

## ORIGINAL PAPER

# Study on Sero-prevalence of Rubella in Pregnancy' in Relation to Socio-economic Status

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Received on September 1, 2015; editorial approval (revised) on February 21, 2016

### ABSTRACT

The present study was under taken with a purpose to study the sero-prevalence of rubella in pregnant woman and to examine its relation with socio-economic status. The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics & Gynaecology departments in Gauhati Medical College & Hospital, Guwahati, having different ethnic backgrounds, after approval of the Institutional Ethical Committee. Among the total of 81 samples, sero-positivity of rubella virus was seen using IgG as the serological marker. The cases were studied in three age groups as '16-20' years, '21-30' years and '31-40' years. Four socio-economic statuses were taken for the study as "economically weaker section", "lower income group", "middle income group" and "higher income group". The socio-economic status of the study group was evaluated according to the different economic categories formulated by 'Housing and Development Co-Operative Organization'. The data recorded was analysed statistically using Student's T-test. P value < 0.05 is considered as statistically significant. Such a study may be useful in prevention and treatment of rubella virus.

**Keywords:** Rubella, Sero-positive, Socio-economic

### INTRODUCTION

Infection during pregnancy has been documented since the writings of Hippocrates. Obstetrics practice in western world does not reflect what happens elsewhere.<sup>1</sup> But in the world, half a million pregnant women die each year, many from such infection. Rubella is one of the frequent causes of intra-uterine acquired infection in human species. Rubella virus infection acquires a special significance in pregnant women as the virus may enter the fetal circulation through the placenta.<sup>2</sup> Unfavourable outcome to pregnancy has become a serious problem in the society. Rubella virus infection during pregnancy can be a serious threat to the fetus with possible loss of pregnancy and

diseases of newborn of which, encephalitis, hepatomegaly, neuritis, orchitis, thrombocytopenic purpura are the hallmarks of infection. Rubella or German measles is a exanthematous fever characterized by transient macular rash and lymphadenopathy. In itself, the disease is trivial but rubella in the pregnant woman may lead to congenital malformation in the baby.<sup>3</sup> The infection is transmitted during passage through contaminated uterine cervix during birth, by transplacental transmission, from human milk by breast feeding or from banked milk, transmitted from other children in the newborn nursery and in day-care centers, transmitted through blood, through sexual contacts and through contacts with urine and other body secretions like saliva, semen etc.<sup>4</sup> Primary maternal rubella infection during the first semester of pregnancy causes high risk for the development of congenital rubella with malformations of heads, eye and ear.<sup>5,6,7,8,9,10,11</sup>

### OBJECTIVES

1. To study sero-prevalence of rubella in different ages of pregnant female. 2. To find out whether there is any significant relationship of sero-positive rubella cases with socio-economic status.

### MATERIALS AND METHODS

Materials: 5 ml of venous blood was collected aseptically in a sterile vial. The vial was left at room temperature and the blood was allowed to clot. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree

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centigrade till the assay was done. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree centigrade till the assay was done. Serum samples were tested by Enzyme Linked Immuno Sorbent Assay for IgG to rubella virus using the commercially available kit (NOVATEC IMMUNDIAGNOSTICA GMBH) manufactured by Germany with lot no.RUBG-013.

**Method:** The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics and Gynaecology departments in Gauhati Medical College & Hospital, Guwahati.

**Selection of Cases:** In the present study 81 cases of pregnant women were selected. Amongst them some were Primi gravidae; some were multiparous women with bad obstetric histories like recurrent spontaneous abortion, threatened abortion, missed abortion, intrauterine growth retardation, intrauterine death, congenitally malformed foetus and neonatal death. The socio-economic of the cases of both control and the study group was evaluated according to the different economic categories formulated by HOUSING AND DEVELOPMENT CO-OPERATIVE ORGANIZATION.

