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Sero Susceptibility Survey of Rubella Infection among Pregnant Women Attending Antenatal Clinic in Jos.

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ABSTRACT

Background: In 2000, a WHO position paper on rubella vaccines recommended that all countries assess their rubella prevalence and, if appropriate, make plans for the introduction of rubella vaccine [6]. Two types of assessment were recommended: (1) a susceptibility profile of women of childbearing age, e.g through serological surveys of women attending antenatal services and (II) surveillance for Congenital Rubella Syndrome[7]. For the purpose of this study and for international comparison the WHO guidelines for assessment of susceptibility profile of women attending antenatal services was used. The aim of the study was to determine the seroprevalence of rubella virus infection amongst pregnant women attending antenatal clinic in Jos University Teaching Hospital
Method: The study was descriptive cross-sectional study and clinic based.
Result: A total of 276 samples were analyzed, 265 (96%) were positive showing protective titre of rubella immunoglobulin G, while 11 subjects i.e. 4% were sero susceptible having no protective titre of rubella immunoglobulin G. The influence of socio demographic and obstetric factors if any on the prevalence of rubella immunity of pregnant women was determined. It was found out that age, ethnicity, place of residence and parity had no influence on rubella immunity as there was no statistically significant difference. There was statistically significant difference however when the influence of religion, education and occupation were analyzed. Out of the 276 sample analyzed, 153 were Muslims and 123 were Christians subjects tested. 9 Muslims and 2 Christians were negative. The difference was statistically significant (x^2 =3.288 ,p=0.0493). Out of the 11 that were negative 7 had no education and 4 had primary education. Those without education when compared with those of secondary education, the difference in the findings was statistically significant.(x^2 =5.684,p=0.017).When the role of occupation was compared 6 negative subjects were housewives and 5 were business women. Subjects that are housewives when compared with subjects in other occupation, is statistically significant (x^2=11.576,P=0.041).
Conclusion: The seroprevalence of rubella IgG antibodies among pregnant women attending antenatal clinic Jos University Teaching Hospital suggest 4% of women is susceptible and the fetuses are at risk of congenital rubella malformation.
In this study the rate of susceptibility to rubella is low and is recommended that those with seropositive serum immunoglobulin G be assessed for evidence of recent infection and the burden of congenital rubella syndrome (CRS) be determined in further study.

INTRODUCTON

Rubella, commonly known as German measles is a disease caused by rubella virus. Rubella has a worldwide distribution[1]. The virus transmitted via airborne droplet emission from the upper respiratory tract of infected persons [1,2]. The disease has an incubation period of 2-3weeks, after which disease symptoms develop, which is usually mild without consequences and complication[2]

Infection of non-immune or susceptible pregnant mother by the virus does not cause serious illness to the mother, but can cause devastating problems, if the virus infects the placenta and then spread to the fetus especially within the first 20 weeks of pregnancy [3]. It can lead to spontaneous abortion, stillbirth, and the child maybe born with congenital rubella syndrome (CRS), which is a range of serious incurable illnesses [4,11]

Although the burden of CRS is not adequately characterized in most countries, data from World Health Organization (WHO) estimates that more than 100,000 cases of CRS occurs each year in developing countries alone, which is pointing to a serious health issue [5]. In 2000, a WHO position paper on rubella vaccines recommended that all countries assess their rubella prevalence and, if appropriate, make plans to the introduction of rubella vaccine [6]. Two types of assessment were recommended: (1) a susceptibility profile of women of childbearing age, e.g through serological surveys of women attending antenatal services and (II) surveillance for CRS [7]. For the purpose of the study and for international comparison the WHO guidelines for assessment of susceptibility profile of women attending antenatal services was used

AIMS AND OBJECTIVES

General

To determine the seroprevalence of rubella virus infection amongst pregnant women attending antenatal clinic in Jos University Teaching Hospital.

Specific

1) To estimate the frequency of rubella seropositivity among pregnant women and there getting an estimate of seronegative, who might be in need of immunization postpartum.
2) To determine if the virus induces detectable immunoglobulin G (IgG) antibodies in protective level in pregnant women.
3) To determine whether rubella virus infection is a public health concern in Jos.
4) To recommend the findings to the ministry of health and to other relevant agencies.

