobulin (Ig) M antibody, which rises and peaks 7-10 days after infection and then declines over time. IgG antibodies develop more slowly but remain positive for life, providing immunity against repeat infection. As a result, the presence of IgM antibody indicates a recent infection, whereas the presence of IgG antibody indicates an old infection and immunity. **(Lombardo PC.et.al. 2012).** The majority of publications on the incidence and prevalence of rubella infection in Nigeria have focused on either IgM or IgG, but not both. **(Olajide, Okikiola M et al. 2015).**

REVIEW

OF

LITERATURE

REVIEW OF LITERATURE

In study by Richard Yomi Akele¹ et.al. (2020): - the study aimed at carrying out a serosurvey to generate epidemiological data for this location. One hundred and eighty four consenting pregnant women attending antenatal clinic at FETHI were enrolled. the 184 sera samples analyzed 176 (95.7%) and 22 (12%) were seropositive for rubella IgG and IgM respectively. Twenty (11%) of those seropositive for IgM were also positive for IgG and only 2(1%) were positive only for IgM. Prevalence rate for IgG was highest among 26- 30years (98.3%) and 31-35years (18.8%) for IgM.

In study by Richard Yomi Akele¹ et.al. (2020): - The aim of this study was done to determine the pooled seroprevalence of rubella among pregnant women in Sub-Saharan Africa. Rubella continues to be a leading cause of vaccine-preventable congenital birth defects and permanent organ damage, especially in developing countries. For women who are infected with the rubella virus (RV) before conception or during the first trimester of pregnancy, the unborn child has up to a 90% probability of developing congenital rubella syndrome. Twenty-eight studies were included in this meta-analysis. The pooled seroprevalence of anti-RV IgG among pregnant women in Sub-Saharan African was 89.0% (95%CI: 84.6-92.3), and the pooled prevalence of anti-RV IgM among pregnant women in Sub-Saharan Africa was 5.1% (95%CI: 2.6-9.9). This meta-analysis showed that seronegativity and acute infection with RV among pregnant women in sub-Saharan Africa is high compared to other studies and the WHO threshold among women of child-bearing age. This finding calls for primary health care providers to make the community aware of this rubella-susceptible group and its healthcare burden, with the desired outcome that sub-Saharan Africa countries would

introduce an implementation strategy for rubella vaccination of pregnant women and women of child-bearing age.

In Study by Rıza Aytaç Çetinkaya¹ et.al. (2019): - In this meta-analysis, the seroprevalence Rubella among pregnant women in Turkey in the last decade was evaluated. Studies conducted in Turkey between 2007 and 2017 were analyzed, and differences in seroprevalence between provinces were compared by evaluating Rubella immunoglobulin (Ig)-G, IgM, and IgG avidity results in pregnancy in this period. The Rubella IgG seropositivity rate in Turkey among pregnant woman is high, whereas it is low for IgM. These rates may be considered as the result of successful immunization policies and practices. In a few provinces, it is necessary to revise the Rubella immunization procedures and adult vaccination strategies should be developed in order to control Rubella infections in adults, including pregnant women.

In study by Marchi, Serena et al. (2019) :- The aim of this study was to assess the immunity against rubella in women of childbearing age in Tuscany (Central Italy) and Apulia (Southern Italy) and pregnant women in Apulia after the implementation of the National Plan for Measles and Congenital Rubella Elimination. The findings of this study highlight the need for increasing awareness on the risk of contracting rubella infection during pregnancy and implement vaccination strategies to create opportunities for administration of rubella containing vaccines in young girls and women of childbearing age.

In Study by Icenogle JP, et al. (2019): - In the pregnant participants, the seroprevalence of rubella IgM antibodies was 5.0 percent. As confirmed with high avidity, no participant presented with an acute/recent rubella infection. IgG avidity testing should be performed before making any decision to terminate a pregnancy due to a positive rubella IgM result. Our findings show that there are susceptible pregnant women in the population who lack rubella immunity and are at risk of having children with CRS. To reduce the burden of rubella and CRS in Cameroon, rubella screening of women of childbearing age should be encouraged, those lacking immunity should be vaccinated, and rubella-based surveillance should be strengthened. strengthened in order to reduce the prevalence of rubella and CRS in Cameroon strengthened in order to reduce the prevalence of rubella and CRS.