**OBSERVATION & RESULTS**

The results and observations of the present study is tabulated and graphed as follows:

**Table 1** Total and sero-positive cases of rubella in different age group

Age group	Total cases	Sero positive cases
16-20	10	1
21-30	53	11
31-40	18	4
<b>SUM</b>	<b>81</b>	<b>16</b>
<b>MEAN</b>	<b>27.00</b>	<b>5.33</b>
<b>SD</b>	<b>±22.869</b>	<b>±5.132</b>
<b>SEM</b>	<b>±13.203</b>	<b>±2.962</b>

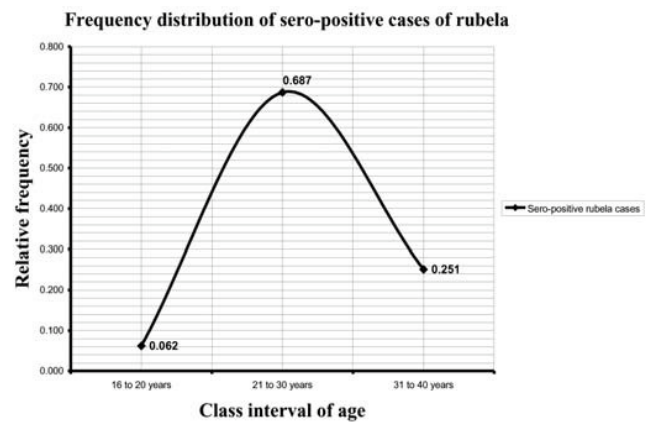
For three different age groups, it is seen that the number of sero-positive cases of rubella ranges from 1 to 11 with a mean value of 5.33, Standard Deviation ±5.132 and Standard Error of Mean ±2.962 as evident from **Table 1**.

**Table 2** Frequency distribution of sero-positive cases

Class interval of age group	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
16 to 20 years	1	0.062	6.200
21 to 30 years	11	0.687	68.700
31 to 40 years	4	0.251	25.100
<b>Sum</b>	<b>16</b>	<b>1.000</b>	<b>100.000</b>

**Table 2** shows that highest number of rubella cases are found in the class interval of ‘21 to 30’ years with a relative frequency of 0.687, simple frequency of 11 and a percentage of 68.700. The lowest number of rubella cases are found in the class interval of

‘16 to 20’ years with a relative frequency of 0.062, simple frequency of 1 and a percentage of 6.200 as evident in **Figure 1**.



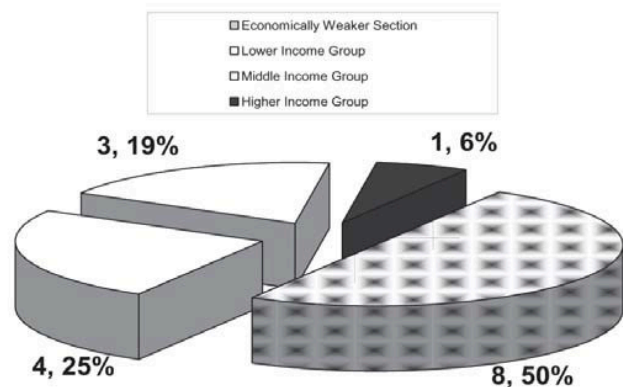
**Figure 1** Relative frequency

**Table 3** Sero-positive rubella cases for different socio-economic status

Socio-economic status	Total number of cases	Sero-positive cases
Economically Weaker Section	34	8
Lower Income Group	20	4
Middle Income Group	20	3
Higher Income Group	7	1
<b>SUM</b>	<b>81</b>	<b>16</b>
<b>MEAN</b>	<b>20.25</b>	<b>4</b>
<b>SD</b>	<b>±11.026</b>	<b>±2.944</b>
<b>SEM</b>	<b>±5.513</b>	<b>±1.472</b>

For four groups of different socio-economic status, it is seen that the number of sero-positive cases of rubella ranges from 1 to 8 with a mean value of 4, Standard Deviation ±2.944 and Standard Error of Mean ±1.472 as evident from **Table 3** and **figure 2**.

