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Research Article

Research: A Five Years Retrospective Trends of Rubella Virus IgM Antibodies from Measles Suspected Cases with Negative/Intermediate Results for Measles Infection: From 2015-2019

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ABSTRACT

Background: Rubella is an important human pathogen that causes an acute and contagious infectious disease caused by a single-stranded RNA virus belonging to the family Togaviridae. As the clinical diagnosis of rubella is unreliable, serological tests are required for a diagnosis and the role of the laboratory is crucial in the management of rubella infection. Therefore, this study aimed to assess retrospective trends of rubella virus-specific IgM antibodies from measles suspected cases with negative/intermediate results for measles infection.

Methods: A retrospective cross-sectional study was conducted on 1518 samples from 2015 to 2019 at Hawassa regional Public Health Laboratory, Southern Ethiopia. Measles suspected sample tested for IgM antibody and the results were negative/intermediate for the measles virus, and those samples done for specific IgM antibody tests for Rubella virus were included in the study. Data on socio-demographic and clinical information of the patients' samples were retrieved from case-based reporting form, while results of Rubella specific IgM antibody tests were obtained from logbook of regional laboratory. Data entry and analysis was done by using Statistical Package for Social Sciences (SPSS) version 20.

Result: Of the total 1518 cases of measles suspected but test negative/intermediate samples were analyzed for rubella virus specific-IgM antibody. About 246 (16.2%) were positive for rubella IgM antibody. Of these 246 rubella infected cases, 122(8.0%) males and 124(8.2%) were females. Measles suspected cases with age group of 2-5 years old had a higher prevalence rate of rubella virus infection followed by age group of 6-9 years old, the rate was 6.3% and 5.1%, respectively.

Conclusion: This study highlights the significant seroprevalence of rubella antibodies among measles suspected children. Providing and incorporating rubella-containing vaccines in the immunization program is vital for the eradication of the rubella virus infection. In addition, an organized surveillance study is required for the good estimations of rubella virus infection and its impact of congenital transmission.

Keywords: Measles suspected cases; Rubella virus; Southern-Ethiopia

ABBREVIATIONS

ELISA: Enzyme-linked Immunosorbant Assay; CRS: Congenital Rubella Syndrome; SPSS: Statistical Package for Social Sciences; WHO: World Health Organization

INTRODUCTION

TRubella is an important human pathogen that causes an acute and contagious infectious disease caused by a virus belonging to the Rubivirus genus in the family Togaviridae. It occurs worldwide in the non-vaccinated population with varying incidences of epidemics [1, 2]. The virus is mainly transmitted from human to human by direct contact with infected bodily fluids or respiratory droplets from diseased people, usually characterized by a mild febrile rash illness [3]. Its incubation period ranging from 12 to 23 days, with an average of 14 days [4, 5]. Rubella is a childhood disease usually having mild clinical appearances with maculopapular rash happening in 50-80% of rubella-infected persons [4, 5]. In addition, rubella infection occurring just before conception and during the first trimester of pregnancy may result in miscarriage, fetal death, premature delivery and a constellation of severe birth defects called Congenital Rubella Syndrome (CRS), [4-7]. Currently, there is no

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specific treatment for the virus [8]. However, its burden can be minimized through use of the live attenuated rubella vaccine [9].

The World Health Organization (WHO) targets the elimination of rubella, as well as measles, whichare vaccine-preventable diseases [10]. In African countries, including Ethiopia, data on rubella epidemiology is very limited [11]. Moreover, in Ethiopia, the rubella investigation system has not yet been established [12]. The seropositivity of rubella virus in measles suspected cases in Ethiopia is largely unknown. Therefore, this study aimed to assess the seropositivity of acute rubella infection among measles suspected case in Hawassa Regional laboratory, Southern Ethiopia

METHODS

Study settings, study population and sampling

A five-year retrospective data (2015-2019) of measles suspected cases with signs and symptoms of generalized rash and fever with a runny nose, cough, or swollen red weepy eyes (conjunctivitis) were included in the study and accessed from Hawassa regional Public Health Laboratory, Southern Ethiopia. The laboratory provides external quality assurance services for the entire region's hospitals and health center laboratories. Patients whose sera were negative/intermediate for measles IgM antibodies were re-tested for rubella specific IgM antibody. In addition, 2015 to 2019 data on socio-demographic and other relevant information of the patients were obtained from case-based reporting form and lab results were accessed from logbook of the Regional laboratory. Only data of laboratory-confirmed rubella cases were included in the study. The test was done by specific IgM antibody for rubella by indirect Enzyme-Linked Immunosorbent Assay (ELISA) method of commercially available standard kit (Siemens Diagnostics, Marburg, Germany).