In Study by Mousa, W. T. A. S. A. et.al. (2019): - This study was performed to detection of antirubella IgM, IgG andto determine the prevalence of antisperm antibodies in the sera of aborted and non -pregnant married women. Then study the correlation between the above parameters and the cause of abortion The majority (18(41.8%)) of study groups with positive anti-rubella IgG were between the ages of (26-35) years old, while the minority (10(7.1%)) of study groups with positive anti-rubella IgG were between the ages of (26-35) years old (36-45) years of age The majority of women who are seropositive to anti-rubella IgG are not pregnant but have had a previous pregnancy. abortion20(66.6%), only 1(3.3%) of pregnant women with previous abortion and pregnant but without previous abortion. Seropositivity to anti-rubella IgM was found in 2 (6.6 percent) of non-pregnant women who had previously had an abortion.

In study by Al-Alouci, T. M. et.al. (2019): - This study concludes a large percentage of women are not immunised against this virus and are therefore susceptible to infection in the future, they must be given the vaccine to develop an immune response against this virus. Although 58 percent of women are immunised against this virus, a screening programme in our community is needed to investigate women with negative IgG and implement a new vaccination programme to reduce infection in our population.

In study Yitayih Wondimeneh et.al. (2018): - A total of 600 pregnant women, seroprevalence of rubella infection was 89% of the total study participants, 9.5% were positive for rubella-specific IgM antibody. The rubella virus seroprevalence was found to be high, and many pregnant women (9.5 percent) had acute rubella virus infections at the time of data collection. This suggests that the virus is widespread in the study areas. Despite having IgG levels >10 IU/ml and being immune to natural/wild-type rubella virus infections, approximately 11% of pregnant women were found to be non-immune and represent the susceptible group. These pregnant women may develop rubella-associated congenital anomalies in subsequent pregnancies. As a result, screening women of child-bearing age before conception, rubella vaccination, and a strong surveillance system may be necessary to reduce rubella-related health complications in the country.

Michel Noubom et.al. (2018):- In this study, 91 pregnant women, 93.40% (85/91) were seropositive for rubella IgM and IgG antibodies. Among the rubella seropositive women, 87.91% (80/91), 5.49% (5/91) and 5.49% (80/91) were seropositive for IgG antibody, IgM antibody, and both IgM and IgG antibodies respectively.

In study by Mahjabeen W. et. al. (2018): - To determine IgG rubella seropositivity in pregnant women in Pakistan, assess the prevalence of infection, and estimate the need for vaccination. Rubella is extremely common in females of childbearing age in Pakistan. This is concerning because it increases the risk of CRS in newborns and foetal death. As a result, pregnant women who do not have natural immunity to rubella should be vaccinated at least four weeks before conception.

In study by Biniam Tamirat et.al. (2017): - The seroprevalence of anti-rubella IgM and IgG was 2.1 percent and 86.3 percent, respectively, in this study. Thus, 13.7 percent of pregnant women were found to be susceptible to rubella virus infection.

In study by Gündem, N. S., & Kalem, F. et.al (2017): - The goals of this study were to determine the seroprevalence of rubella antibodies among Turkish and foreign women living in Turkey, as well as to estimate the percentage of women who are susceptible to rubella infection. This study included 970 women (816 Turks) who attended gynaecology and obstetrics outpatient clinics.

Anti-rubella IgM and IgG seronegativity rates in non-pregnant women were significantly higher in the 31-35 year age group than in the other age groups. Our findings suggest that all pregnant women in Turkey should be routinely tested for anti-rubella IgM and IgG antibodies during the antenatal period. The susceptibility of women of reproductive age to rubella infection must be assessed in order to develop a strategy for preventing antenatal rubella through vaccination of non-immune women across the country.

In study by Gupta, A., Jain, P., & Jain, A. et. al (2015): - The work done in this paper is focusing on to assess the rubella seroprevalence among pregnant women in the Lucknow region of North India. Among the 152 pregnant women who participated in the study, 134 (88.2 percent) tested positive for anti-rubella virus IgG antibodies. There was no statistically significant difference in seropositivity or geometric mean titers of anti-rubella virus IgG antibodies among different age groups of pregnant women (p-values: 0.35 and 0.83, respectively). There was no correlation found between parity and anti-rubella virus IgG positivity (p-value: 0.23).