**Number & percentage of sero-positive cases of rubella in different socio-economic status**

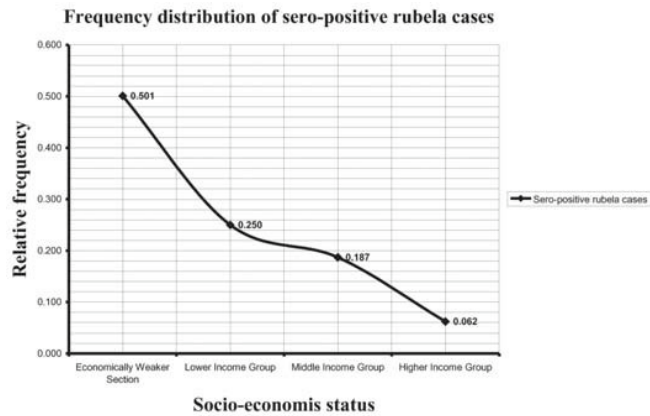


**Figure 2** Sero positive cases of rubella

**Table 4** Frequency distribution of sero-positive cases

Class interval of socio-economic status	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
Economically Weaker Section	8	0.501	50.100
Lower Income Group	4	0.250	25.000
Middle Income Group	3	0.187	18.700
Higher Income Group	1	0.062	6.200
<b>Sum</b>	<b>16</b>	<b>1.000</b>	<b>100.000</b>

**Table 4** shows that highest number of rubella cases are found in the class interval of ‘Economically Weaker Section’ with a relative frequency of 0.501, simple frequency of 8 and a percentage of 50.100. The lowest number of rubella cases are found in the class interval of ‘Higher Income Group’ with a relative frequency of 0.062, simple frequency of 1 and a percentage of 6.200 as evident in **Figure 3**.



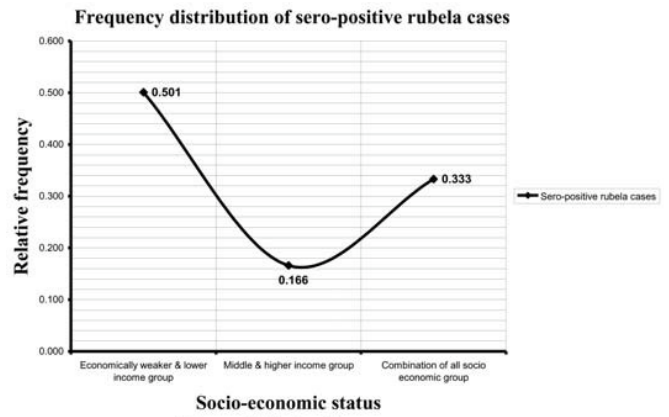
**Figure 3** Relative frequency

**Table 5** Frequency distribution of sero positive cases

Class interval of socio-economic status	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
Economically weaker & lower income group	6	0.501	50.100
Middle & higher income group	2	0.166	16.600
Combination of all socio economic group	4	0.333	33.300
<b>Sum</b>	<b>12</b>	<b>1.000</b>	<b>100.000</b>

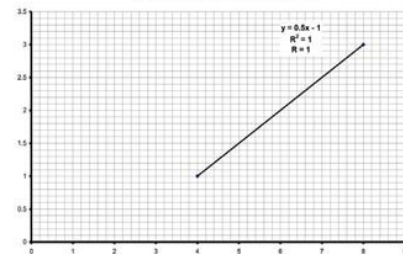
**Table 5** shows that highest number of rubella cases are found in the class interval of ‘Economically weaker & lower income group’ with a relative frequency of 0.501, simple frequency of 6 and a percentage of 50.100. The lowest number of rubella cases are

found in the class interval of ‘Middle & higher income group’ with a relative frequency of 0.166, simple frequency of 2 and a percentage of 16.600 as evident in **Figure 4**.



**Figure 4** Relative frequency

Co-relation between ‘economically weaker & lower income group’ and ‘middle & higher income group’



**Figure 5** XY (Scatter) chart showing trendline and R value

**Table 5** Level of significance of differences between the various categories

Serial number	Comparison of mean between	t <sub>a</sub>	P
1	‘economically weaker & lower income group’ and ‘middle & higher income group’	1.633	P > 0.05
2	‘all groups’ and ‘economically weaker & lower income group’	0.805	P > 0.05

**DISCUSSION**

Studies have shown that less than 50%-70% (mean 60%) of pregnant and non-pregnant women aged 20-40 years from middle and upper socio-economic groups have antibodies to rubella compared with 71.8% of those from lower economic scale.<sup>12,13,14</sup> Crowded conditions in lower class population might increase the chances of exposure to rubella infection.<sup>15</sup> A lot of research has been conducted till date on ‘rubella virus’ in relation to socio-economic status. Most of the studies have concluded that rubella infection is related to lower socio-economic status. Our study is consistent with this universal observation.