Justification for the Study

In view of the effect of rubella infection in non-immune pregnant women infected within the first 20 weeks of pregnancy vis-à-vis the medical implications, which are spontaneous abortion, stillbirths and the devastating teratogenic effects also known as congenital rubella syndrome (CRS), which is a range of incurable illnesses. There is a need to ascertain the prevalence of this infection in pregnant women, especially since there is no published information on the immune status of women from Plateau and environ. It is therefore necessary to evaluate the prevalence and to provide data that will facilitate prevention.

SUBJECT, MATERIALS AND METHOD

Study Area

Jos University Teaching Hospital (JUTH) is a tertiary health institution situated in Jos. JUTH is one of the two teaching hospitals in the North-central zone of Nigeria. Jos is the capital city of Plateau State. Plateau State has over 30 different ethnic group[20].

The 1991 Nigerian census put the population of Plateau State at 2,959,588 with 1,031,662 female[20].

Plateau State lies between latitude 7^0 and 11^0 North and Longitude 70^0 and 250^0 east. The capital city is a pear shape upland known as Jos Plateau. This upland stretches for approximately 104km from north to south, and 80km from east to west, covering an area of about 8,600km.

This region has a height of 1,200m above sea level[21].

JUTH is located in the central part of Jos, the Plateau State capital in North central Nigeria. The hospital has an established Obstetrics and Gynaecology department that offers services relating to the prevention of mother to child infections.

Study Population

The study population was pregnant women presenting to the antenatal clinic for booking at Jos University Teaching Hospital, North Central, Nigeria

Study Design

The study was descriptive cross-sectional study and clinic based.

Inclusion Criteria

1) Pregnant women presenting to the antenatal clinic of JUTH for booking.

2) Pregnant women presenting to the antenatal clinic for follow up with a willingness to participate by signing the consent form.

Exclusion Criteria

Women who were not pregnant

Ethical Consideration

This proposal was presented to the research and ethical committee of Jos University Teaching Hospital for approval. Informed consent was obtained from the subjects before enlistment for the study.

Sample Size

A total of 276 pregnant women were subjected to the test.

Data Collection

The procedure was explained to all subjects and a written consent obtained from each of them.

Data was collected from the proforma and Laboratory. Data was collected in collaboration with the midwives were trained as voluntary counselors. The laboratory investigations was done at the virology laboratory of National Veterinary Research Institute. (NVRI) Vom.

Serum samples were screened for rubella-specific IgG antibodies using a commercial ELISA test kits.

This is a solid phase enzyme immunoassay for qualitative and quantitative determination of rubella IgG antibodies in human serum.

The presence and quantity of rubella IgG antibody in each serum sample was determined by comparing the optical density of test sample to the standard range.

The permitted calculation of antibody titre is in international unit per ml (IU/ML).

Based on the manufacturer's instruction, serum sample with titre < 10IU/ml was classified as negative for rubella IgG antibodies, samples with titre of 10 to < 15IU/ml will be classified as equivocal; samples with titre of 20IU/ml or higher will be classified as positive.

Any sample that is 20IU/ml and above has protective titre value.

ELISA runs was validated using the criteria indicated by manufacturer.

Statistical Methods

The following parameters were evaluated in terms of their association with IgG level: demographic characteristics, qualitative and quantitative determination, history of vaccination or precious infection. Results was expressed as means, and or as median with ranges. Chi square was used to determine significance of association. The relationship between IgG and other variables listed above was examined using P values. All analysis were conducted using the SPSS version 15 software.

Expected Results

From the review of literatures, the rate of rubella susceptibility in women varied widely depending on the availability of vaccination program.

A range of 5-45%[4,10,11] sero negativity has been quoted, I expected a similar rate in this study on account of similar socio-economic conditions and lack of vaccination programs in the two environment.

Limitation to the Study

1. It would have been appropriate to investigate those women that will be seronegative to find out the percent that might seroconvert and effect(s) of this if any on fetuses at delivery. This should form the basis for further studies.
2. Initial compliance of patients was low due to poor knowledge of the disease entity.