In study by Olajide, Okikiola M et al. (2015): - The purpose of this research Determine the prevalence of immunoglobulin M (IgM) and immunoglobulin G (IgG) antibodies to rubella virus in pregnant women using enzyme-linked immunosorbent assay kits. Anti-rubella IgM and IgG antibodies were found in 149 (93.1%) and 62 (33.8%) of the 160 pregnant women, respectively. Similarly, 18 (90%) and eight (40%) of the 20 nonpregnant women tested positive for rubella IgG and IgM antibodies, respectively. The prevalence of rubella was high in both pregnant and

nonpregnant women (93.1 percent and 90 percent, respectively), indicating sustained transmission and endemicity. The presence of rubella IgM and IgG antibodies in pregnant women predisposes babies to congenital rubella syndrome, emphasising the need for Nigeria to launch a national rubella vaccination programme.

In study by Sangeetha, S., Seema, P., & Suresh, D. G. et.al. (2012): - The current study found that a significant percentage of health care professionals aged 15-20 were susceptible to rubella infection. As a result, it is recommended that rubella vaccination of adolescents be included in our national immunisation schedule, as well as at the start of medical training for health care professionals.

In study by O.O. Agbede et.al (2011): - In this study, Ibadan had a 68 percent prevalence of rubella infection in pregnant women, while Lagos had a 76 percent prevalence. Pregnant women were found to have a 54.1 percent prevalence in Maiduguri. Because 85 percent of the subjects were susceptible to rubella virus infection, health planners should immunise women of childbearing age to prevent further occurrences of antenatal rubella, which may result in congenital rubella anomalies.

In study by Olajide, Okikiola M., et al. (2010) :- A study was carried out to investigate the seroprevalence of the rubella virus among pregnant women and the relationship it has with pregnancy duration, premature delivery, and a history of abortion in pregnant women visiting the Yaoundé Gynecological, Obstetric, and Pediatric Hospital.

Hospital (HGOPY). 211 pregnant women with a mean age of 275.99 attended the prenatal consultation. years were chosen at random and tested for rubella IgG antibodies. 39.3% of them were in their teens.

third trimester of pregnancy, while 25.6 percent and 35.1 percent were in their first and second trimesters of pregnancy, respectively, pregnancy 11.73 percent of the women had a history of premature delivery, and 40.3 percent had a history of miscarriage. At least one abortion history The Spearman's correlation between antibody titre and age. While 88.6 percent of pregnant women were seropositive, While 9 percent (susceptible) were seronegative, 2.4 percent were not ambiguous outcomes Women between the ages of 26 and 30 were the most vulnerable to rubella infection.

Women between the ages of 21 and 25 years were the most seropositive. There was an incident. There is a strong correlation between antibody titre and age ($r=0.549$, $p0.01$). There was no statistical evidence.

There was a difference in pregnancy trimesters and antibody titres ($p=0.0926$), as well as between the number of previous abortions and the antibody titre ($p0.01$, $r=0.246$) were both significant ($p0.01$, $r=0.246$). There are no correlations between Premature births are associated with antibody titre and pregnancy duration. There was a flaw. There is a link between antibody titre and the number of previous abortions.

In study by Adejo Daniel et. al. (2010): - The majority (97.9 percent) of women screened for rubella IgG antibodies were positive in this study, which found a rubella seropositive rate of 73 percent among both pregnant and non-pregnant women in western Nigeria in 1978. Olusanya and Bloomberg discovered a rubella seropositive rate of 75% among hospital personnel in Sagamu in

1990, including both men and women. 3 In 2000, Onyenekwe et al. discovered a 76 percent rubella seropositivity rate among pregnant women in Lagos. 6 Bukbuk et al. found a rubella seropositivity rate of 54.1 percent among pregnant women in Maiduguri in 2002. 2 Bamgboye et al. discovered a rubella seropositive rate of 68.5 percent among pregnant women in Ibadan in 2004.