Statistical analysis

Data entry and statistical analysis were done using Statistical Package for Social Science (SPSS) version 20. Descriptive statistics were used and data presented by frequency and percentage using tables and bar graphs.

RESULTS

Of 1518 measles suspected cases, 47.4% were females and males 52.6%, with male to female ratio 1.1:1. About 30.5% of suspected cases were aged between 2-5 years followed by 6-9years old that was 24.8%. More than half (52.5%) of the suspected cases were vaccinated and 26.2% were not vaccinated for measles and others. Of the total 1518 measles negative and indeterminate cases, 246 (16.2%) were positive for Rubella virus-specific IgM. Of these 246 rubella virus-infected cases, 122(8.0%) males and 124(8.2%) were females. Measles suspected cases with age group of 2-5 years old had a higher prevalence rate (6.3%) of rubella virus infection followed by age group 6-9 years old (5.1%) (Table-1).

Table 1: The distribution of Rubella virus infection by the socio-demographic characteristics in southern-Ethiopia, from 2015-2019

Variables	Total suspected cases	Rubella IgM(+ve)	Rubella IgM(-ve)
Sex: Male	807(53.2%)	122(8.0%)	685(45.1%)
Female	711(46.8%)	124(8.2%)	587(38.7%)
Age category: <2 years	307(20.2%)	32(2.1%)	275(18.1%)
2-5 years	463(30.5%)	96(6.3%)	367(24.2%)
6-9 years	376(24.8%)	78(5.1%)	298(19.6%)
10-14 years	230(15.15%)	29(1.9%)	201(13.2%)
≥ 15 years	142(9.35)	11(0.7%)	131(8.6%)
Vaccinated: Yes	797(52.5%)	42(2.8%)	755(49.7%)
No	398(26.22%)	145(9.55%)	253(16.7%)
Unknown	323(21.13%)	59(3.9%)	264(17.4%)

Totally, 51, 380, 396, 408 and 287 suspected cases were tested for rubella IgM antibody from 2015-2019, respectively. In addition, an increasing trend of rubella infection was observed from 2015-2019, that showed the year based prevalence of rubella infection was 0.7%, 0.7%, 3.7%, 3.0%, 4.2% and 4.7% from 2015-2019, respectively (Figure-1).

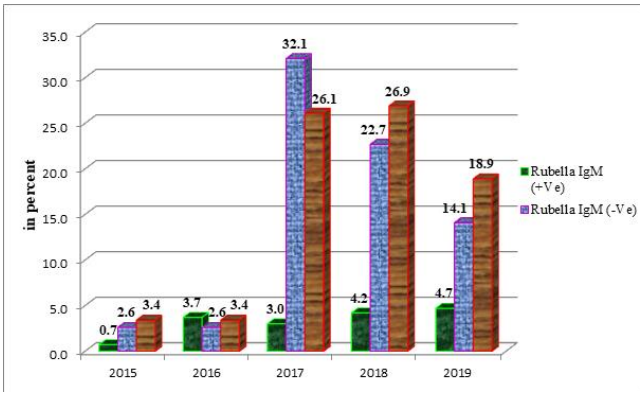

Figure 1: Trends of Rubella IgM results of 1518 measles suspected cases from 2015-2019

The measles suspected samples were received from 19 sites (17 sites of South-Ethiopia region and 2 sites of neighboring Oromia-region) to the regional laboratory of southern Ethiopia. The high numbers of suspected case samples were received from Sidama, Borena, Gamogofa, Gedeo and Debub Omo, which were 239, 217, 197, 168 and 168, respectively. The raised prevalence of rubella exposure was diagnosed from Borena (Oromia-region), Gedeo and Debub Omo, which were 1.7%, 2.6%, and 2.8%, respectively. However, Basketo, Sagan, and Shashemene (Oromia region) suspected cases were negative for Rubella-IgM throughout five years.