RESULTS

A total of 276 samples from voluntary subjects were analized. 265 samples were positive for rubella IgG i.e. 96% (C.I). 11 samples were negative i.e 4% as shown on table A

Socio-demographic characteristics:

Table B showed the age distribution of subjects and rubella IgG result .for the age range 15-20yrs, 27 subjects were in this age range; 26 were positive,1 was negative. In the age range 21-25, 86 out of the 90 were positive while 4 were negative. For the age range 26-30 they were 99 subjects, 95 were positive and 4 were negative. In the age range 31-35 yrs they were 43 in that group, 41 of who were seropositive while 2 were negative. In 36-40 yrs age group all 17 in that age group were all positive. The findings in the various age ranges was not statistically significant (x^2 =0.811, p=0.937). See tables B1,

Table C showed the ethnic groups of all the subjects. 98 were Hausa, 34 were Igbo, 32 were Fulani, 18 were Beroms, 13 Yoruba and 81 were other ethnic groups. Among the negative subjects, 4 were Fulani, 3 were Hausa and 4 were from other ethnic groups. This was not statistically significant (x^2 =9.171, P=0.102) as shown on table C1

Table D shows place of residence.227 subjects (85.7%) were resident in Jos .All the 11 negative subjects were living in Jos. 26 subjects or 9.8% reside in Bukuru. And 12 were outside. The difference was not statistically significant (x^2 =1.829,P=0.401)

Table E shows Parity of Subject.151 were multigravidae (G2-4), 8 were negative.54 were grandmultigravidae (G5 and above),2 were negative.61

subjects were recruited and 1 was negative. No statistically significant difference in the findings.(x^2 =1.357,P=0.507)

Table F showed Religion of subject. 2 of the 123 Christians subject were negative and 9 out of the 153 Muslims were negative. There was statistically significance difference in the percentage negativity amongst the two religious groups (x^2 =3.288 and P=0.05).

The educational status of subject is shown on table G. 7 out of the 100 subjects that had no education were negative, 4 out of the 67 subjects that had primary education were negative. Of the 78 and 31 that had secondary and tertiary education respectively, there were all sero-positive. In comparing those with no education with those with secondary education, there was statistically significant difference (x^2 =.5.684; P=.0.017). However there no statistically significant difference between subjects that had no education and those with tertiary education (x^2 =.2.293; P=0.130).

Table H shows occupation of subjects; of the 120 subjects that were housewives 6 were negative and 5 out of 43 business women were negative. All the 54 civil servants, 31 tailors, 27 students and other (banker) were all sero positive. There was statistically significant difference between the different occupation(x^2 =.11.57; P=0.041). See table H1.

Table I shows the serum rubella immunoglobulin result according to trimester. Among the 11 subjects that were positive 2 were in 1st trimester, 6 in second trimester, 3 in 3rd trimester. There was no statistically significant difference in the finding (x^2 =1.004,P=0.587).

The IgG status of the 276 volunteer subjects

Number	OD Value	IgG Concentration(I.U)	Remark
1	0.494	>20	Positive
2	0.626	>20	Positive
3	0.625	>20	Positive
4	1.015	>20	Positive
5	0.901	>20	Positive
6	0.245	>20	Positive
7	0.032	<15	Negative
8	1.318	>20	Positive
9	0.493	>20	Positive
10	1.003	>20	Positive
11	0.478	>20	Positive
12	0.411	>20	Positive
13	1.362	>20	Positive
14	0.190	>20	Positive
15	0.806	>20	Positive
16	0.730	>20	Positive
17	1.062	>20	Positive
18	0.969	>20	Positive
19	0.365	>20	Positive
20	0.708	>20	Positive
21	0.556	>20	Positive
22	0.510	>20	Positive
23	0.426	>20	Positive
24	0.742	>20	Positive
25	0.448	>20	Positive
26	0.841	>20	Positive
27	0.578	>20	Positive
28	0.584	>20	Positive
29	0.939	>20	Positive
30	1.110	>20	Positive
31	0.817	>20	Positive
32	0.562	>20	Positive
33	0.571	>20	Positive
34	1.415	>20	Positive
35	0.259	>20	Positive
36	1.544	>20	Positive
37	0.729	>20	Positive