In study by Grace, P. et. al. (2009): - In this study, the majority of pregnant women in Nigeria were found to be immune to rubella infection. Rubella IgM antibodies were found in 21 (3.9 percent; 95 percent CI=1.64 percent) of the 534 sera samples tested. Rubella infection is a real or perceived risk for 3.9 percent of 33.8 percent of pregnant women. As a result of mathematical modelling, the actual corrected susceptible population for rubella in pregnancy in Nigeria was estimated to be 4.2 percent. All of the women who took part in this study were between the ages of 18 and 36 (mean= 28.11.7 years; 95 percent CI= 0.14 percent), and there was no age preponderance. Furthermore, the difference in rubella IgM seroprevalence (3.9 percent) versus the true susceptible population (4.2 percent) was not statistically significant ($p>0.05$).

In study by Pehlivan, E., et al. (2007):- To determine the prevalence of rubella seroprevalence during pregnancy in Malatya, Turkey. A total of 824 pregnant women from 60 clusters participated in the study. Several blood samples were taken. Anti-rubella IgM and IgG titres were measured using a micro ELISA after serum samples were stored at 20 °C for 6 months. Only 803 sera were considered for serological testing. Anti-rubella IgG positivity was found in 753 of the 803 samples tested for rubella antibodies, indicating past infection. Five pregnant women (0.6 percent) tested

positive for both anti-rubella IgM and IgG antibodies, indicating a recent infection. The remaining 45 women (5.6%) tested negative for both antibodies. Age or urban/rural residency had no effect on seroprevalence. The five women who tested positive for anti-rubella IgM were all in their second trimester of pregnancy. Because 5.6 percent of pregnant women were susceptible to rubella during pregnancy, and five of them had recently been infected, immunisation efforts should focus on infants and adolescents.

AIMS AND OBJECTIVE

AIMS AND OBJECTIVES

AIM: - To study the seroprevalence of anti-Rubella antibodies among pregnant women.

OBJECTIVES:

- (1) To evaluate the Rubella specific antibodies among pregnant women.
- (2) To evaluate the prevalence of congenital Rubella syndrome among pregnant females with positive anti-Rubella antibodies.

MATERIALS

AND

METHOD

MATERIALS & METHODS

STUDY DESIGN: - A SYSTEMIC REVIEW

PLACE OF STUDY: - Department of microbiology, Integral Institute of Medical Science and Research.

DATA TYPE: - Data for this systemic review were collected from following sources.

- a) Data from various publications in indexed journals.
- b) Data from recent editions of textbooks.
- c) Data from websites of CDC, NCDC, WHO.

