

# Detection of IgG and IgM Antibodies to Rubella Virus in Misurata Population

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## Abstract

**Background:** Although a single dosage of the rubella-containing vaccine (RCV) can offer long-lasting protection against rubella, the disease still affects both adults and children in many parts of the world.

**Objectives:** This study was designed to determine the seroprevalence of IgG and IgM antibodies to rubella virus in the Misurata population, thus, determining the proportion of individuals at risk of infection, as well as to develop preventive measures for congenital rubella syndrome (CRS).

**Materials and Methods:** 198 participants were randomly selected for the study, and the IgG and IgM antibodies specific to the rubella virus were evaluated using the ELISA technique.

**Results:** The seroprevalence of rubella IgG antibodies was 81.3% and therefore these individuals have good immunity against the rubella virus, while the proportion of people exposed to rubella virus was rather high 18.7%. And the results showed that 2.5% have IgM antibodies against rubella (recent infection). The highest rate of rubella IgG antibodies was in the age groups 1 to 15 years and those who were older than 46. Females between the ages of 16 and 45 years are highly susceptible to German measles.

**Conclusion:** The National Health Service must work to eradicate the rubella virus, which includes immunizing all vulnerable individuals.

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## Introduction:

The measles virus (morbillivirus) is the source of the acute highly contagious viral illness known as rubella (German measles). That occurs all over the world and caused millions of deaths before the development of its vaccine (Adekola *et al.*, 2021 ; Yu *et al.*, 2018). The virus is spread from person to person via the respiratory route by inhaling respiratory droplets or secretions that are contaminated ( *et al.*, 20). The disease incubation period ranges from 12 to 23 days (10 days before a fever appears and 14 days before a rash appears). The disease clinically is characterized by a slight fever and lymphadenopathy followed by a broad erythematous, maculopapular rash (Leung *et al.*, 2019).

Rubella virus infection during the first trimester of pregnancy can cause severe birth defects called congenital rubella syndrome (CRS) (Zheng *et al.*, 2003), even though many infections with the virus are subclinical. The virus can cause various forms of arthritis, especially in adults (Reef *et al.*, 2002; George *et al.*, 2019 ; Lanzieri *et al.*, 2004).

Congenital heart disorders, deafness, glaucoma, retinopathy, thrombocytopenia, encephalitis, mental retardation and a range of other manifestations that affected all organs are all symptoms of congenital rubella syndrome (Cutts *et al.*, 1997 ; Adekola *et al.*, 2021 ; Oner *et al.*, 2006). There are estimated to be 100,000 cases of CRS every year (Caidi *et al.*, 2009). In the USA alone, more than 20000 cases of CRS (Duncan *et al.*, 2000). The US and UK started national immunization programs for rubella in 1964 after the epidemic expanded to their countries (Plotkin, 2006), and the vaccination was given to infants and women. Since then, this strategy has been used and had great success (Plotkin, 2006). Systematic rubella immunization has eliminated both acquired and congenital rubella in many developed regions, as seen by the 86 % decline in the incidence of globally reported rubella cases from 2000 to 2012 (Lambert *et al.*, 2015 ; Plotkin, 2006).

Although measles prevalence has decreased significantly since the development of vaccines, which have given people immunity, the disease is still common because of insufficient vaccination coverage. The fact that a partial vaccination strategy results in significant outbreaks was highlighted by the more than 11,000 cases of rubella that occurred in Japan in 2013 (Minakami *et al.*, 2014), and reports from the World Health Organization (WHO) show that the cases of rubella increased by more than twice in the first quarter of 2019. when compared to the same time the year before (Ujiie, 2019).and reports have revealed that immunity against the disease is not lifelong. People with weakened antibodies or secondary immunosuppression may have measles symptoms (Adekola *et al.*, 2021 ; Yu *et al.*, 2018 ; Hübschen *et al.*. 2017). Failure of the vaccine can lead to re infection with measles virus, this can be tested by measuring concentration of the rubella IgG antibodies using enzyme linked immunosorbent assay (Adekola *et al.*, 2021; Sower *et al.*, 2016).

There is insufficient epidemiological data on the seroprevalence of rubella in Libya, which precludes policy regarding potential immunization program options. In a study conducted by Gebreel *et al.*, 1984 IgG positive rates were obtained from a random serological sample of schoolchildren. in Benghazi 58.8% at six years, growing to 78.3% at 12 years; in Gharian, 61.1% at six years old growing to 89.3% at 12 years, A random sample of 70 children from Benghazi showed positive rates of 55.7% at six years old growing to 78.6% at nine years (Gebreel *et al.*, 1984). This study was carried out to better understand the epidemiological situation of German measles and to aid in its control and prevention.

### **Materials and methods:**

#### **Study design:**

This study was designed as a cross-sectional study to determine the rates of immunization against the rubella virus by studying the proportion of antibodies IgG and IgM in the study samples.

#### **Field of the study:**

Random samples from the community of Misurata City, Libya, were used in the study, and the study was conducted at the Misurata Central Laboratory for Medical Analysis.

#### **The study samples:**

The present study included 198 volunteers, 7 male, and 166 female, while the number of children under ten months was 25. Their ages ranged between one day and 69 years, with an average age was (18.86), the study was conducted in the period from August to November 2021.

**Ethical considerations:**

This research was conducted while ensuring respect for the privacy of the participating individuals and maintaining the confidentiality of the data, While this research was included in the descriptive studies, it does not pose a risk to the participants, it is not an experimental study, and on the contrary, it provides a service to the community by determining the immune status of individuals by estimating the proportion of antibodies to the virus German measles and thus assessing the immune status of the community and knowing the effectiveness of vaccination and the extent of the effect for it to protect against infection.

**Epidemiological assessment:**

Socio-demographic data such as gender, age, nationality, vaccination taken, and previous infection with rubella virus (vaccination taken, and the previous infection with rubella virus were excluded because most of the participants did not respond) after explaining the importance of the study to the participants and obtaining their consent to participate while ensuring the confidentiality of information. The questionnaire is included in the appendices section (Appendix No. 1).

**Laboratory work:**

A venous fasting blood sample (5ml) was collected in plain tubes (that did not contain anticoagulants), and assigned a serial number. The blood was left to coagulate for 15 minutes before being centrifuged at 3500 rpm for 5 minutes to ret the serum. The clear serum was separated into other tubes (hemolysis and fatty samples were excluded), and the serum was used to detect IgG and IgM antibodies to the rubella virus using a commercially available Enzyme-Linked Immunosorbent Assay (ELISA), using a device Chorus Trio, figure, and reagent Kits of Rubella IgG and Rubella IgM, and all analyses were performed at the Misurata Central Laboratory for Medical Analysis.

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