38	0.017	<15	Negative
39	1.146	>20	Positive
40	0.883	>20	Positive
41	1.102	>20	Positive
42	0.623	>20	Positive
43	1.388	>20	Positive
44	0.140	<15	Negative
45	1.110	>20	Positive
46	0.011	<15	Negative
47	1.714	>20	Positive
48	0.389	>20	Positive
49	0.693	>20	Positive
50	1.154	>20	Positive
51	0.273	>20	Positive
52	0.531	>20	Positive
53	1.362	>20	Positive
54	0.927	>20	Positive
55	0.895	>20	Positive
56	1.317	>20	Positive
57	0.282	>20	Positive
58	0.410	>20	Positive
59	0.537	>20	Positive
60	1.023	>20	Positive
61	0.826	>20	Positive
62	0.744	>20	Positive
63	1.062	>20	Positive
64	0.961	>20	Positive
65	0.540	>20	Positive
66	1.489	>20	Positive
67	0.714	>20	Positive
68	0.444	>20	Positive
69	0.684	>20	Positive
70	1.281	>20	Positive
71	1.310	>20	Positive
72	0.180	>20	Positive
73	1.773	>20	Positive
74	0.623	>20	Positive
75	0.917	>20	Positive
76	0.744	>20	Positive
77	1.273	>20	Positive
78	0.726	>20	Positive
79	0.559	>20	Positive
80	0.408	>20	Positive
81	0.327	>20	Positive
82	0.945	>20	Positive
83	0.463	>20	Positive
84	0.808	>20	Positive
85	0.358	>20	Positive
86	0.370	>20	Positive
87	0.132	<15	Negative
88	0.295	>20	Positive
89	1.273	>20	Positive
90	0.274	>20	Positive
91	1.573	>20	Positive
92	1.203	>20	Positive
93	2.016	>20	Positive
94	1.713	>20	Positive

95	0.494	>20	Positive
96	2.285	>20	Positive
97	0.921	>20	Positive
98	1.427	>20	Positive
99	2.194	>20	Positive
100	0.346	>20	Positive
101	1.486	>20	Positive
102	0.688	>20	Positive
103	1.349	>20	Positive
104	1.622	>20	Positive
105	1.427	>20	Positive
106	2.216	>20	Positive
107	1.496	>20	Positive
108	1.533	>20	Positive
109	2.076	>20	Positive
110	0.450	>20	Positive
111	1.293	>20	Positive
112	1.928	>20	Positive
113	2.100	>20	Positive
114	2.078	>20	Positive
115	1.384	>20	Positive
116	1.902	>20	Positive
117	0.819	>20	Positive
118	1.665	>20	Positive
119	1.509	>20	Positive
120	0.764	>20	Positive
121	0.494	>20	Positive
122	0.626	>20	Positive
123	0.625	>20	Positive
124	1.015	>20	Positive
125	0.901	>20	Positive
126	0.245	>20	Positive
127	0.032	<15	Negative
128	1.318	>20	Positive
129	0.493	>20	Positive
130	1.003	>20	Positive
131	0.478	>20	Positive
132	0.411	>20	Positive
133	1.362	>20	Positive
134	0.190	>20	Positive
135	0.806	>20	Positive
136	0.730	>20	Positive
137	1.062	>20	Positive
138	0.969	>20	Positive
139	0.365	>20	Positive
140	0.708	>20	Positive
141	0.556	>20	Positive
142	0.510	>20	Positive
143	0.426	>20	Positive
144	0.742	>20	Positive
145	0.448	>20	Positive
146	0.841	>20	Positive
147	0.578	>20	Positive
148	0.584	>20	Positive
149	0.939	>20	Positive
150	1.110	>20	Positive
151	0.817	>20	Positive