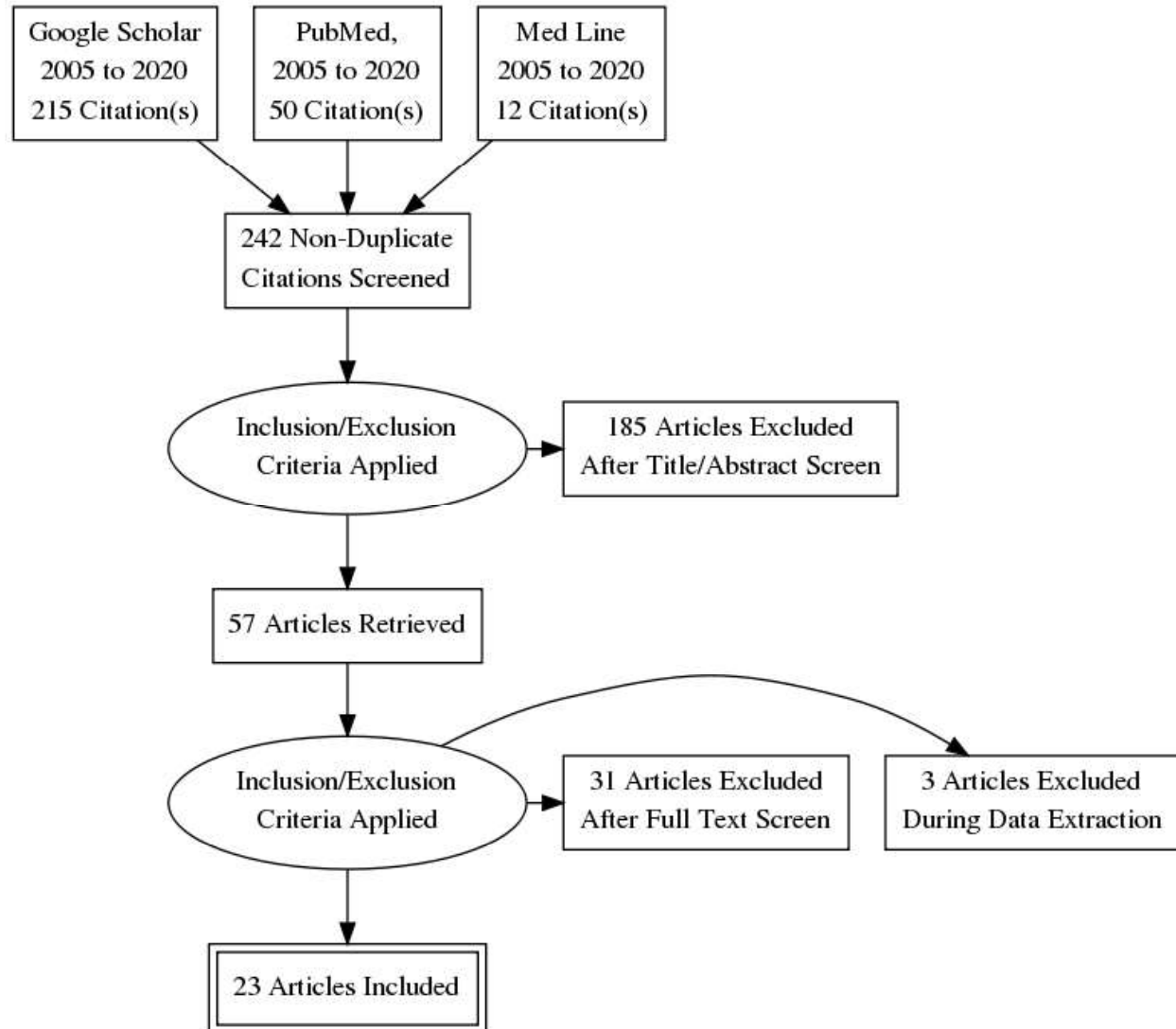
TIME FRAME: - All the studies in indexed journal from year 2005 to 2020.

SEARCH STRATEGY: - This systemic review followed the PRISMA guidelines.

Articles were searched on PubMed, Google scholar, Web of Science, Science Direct, and Scopus using terms related to Sero-prevalence of rubella among pregnant women, Sero-prevalence of rubella IgG and IgM Antibodies among pregnant women, anti-rubella IgG and IgM were used. Boolean AND, OR and NOT were used.

INCLUSION CRITERIA: - Article titles and abstracts were screened to include relevant articles. Sero-prevalence of rubella among pregnant women, Sero-prevalence of rubella IgG and IgM Antibodies among pregnant women, anti-rubella IgG and IgM, Risk factors among pregnant women, Sero-prevalence of rubella among pregnant women in different region on different country.

EXCLUSION CRITERIA: - Article titles and abstracts were screened by researchers independently to exclude irrelevant articles.



OBSERVATION AND RESULTS

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S. No.	AUTHOR	YEAR	COUNTRY	STUDY FINDING
1.	Richard Yomi Akele. et. al.	2020	Nigeria	176 (95.7 percent) and 22 (12 percent) of the 184 sera samples tested positive for rubella IgG and IgM, respectively. Twenty (11%) of those seropositive for IgM were also positive for IgG, while only two (1%) were only positive for IgM. IgG prevalence was highest in people aged 26 to 30 (98.3 percent) and lowest in people aged 31 to 35 (18.8 percent). Age had no effect on seroprevalence distribution ($p > 0.05$).
2.	Zemenu Yohannes Kassa. et. al.	2020	Africa	The pooled seroprevalence of anti-RV IgG was 89.0 percent (95 percent CI: 84.6-92.3) among pregnant women in Sub-Saharan Africa, and the pooled prevalence of anti-RV IgM was