Difference between different socio-economic group have been measured in matched sets of observation using the null hypothesis: Reject H<sub>0</sub> if P ≤ t<sub>a</sub> ?? when ? t<sub>a</sub> = t<sub>0.05</sub> setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of P < 0.05, the hypothesis will be rejected establishing differences in socio-economic groups between the tested groups.

**CONCLUSION**

The present study reveals that the number of sero-positive rubella cases is much higher in the age group of ‘21-30’ years than the other two groups i.e. ‘31-40’ years and ‘16-20’ years.

On the other hand, sero-positive rubella cases from highest to

lowest number in relation to socio-economic status are respectively “economically weaker section”, lower income group”, “middle income group” and “higher income group”. When “economically weaker and lower income group” is compared with “middle and higher income group”, then the cases in the first category is much higher than the cases in the second category, but without any significance ( $p > 0.05$ ) and there is strong correlation between this two ( $R=1$ ).

So, we can conclude that highest number of Rubella incidence can be found in the age group of ‘21-30’ years and highly affected people are of “economically weaker section”.

**Conflicts of interest:** No conflict of interest is associated with this work.

**Ethical clearance:** Taken from Institutional Ethical Committee.

**Conflict of interest:** None declared.

**Ethical clearance:** Taken.

**Source of funding:** None declared.

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#### REFERENCES

- MacLean AB and Cockburn F. Maternal and perinatal infection. Dewhursts Text book of obstetrics & Gynaecology for post graduates. 1995;5:471-493.
- Harrison KA. Maternal mortality in developing countries; Br J Obstet. Gynaecol. 1989; 96:1-3.
- Jawaetz, Melnick & Adelbergs. Rubella, chapter 40, Medical Microbiology. 2004;23: 506-569.
- Miller E, Cradock-Watson JE, Pollock TM. Consequences of confirmed maternal rubella at successive stages of pregnancy. Lancet. 1982;2:781-4.
- Cooper LZ & Krugman S. Clinical Manifestations of Postnatal and Congenital Rubella. Arch Ophthalmol. 1967;77:434-9.
- Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B & Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child. 1969;11:18-29.
- Cradock-Watson JE, Ridehalg MKS, Anderson MJ, Pattison JR. Outcome of asymptomatic infection with Rubella virus during pregnancy. J Hyg. 1981;87:147-54.
- Dudgeon JA. Congenital Rubella - A preventable disease. Postgrad Med J. 1972;48:7-11.
- McEvoy GK (Ed). Drug Information 97, American Hospital Formulary Service, American Society of Hospital Pharmacists, Bethesda, MD. 1997;1:2645.
- Robertson SE, Cutts FT, Samuel R, Diaz-Ortega JL. Control of rubella and congenital rubella syndrome in developing countries. vaccination against rubella. Bull World Health Organ. 1997;2(75):69-80.
- Tartakow IJ. The teratogenicity of maternal rubella. J Pediatr. 1965;66:380-1.
- Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B & Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child. 1969;11:18-29.
- Seth P, Balaya S, Mohapatra LN. Seroepidemiological study of Rubella infection in female subjects of Delhi and its surrounding villages. Indian J Med Res. 1971;59:190-94.
- Vijaylakshmi P, Anuradha R, Prakash K, Narendran K, Ravindran M & Prajna L. Rubella serosurveys at three Arvind Eye Hospitals in Tamil Nadu, India. Bulletin of the World Health Organization. 2004;82:259-64.
- Yadav S, Gupta S & Kumar S. Seroprevalence of Rubella in women of reproductive age. Indian J Pathol Microbiol. 1995;38(2):139-142.