152	0.562	>20	Positive
153	0.571	>20	Positive
154	1.415	>20	Positive
155	0.259	>20	Positive
156	1.544	>20	Positive
157	0.729	>20	Positive
158	0.017	<15	Negative
159	1.146	>20	Positive
160	0.883	>20	Positive
161	1.102	>20	Positive
162	0.623	>20	Positive
163	1.388	>20	Positive
164	0.140	<15	Negative
165	1.110	>20	Positive
166	2.105	>20	Positive
167	1.789	>20	Positive
168	1.149	>20	Positive
169	1.189	>20	Positive
170	2.037	>20	Positive
171	1.810	>20	Positive
172	1.669	>20	Positive
173	2.026	>20	Positive
174	0.010	<15	Negative
175	1.110	>20	Positive
176	1.411	>20	Positive
177	2.007	>20	Positive
178	1.727	>20	Positive
179	1.998	>20	Positive
180	2.044	>20	Positive
181	1.656	>20	Positive
182	2.138	>20	Positive
183	2.102	>20	Positive
184	1.309	>20	Positive
185	1.948	>20	Positive
186	2.259	>20	Positive
187	2.267	>20	Positive
188	1.917	>20	Positive
189	1.236	>20	Positive
190	2.054	>20	Positive
191	1.067	>20	Positive
192	2.204	>20	Positive
193	2.118	>20	Positive
194	1.966	>20	Positive
195	1.567	>20	Positive
196	0.011	<15	Negative
197	1.714	>20	Positive
198	0.389	>20	Positive
199	0.693	>20	Positive
200	1.154	>20	Positive
201	0.273	>20	Positive
202	0.531	>20	Positive
203	1.362	>20	Positive
204	0.927	>20	Positive
205	0.895	>20	Positive
206	1.317	>20	Positive
207	0.282	>20	Positive
208	0.410	>20	Positive

209	0.537	>20	Positive
210	1.023	>20	Positive
211	0.826	>20	Positive
212	0.744	>20	Positive
213	1.062	>20	Positive
214	0.961	>20	Positive
215	0.540	>20	Positive
216	1.489	>20	Positive
217	0.714	>20	Positive
218	0.444	>20	Positive
219	0.684	>20	Positive
220	1.281	>20	Positive
221	1.310	>20	Positive
222	0.180	>20	Positive
223	1.773	>20	Positive
224	0.623	>20	Positive
225	0.917	>20	Positive
226	0.744	>20	Positive
227	1.273	>20	Positive
228	0.726	>20	Positive
229	0.559	>20	Positive
230	0.408	>20	Positive
231	0.327	>20	Positive
232	0.945	>20	Positive
233	0.463	>20	Positive
234	0.808	>20	Positive
235	0.358	>20	Positive
236	0.370	>20	Positive
237	0.132	<15	Negative
238	0.295	>20	Positive
239	1.273	>20	Positive
240	0.274	>20	Positive
241	2.143	>20	Positive
242	2.282	>20	Positive
243	1.508	>20	Positive
244	2.161	>20	Positive
245	2.131	>20	Positive
246	1.153	>20	Positive
247	1.459	>20	Positive
248	1.721	>20	Positive
249	2.004	>20	Positive
250	2.115	>20	Positive
251	1.844	>20	Positive
252	2.100	>20	Positive
253	0.954	>20	Positive
254	2.005	>20	Positive
255	1.879	>20	Positive
256	0.610	>20	Positive
257	2.159	>20	Positive
258	2.086	>20	Positive
259	2.171	>20	Positive
260	2.277	>20	Positive
261	2.065	>20	Positive
262	1.444	>20	Positive
263	1.598	>20	Positive
264	2.085	>20	Positive
265	1.565	>20	Positive

266	1.582	>20	Positive
267	1.828	>20	Positive
268	1.498	>20	Positive
269	1.962	>20	Positive
270	1.520	>20	Positive
271	0.638	>20	Positive
271	2.018	>20	Positive
273	1.907	>20	Positive
274	1.858	>20	Positive
275	2.135	>20	Positive
276	1.439	>20	Positive

Table A: serum sample * IgG status Cross tabulation

			IgG status		Total
			Positive	Negative	Positive
Serum sample	Samples	Count	265	11	276
		% of Total	96.0%	4.0%	100.0%
Total		Count	265	11	276
		% of Total	96.0%	4.0%	100.0%

Table B: Age distribution of subjects

	IgG Status		
	Positive	negative	Total
Age range			
15-20	26	1	27
% Total count	9.4%	0.4%	9.8%
% Within IgG status	9.4%	9.1%	9.8%
21-25	86	4	90
% Total count	31.2%	1.4%	32.6%
% Within IgG status	32.5%	36.4%	32.6%
26-30	95	4	99
% Total count	34.2%	1.4%	35.9%
% Within IgG status	35.8%	36.4%	35.9%
31-35	41	2	43
% Total count	14.9%	0.7%	15.6%
% Within IgG status	15.5%	18.2%	15.6%
36-40	17	0	17
% Total count	6.2%	0.0%	6.2%
% Within IgG status	6.4%	0.0%	6.2%
Total count	265	11.0	276.0
	96.0%	4.0%	100%

Chi-Square Tests .Table B1

	Value	Df	Asymp. Sig. (2-sided)
Pearson -Square Chi	.811(a)	4	.937
Likelihood Ratio	1.484	4	.829
N of Valid Cases	276		

a 5 cells (50.0%) have expected count less than 5. The minimum expected count is .68.