				5.1 percent (95 percent CI: 2.6-9.9).
3.	Taku N.A et.al	2019	South Africa	In this study, 522 pregnant women, the overall seroprevalence of rubella specific IgG and IgM antibodies were 94.4% (493/522) and 5.0% (26/522) respectively
4.	Alouci M.M.H.A et.al	2019	Iraq	From 303 women that were tested to detect rubella immunity IgG and IgM. (54.8%) of aborted women and (73.3%) of the control group were positive of IgG antibody. The percentage of positive IgM in patients was (2%) and (0%) in the control group
5.	Rıza Aytaç Çetinkaya. at. al.	2019	Turkey	Rubella IgG and IgM seroprevalence rates were found to be 93.47 percent (95 percent confidence interval [CI]: 91.72 to 95.03) and 0.783 percent (95 percent CI: 0.505 to 1.120), respectively, in pregnant women in Turkey. 4.66 percent (95 percent CI: 0.969 to 10.906), 7.51

				percent (95 percent CI: 5.101 to 10.345), and 93.55 percent (95 percent CI: 82.584 to 99.311), respectively, of rubella IgG were low, intermediate, and high avidity.
6.	Serena Marchi. et.al.	2019	Italy	The results of this study emphasise the need for greater public awareness of the dangers of acquiring rubella infection while pregnant and the implementation of vaccination strategies to make it possible to give young girls and women who are sexually active and fertile the rubella-containing vaccine.
7.	Ashukem Taku. et.al	2019	Cameroon	The results of this study demonstrate the importance of rubella infection in Cameroon. Rubella infection still has some risk for pregnant women. Consideration should be given to investigating for an IgG-avidity

				test in cases with positive rubella IgM results in order to differentiate between recent and past rubella infection in Cameroon.
8.	Wasan Talib Abed. et.al.	2019	Kirkuk city	Only six cases of non-pregnant married women (37.6 percent) in study groups with high concentrations of ASA were between the ages of (25-35), while five cases of married women who had had abortions (55.6 percent) were more common in study groups with high concentrations of ASA.
9.	Yitayih Wondimeneh et.al	2018	Ethiopia	A total of 600 pregnant women, seroprevalence of rubella infection was 89% of the total study participants, 9.5% were positive for rubella-specific IgM antibody.
10.	Michel Noubom et.al	2018	Cameroon	In this study, 91 pregnant women, 93.40% (85/91) were seropositive for rubella IgM and IgG antibodies. Among the rubella seropositive

				women, 87.91% (80/91), 5.49% (5/91) and 5.49% (80/91) were seropositive for IgG antibody, IgM antibody, and both IgM and IgG antibodies respectively
11.	Huda rana. et. al.	2018	Islamabad	The study included 730 subjects in total, who were divided into four groups based on their ages. The results were as follows: group 1 (18-20 years old): 100% positive; group 2 (21-30 years old); group 3 (31-40 years old); and group 4 (>40 years old); 95% positive. Overall seropositivity was found to be 92.32 percent, and 7.70 percent were found to be at risk for infection.
12.	Biniam Tamirat et.al	2017	Ethiopia	In this study, the seroprevalence of anti-rubella IgM and IgG was 2.1% and 86.3% respectively. Thus, the rate of susceptibility to rubella virus infection among pregnant women was found to be 13.7%.

13.	Seval Gündem et.al.	2017	Turkey	The mean age of the 970 women in this retrospective study was 26 6 years (range 16 to 57 years old), with 816 (84.1 percent) being Turkish, 153 (15.8 percent) pregnant and admitted to obstetrics outpatient clinics for antenatal screening, and 817 (84.2 percent) admitted to gynaecology outpatient clinics for other diagnosis.
14.	M Olajide. et. al.	2015	Nigeria	Anti-rubella IgM and IgG antibodies were found in 149 (93.1%) and 62 (33.8%) of the 160 pregnant women, respectively. Similarly, 18 (90%) and eight (40%) of the 20 nonpregnant women tested positive for rubella IgG and IgM antibodies, respectively.
15.	Ananya Gupta. et.al.	2015	Lucknow (India)	134 (88.2 percent) of the 152 pregnant women enrolled in the study tested positive for anti-