Table 1: Prevalence of Rubella IgM antibody by samples collected sites from 2015-2019.

Characteristics	Total sample collected (%)	Rubella IgM(+ve)	Rubella IgM(-ve)
Samples site: Alaba	28(1.8%)	4(0.3%)	24(1.6%)
Amaro	9(0.6%)	3(0.2%)	6(0.4%)
Basketo	11(0.7)	0	11(0.7%)
Benchi maji	22(1.4%)	2(0.1%)	20(1.32%)
Borena	217(14.3%)	26(1.7%)	191(12.6%)
Dawuro	39(2.6%)	9(0.6%)	30(2.0%)
Gamogofa	197(13.0%)	20(1.3%)	177(11.7%)
Gedeo	168(11.1%)	39(2.6%)	129(8.5%)
Gurage	35(2.3%)	1(0.06%)	34(2.2%)
Hadiya	81(5.3%)	11(0.7%)	70(4.6%)
Hawassa district	36(2.4%)	19(1.2%)	17(1.1%)
Konta	53(3.5%)	12(0.8%)	41(2.7%)
Debub Omo	168(11.1%)	42(2.8%)	126(8.3%)
Sagan	43(2.8%)	0	43(2.8%)
Sidama	239(15.7%)	20(1.3%)	219(14.4%)
Silte	16(1.1%)	2(0.1%)	14(0.9%)
Walayita	75(4.9%)	16(1.1%)	59(3.9%)

Kembata Tambaro	78(5.1%)	20(1.32%)	58(3.8%
Shashemene	3(0.2%)	0	3(0.2%)

DISCUSSION

From2015-2019, from 17 sites of Southern region and 2 sites of Oromia region suspected cases samples were received in the regional and 246(16.2%) laboratory-confirmed rubella cases were identified in 1518 suspected to have measles with measles IgM negative or intermediate cases. The finding is comparable with the study conducted in Sudan that was 16.3% [13], a retrospective study reported by Getahun et al. [14, 15], which were 15.3% and 17.3%, respectively. Conversely, a higher prevalence rate, 58.9% was reported from Adamawa State, Nigeria [16] and democratic Republic of Congo [17] that was 33 %.The variation might be attributed to the methodology of rubella diagnosis that means IgM antibody test was done in the current study whereas IgG antibody test was done in the Nigerian study. Furthermore, low rate of rubella virus was also reported by Mitiku et al. which was 12% [18], about 12.5% in Philippines and another study conducted in Nigeria of 2014 and 2015, which were 3.5% and 2.6%, respectively. The variations may be due to the variations in geographical location and outbreak status of viral infection. This study indicated that children between the ages of 2-5 years and 6-9 years were more infected by the rubella virus when compared to age lesser than 2 years and age greater than or equal to 10 years. The raised rate occurrence of rubella cases in young children might be due to level of acquired immunity in this age level when compared to older age. The study conducted in Poland revealed that males were the most affected than females. However, we found that the prevalence of rubella virus infection was almost similar in both sexes and this in line with the study reported by Getahun et al. Further, the absence of vaccine that contains rubella in our country setting might be responsible for the prevalence rate. Moreover, in different African countries, including Ethiopia the epidemiology of rubella is not well-studied and rubella virus infection based surveillance is not established in Ethiopia. Rubella has not been given consideration, and still more infants are born with Congenital Rubella Syndrome (CRS) each year and die due to this syndrome. Further, providing rubella-containing vaccine is crucial and it should be expanded for immunization in the health system in order to eradicate rubella virus infection.

CONCLUSIONS

This study highlights the significant seroprevalence of rubella antibodies among measles suspected children. Providing and incorporating rubella-containing vaccines in immunization program is vital for the eradication of the rubella virus infection. In addition, an organized surveillance study is required for the good estimations of rubella virus infection and its impact of congenital transmission.

The outpatient doctor at the department of gynaecology collected vaginal secretions from the vaginal posterior fornix using a sterile cotton swab according to standard clinical practice. Samples were treated by adding 750 µl of PowerSoil®-htp Bead Solution (MOBIO Laboratories, Inc. Carlsbad, CA, USA; catalogue number 12955–12-BS) and then stored at −80°C until analysis. Samples were collected from the posterior vaginal fornix and were stored in duplicate.

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