Table C: Tribes * IgG status Cross tabulation

			IgG status		Total
			positive	negative	Positive
Tribes	Ibo	Count	34	0	34
		% within IgG status	12.8%	.0%	12.3%
		% of Total	12.3%	.0%	12.3%
	Hausa	Count	95	3	98
		% within IgG status	35.8%	27.3%	35.5%
		% of Total	34.4%	1.1%	35.5%
	Yoruba	Count	13	0	13
		% within IgG status	4.9%	.0%	4.7%
		% of Total	4.7%	.0%	4.7%
	Fulani	Count	28	4	32
		% within IgG Status	10.6%	36.4%	11.6%
		% of Total	10.1%	1.4%	11.6%
	Berom	Count	18	0	18
		% within IgG Status	6.8%	.0%	6.5%
		% of Total	6.5%	.0%	6.5%
	Others	Count	77	4	81
		% within IgG Status	29.1%	36.4%	29.3%
		% of Total	27.9%	1.4%	29.3%
Total		**Count**	265	11	276
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

Table C1 :Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.171(a)	5	.102
Likelihood Ratio	9.648	5	.086
N of Valid Cases	276		

a 6 cells (50.0%) have expected count less than 5. The minimum expected count is .52.

Table D=Residence

			IgG status		Total
			positive	Negative	Positive
Resident	Jos	Count	227	11	238
		% within IgG Status	85.7%	100.0%	86.2%
		% of Total	82.2%	4.0%	86.2%
	Bukuru	Count	26	0	26
		% within IgG Status	9.8%	.0%	9.4%
		% of Total	9.4%	.0%	9.4%
	Others	Count	12	0	12
		% within IgG Status	4.5%	.0%	4.3%
		% of Total	4.3%	.0%	4.3%
Total		Count	265	11	276
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

resident * IgG status Cross tabulation

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.829(a)	2	.401
Likelihood Ratio	3.331	2	.189
N of Valid Cases	276		

a 2 cells (33.3%) have expected count less than 5. The minimum expected count is .48.

Table E Parity: Parity IgG status Cross tabulation

			IgG status		Total
			positive	negative	Positive
Parity	1	Count	60	1	61
		% within IgG Status	22.6%	9.1%	22.1%
		% of Total	21.7%	.4%	22.1%
	2-4	Count	151	8	159
		% within IgG Status	57.0%	72.7%	57.6%
		% of Total	54.7%	2.9%	57.6%
	5-above	Count	54	2	56
		% within IgG Status	20.4%	18.2%	20.3%
		% of Total	19.6%	.7%	20.3%
Total		Count	265	11	276
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.357(a)	2	.507
Likelihood Ratio	1.567	2	.457
N of Valid Cases	276		

a 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.23.

Table F: Religion

Religion * IgG status Crosstabulation

Count

		IgG status		
		positive	Negative	Total
Religion	Christian	121	2	123
	Islam	144	9	153
Total		265	11	276

Table F1:Religion Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.228(b)	1	.0493		
Continuity Correction(a)	2.212	1	.137		
Likelihood Ratio	3.550	1	.060		
Fisher's Exact Test				.119	.065
Linear-by-Linear Association	3.216	1	.073		
N of Valid Cases	276				

a Computed only for a 2x2 table
b 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.90.

Table F2: Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Interval by Interval	Pearson's R	.108	.050	1.801	.073(c)
Ordinal by Ordinal	Spearman Correlation	.108	.050	1.801	.073(c)
N of Valid Cases		276			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.
c Based on normal approximation.