				rubella virus IgG antibodies. There was no statistically significant difference in seropositivity or geometric mean titers of anti-rubella virus IgG antibodies among different age groups of pregnant women (p-values: 0.35 and 0.83, respectively).
16.	S Sangeetha.et.al	2012	India	25 (15.82 percent) of the 158 subjects tested negative for IgG antibodies against rubella. Table 1 depicts the age and gender distribution of 158 health care professionals. The majority of the subjects, 113 (71.5 percent), were between the ages of 15 and 25, with 41 (24.9 percent) between the ages of 21 and 25, and 4 (2.5 percent) between the ages of 26 and 30. The average age was 22.5 years.

17.	O.O. Agbede et.al	2011	Nigeria	In this study, south western Nigeria ,68% prevalence of rubella infection in pregnant women have been observed in Ibadan ,76% in Lagos. In Maiduguri 54.1% prevalence was however observed in pregnant women.
18.	J chiwuzie. et.al.	2011	Nigeria	The mean age and parity of the women were 30.0 ± 4.8 years, 95% CI 29.727-30.873 and 2.0 ± 1.4 ; 95% CI 1.317-1.661, respectively. IgG seroprevalence was 53%, while 10.0% of all IgG seropositive women were IgM seropositive. Most infections were acquired before the age of 35. None of the women ever had previous rubella vaccination.
19.	SH Abdul- razak. et. al	2011	Iraq	The results showed that the IgG seropositivity rate among pregnant women without previous abortion was 96.1 percent and 76 percent,

				respectively, with a statistically significant difference ($p=0.04$). The seropositivity rate among non-pregnant women without previous abortion was 85.1 percent and 100 percent, respectively, with a statistically insignificant difference ($p=0.11$).
20	Amina M.D. et.al	2010	Nigeria	In this study, 430 serum samples tested among pregnant women, 421 (97.97%) were positive and 9 (2.1%) were neg. for rubella IgG antibody.
21.	Grace, Pennap. et. al.	2009	Nigeria	Rubella IgM antibodies were found in 21 (3.9 percent; 95 percent CI=1.64 percent) of the 534 sera samples tested. Rubella infection is a real or perceived risk for 3.9 percent of 33.8 percent of pregnant women.
22.	Pehlivan, E., et al.	2007	Turkey	Anti-rubella IgG positivity was found in 753 of the 803 samples

				tested for rubella antibodies, indicating past infection. Five pregnant women (0.6 percent) tested positive for both anti-rubella IgM and IgG antibodies, indicating a recent infection.
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DISCUSSION

DISCUSSION

German measles and rubella are both contagious viral illnesses. It is a very contagious illness that spreads through the air when infected people cough. Non-pregnant in Women experience relatively minor symptoms like coryza, a low-grade fever, slight eye redness, and an associated exanthematous rash that is characteristic. Infections during the first trimester of pregnancy, especially in pregnant women can be transmitted to the foetus during pregnancy, leading to birth-related rubella Syndrome. birth-related rubella A number of avoidable life events are greatly influenced by syndrome. threatening impairments defects in the eyes, the mind Retardation, abnormal heartbeats, and sensorineural hearing loss are a few typical manifestations.

Rubella infection is usually mild in childhood, but it can be severe later in life. It can also cause severe birth defects or death in the foetus during the first trimester of pregnancy. The Rubella IgG seropositivity rate in Turkey was 93.4 percent, according to a meta-analysis of 26 studies. This rate was higher than in 44% of the studies but lower than in 56% of the studies in the meta-analysis. **The Ankara study by evki et al.** with 31,385 cases represents Turkey's best average; the seropositivity rate of 93.9 percent and 37.1 percent weight in the meta-analysis.

In general, vaccination rates are higher in the west of Turkey, while immunity is gained after acquiring infections against infections that can be prevented by vaccination in the east of Turkey.

The seroprevalence of rubella among Cameroonian pregnant women attending ANC in the Center and South-West regions was investigated in this study. To determine the status of rubella infection, rubella antibodies (IgG and IgM) were detected using ELISA, and rubella IgG avidity testing was

performed. According to the findings, 94.4 percent of pregnant women tested positive for rubella IgG. This confirms previous wild type rubella virus exposure.