Table G :Educational status * IgG status Cross tabulation

			IgG status		Total
			positive	negative	positive
Educational status	no education	Count	93	7	100
		Expected Count	96.0	4.0	100.0
		% within IgG status	35.1%	63.6%	36.2%
		% of Total	33.7%	2.5%	36.2%
	primary education	Count	63	4	67
		Expected Count	64.3	2.7	67.0
		% within IgG Status	23.8%	36.4%	24.3%
		% of Total	22.8%	1.4%	24.3%
	secondary education	Count	78	0	78
		Expected Count	74.9	3.1	78.0
		% within IgG Status	29.4%	.0%	28.3%
		% of Total	28.3%	.0%	28.3%
	tertiary education	Count	31	0	31
		Expected Count	29.8	1.2	31.0
		% within IgG Status	11.7%	.0%	11.2%
		% of Total	11.2%	.0%	11.2%
Total		Count	265	11	276
		Expected Count	265.0	11.0	276.0
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

Table G 1 :Educational status Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.589(a)	3	.055
Likelihood Ratio	11.420	3	.010
N of Valid Cases	276		

a 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.24.

Table G2: Educational status * IgG status Cross tabulation

			IgG status		Total
			positive	Negative	Positive
Educational status	no education	Count	93	7	100
		Expected Count	96.1	3.9	100.0
		% within IgG Status	54.4%	100.0%	56.2%
		% of Total	52.2%	3.9%	56.2%
	secondary education	Count	78	0	78
		Expected Count	74.9	3.1	78.0
		% within IgG Status	45.6%	.0%	43.8%
		% of Total	43.8%	.0%	43.8%
Total		Count	171	7	178
		Expected Count	171.0	7.0	178.0
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.1%	3.9%	100.0%

Table G3 :Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.684(b)	1	.017		
Continuity Correction(a)	3.982	1	.046		
Likelihood Ratio	8.295	1	.004		
Fisher's Exact Test				.019	.016
N of Valid Cases	178				

a Computed only for a 2x2 table

b 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.07.

Table H: occupation IgG status Cross tabulation

			IgG status		Total
			Positive	negative	positive
Occupations	house wife	Count	114	6	120
		% within IgG Status	43.0%	54.5%	43.5%
		% of Total	41.3%	2.2%	43.5%
	civil servant	Count	54	0	54
		% within IgG Status	20.4%	.0%	19.6%
		% of Total	19.6%	.0%	19.6%
	business woman	Count	38	5	43
		% within IgG Status	14.3%	45.5%	15.6%
		% of Total	13.8%	1.8%	15.6%
	Student	Count	27	0	27
		% within IgG Status	10.2%	.0%	9.8%
		% of Total	9.8%	.0%	9.8%
	Tailor	Count	31	0	31
		% within IgG Status	11.7%	.0%	11.2%
		% of Total	11.2%	.0%	11.2%
	Others	Count	1	0	1
		% within IgG Status	.4%	.0%	.4%
		% of Total	.4%	.0%	.4%
Total		Count	265	11	276
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

Table H1 :Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.576(a)	5	.041
Likelihood Ratio	13.895	5	.016
N of Valid Cases	276		

a 7 cells (58.3%) have expected count less than 5. The minimum expected count is .04.

Table IA .Gestational age .Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.064(a)	2	.587
Likelihood Ratio	.960	2	.619
N of Valid Cases	276		

a 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.79.

Table I=Gestational age
Trimester * IgG status Cross tabulation

			IgG status		Total
			Positive	negative	positive
Trimester	0-13 weeks	Count	43	2	45
		Expected Count	43.2	1.8	45.0
		% within IgG status	16.2%	18.2%	16.3%
		% of Total	15.6%	.7%	16.3%
	14-26	Count	179	6	185
		Expected Count	177.6	7.4	185.0
		% within IgG Status	67.5%	54.5%	67.0%
		% of Total	64.9%	2.2%	67.0%
	27-40	Count	43	3	46
		Expected Count	44.2	1.8	46.0
		% within IgG Status	16.2%	27.3%	16.7%
		% of Total	15.6%	1.1%	16.7%
Total		Count	265	11	276
		Expected Count	265.0	11.0	276.0
		% within IgG Status	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

DISCUSSION:

A total of 276 samples were analyzed, 265 (96%) were positive showing protective titre of rubella immunoglobulin G, while 11 subjects i.e. 4% were sero susceptible having no protective titre of rubella immunoglobulin G (Negative).