CRS poses a serious risk to public health in nations with limited resources. Due to a lack of data indicating the prevalence of the rubella virus, the majority of sub-Saharan African nations have not implemented the rubella vaccine. 48 However, complications from the rubella infection and CRS are expensive, especially when compared to how inexpensive vaccination.

The purpose of this meta-analysis was to determine the pooled seroprevalence of anti-RV IgG and IgM among pregnant women in Sub-Saharan Africa. According to studies, RV is common in various Sub-Saharan African countries, indicating a significant number of susceptible reproductive-age women at risk of giving birth to a child with CRS.

This study discovered higher seronegativity than the WHO threshold of <5% seronegativity in women of childbearing age.

Despite the public health importance of rubella in Ethiopia, research on the epidemiology of the infection in various subpopulations is limited. The lack of information about the prevalence of infection, particularly among women of childbearing age, limits intervention efforts that could help to mitigate the effects of vertical transmission. The purpose of this study was to collect information on pregnant women who had recently or previously been exposed to rubella virus infection. IgM positivity indicates a recent infection (or reinfection), whereas IgG positivity indicates a previous infection with the development of protective immunity. Antirubella IgM and IgG seroprevalence was 2.1 and 86.3 percent, respectively.

This study's IgG positivity rate was comparable to that of pregnant women in Mwanza, Tanzania (92.6 percent), Osogbo, Nigeria (87.5 percent), and Cameroon (87.5 percent) (88.5%). This study's

seropositivity of antirubella IgM was comparable to the rate among expectant mothers in Turkey (2%), where the rubella vaccination programme reduced the susceptibility rate to 3.6 percent. On the other hand, a study from Bangladesh found that the IgM seropositivity rate (0.75%) and susceptibility rate (15.7%) were comparable to those found in this paper. It has been proposed that the rate variability in various locations is influenced by variables such as population density, immunisation status, and degree of herd immunity at the time of virus introduction. In Africa between 2002 and 2009, women of reproductive age with clinical measles presentations had an antirubella IgM rate of 20 A5 percent, which was higher than the data at hand. The importance of conducting serosurveys to prevent the possibility of overestimating the burden of CRS based on results of case-based surveillances. It was observed that eight cases were IgM positive and IgG positive and only one case was IgM positive and IgG negative. This may be due to the fact that IgM is produced earlier in the course of infection during which antirubella IgG has not yet been produced.

However, India revealed a different outcome, reporting a higher prevalence among pregnant women. living in rural areas are women. The greater incidence of rubella exposure in the current study's urban pregnant women due to the higher proportion of urban residents likely to reside in densely populated areas.

CONCLUSION

CONCLUSION

Due to the lack of severe clinical symptoms and high seroprevalence discovered in this study, a national programme for the prevention and eradication of the Rubella Virus in Cameroon must first encourage free antibody testing in populations before moving forward with immunisation of those who are unprotected.

Because a large percentage of women are not immunised against this virus and are therefore susceptible to infection in the future, they must be given the vaccine to develop an immune response against this virus. Although 58 percent of women are immunised against this virus, a screening programme in our community is needed to investigate women with negative IgG and implement a new vaccination programme to reduce infection in our population.

In the pregnant participants, the seroprevalence of rubella IgM antibodies was 5.0 percent. As confirmed with high avidity, no participant presented with an acute/recent rubella infection. IgG avidity testing should be performed before making any decision to terminate a pregnancy due to a positive rubella IgM result. Our findings show that there are susceptible pregnant women in the population who lack rubella immunity and are at risk of having children with CRS. To reduce the burden of rubella and CRS in Cameroon, rubella screening of women of childbearing age should be encouraged, those lacking immunity should be vaccinated, and rubella-based surveillance should be strengthened.

In Kirkuk City, women of childbearing age have a high risk of contracting rubella. Premarital anti-rubella screening and vaccination of girls could reduce the risk of infection during pregnancy and childbearing. ASA may be the cause of female infertility and an increase in the rate of recurrent spontaneous abortion.

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