These results are similar to those that have been reported in this continent in the past. Antenatal Rubella sero survey in Maputo Mozambique, a survey of 973 women detected antibody in 95.3% of subjects and 4.7% were negative.[8] The findings is also similar to that reported 11 years ago in a sero survey in Mozambican refugees living in South Africa where 200/205 (97.6%) of persons aged 16-40 yrs had rubella antibody.[9]

Similar works have equally been done in Nigeria, a cross sectional study of primigravida attending antenatal clinic at Adeoye State General Hospital, Ibadan, found a prevalence of 68.5% with 31.5% being negative.[10] Similar work also done in Maiduguri North Eastern Nigeria showed a prevalence of 54.1%.[19.] This research adds to the picture of low rate of rubella susceptibility in other part of the continent but is at variance with those done in Ibadan and Benin. The survey in Ibadan was amongst primigravida and a smaller sample size. There is also weather difference between Jos and Ibadan that could affect the spread of the virus and hence the seroprevalence of rubella IgG immunoglobulin.[12]

For more than 3 decades there has been interest in serological survey to assess rubella immunity in Africa and there are published literature reviews.[13,16.] A more recent review identified 47 rubella sero survey of women of child bearing age conducted in 27 African countries from the late 1960 to 2000.[5] The rate of rubella susceptibility in women of child bearing age varied widely, 13 serosurvey (28%) reported >20% susceptibility,17 serosurvey (36%) reported 10-19% susceptibility, and another 17 serosurvey (36%) reported <10%[8].

This work adds to the picture and shows a relatively low rate of rubella susceptibility.

In countries where the rate of susceptibility to rubella is low among women of childbearing age, it may be useful to assess the burden of CRS. If recent rubella outbreaks have occurred, then a high number of cases of CRS might have occurred[8,14]. Rubella IgM ELISA testing may be used for laboratory confirmation of CRS, but this is most useful in children <6 months of age. Another method for assessing the CRS burden would be a retrospective review of hospital records or of records of children at schools for the deaf and blind, seeking to identify children who meet the CRS clinical case definition[8,10]. Where both the rubella susceptibility among childbearing aged women and the CRS

incidence are low, rubella vaccine introduction would not be a priority. Nevertheless, long-term monitoring of the epidemiological situation would be prudent[6]. This could consist of periodic antenatal rubella serosurveys (every 5–10 years) and/or routine surveillance for rubella linked with laboratory confirmation of measles cases, as is already being implemented in neighboring countries in the Southern part of Africa [16,17,18,19.] .

In this study we also investigated the influence of socio demographic and obstetric factors if any on the prevalence of rubella immunity of pregnant women. I found out that age, ethnicity, place of residence and parity had no influence on rubella immunity as there was no statistically significant difference. There was statistically significant difference however when the influence of religion, education and occupation were analyzed.

153 Muslims and 123 Christian subjects were tested. 9 Muslims and 2 Christians were negative. The difference was statistically significant (x^2 = 3.288 p=0.0493). Public contact among females in the Muslim population is restricted, this could be adduced as reason for the difference in seronegativity.

Those without education when compared with those secondary education and subjects that are housewives when compared with subjects in other occupation, there was statistically significant different in our finding as shown in the result above. The reason above for difference in the religious groups could also suffice. Work outside the home and schooling increases contact with other people and hence the possibility of getting infected with rubella virus and becoming seropositive before pregnancy.

The study found a high prevalence of rubella IgG antibodies among pregnant women attending antenatal clinic in JUTH, Jos .Whether this is due to recent exposure to wild rubella virus or exposure to rubella virus earlier in life remains unclear.

CONCLUSION AND RECOMMENDATIONS

The seroprevalence of rubella IgG antibodies among pregnant women attending antenatal clinic Jos University Teaching Hospital suggest 4% of women is susceptible and the fetuses are at risk of congenital rubella malformation.

In this study the rate of susceptibility to rubella is low and is recommended that those with seropositive serum immunoglobulin G be assessed for evidence of recent infection and the burden of congenital rubella syndrome (CRS) be determined.

Testing of those who where negative should be repeated at delivery using both IgM and IgG ELISA test kits.

After delivery those 11 patients (4%) should be given rubella vaccine if they are still seronegative post partum.

Long term monitoring of the epidemiological situation is prudent, using periodic 5 yearly antenatal serosurvey.

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