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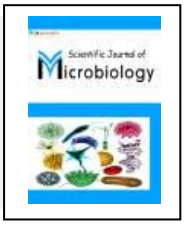

Original article

Seroprevalence of measles IgM in children 5-12 years from selected primary schools in Giwa Local Government Area, Zaria, Kaduna state

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ABSTRACT

Seroprevalence of Measles IgM was carried out among children age 5-12 years in Giwa, Kaduna State. The test was carried out using Enzyme Linked Immunosorbent Assay (ELISA) method. Of the 90 (100%) samples assayed for the measles IgM antibodies, 32.2% were seropositive for measles IgM. A breakdown of the seropositive subject reveals that 18.9% of the infected children were males, while 13.3% were females. Those children within the age of 5-6years had the highest prevalence (16.6%), followed by those within the age of 7-8years (6.6), 9-10years and 11-12years had 5.5% and 3.3% respectively. However, in relation to sex the male children had the highest prevalence of 38% while the female children had a prevalence of 26%. It was observed that 16 (17 8%) of the children had fever and of these number, 68.75% tested positive for measles. However, rashes were most associated with measles in the studies as all the children with rashes were positive for measles IgM. The study also revealed that only 7.7% of the immunized children tested positive for measles IgM.

1. Introduction

Nigeria maintains a routine Immunization programme which was launched in 1979 (Adu and Adeniji, 1995) and coverage in all Government Hospitals at local and National levels leading to reduction of the incidences of vaccine preventable childhood illnesses (Onoja, et al, 1992). Though this goal has been pursued vigorously by the present administration and reports indicate that 80 – 85% of children receive the single dose always given at nine months after birth (FGN/ WHO, 1996). Inspite of all these, it is estimated that measles kills up to 880,000 children annually, a toll more than any other vaccine-preventable disease. The global plan, established by the World Health Organization (WHO) and United Nations Children's Fund (UNICEF), is to cut this burden by two-thirds between 2000 and 2005, and thereafter to prevent 600,000 measles fatalities annually (Brown 2000). It is also reported that half of the total deaths were recorded in three African countries (Congo, Ethiopia and Nigeria) and one Asian country (India) (Nigatu, et al, 2003). The first scientific description of measles and its distinction from smallpox and chickenpox is credited to the Persian Physician, Rhazes (860–932), who published The Book of Smallpox and Measles (Harminder et al., 2008). In 1954, the virus causing the disease was isolated from an 11-year old boy from the United States, David Edmonston, and adapted and propagated on chick embryo tissue culture (Griffin, 2007) leading to the development of the first successful vaccine (Offit, 2007). Classic measles infection can be subdivided into the following clinical stages, incubation the incubation (period begins after measles virus entry via the respiratory mucosa or conjunctivae), prodrome (defined by the appearance of symptoms which typically include fever, malaise, and anorexia, followed by conjunctivitis, coryza, and cough), exanthem (appearance of maculopapular, blanching rash beginning on the face and spreading cephalocaudally and centrifugally to involve the neck, upper trunk, lower trunk and extremities) and recovery (Perry and Halsey, 2004). Measles virus infection causes a generalized immunosuppression marked by decreases in delayed-type hypersensitivity, interleukin (IL)-12 production, and antigen-specific lymphoproliferative responses that persist for weeks to months after the acute infection. Immunosuppression may predispose individuals to secondary opportunistic infections. Bronchopneumonia is a major cause of measles-related mortality among younger children (Schneider, 2009). A second dose of vaccine, now recommended for all school-aged children in the United States induces immunity in about 95% of the 5% who do not respond to the first dose. Slight genotypic variations have been observed in circulating strains though this has not been reported to affect the protective efficacy of live-attenuated measles vaccines (Smeeth et al., 2004). However, many children especially in the tropics are seen to express measles-like symptoms after the age of immunization; this may be due to vaccine failure or lack of vaccine coverage and also due to poor parental attitudes towards vaccination (Bassey, et al, 2010). This work therefore aims at determining the Seroprevalence of measles IgM in children 5-12 years from selected primary schools in Giwa local Government Area of Kaduna State.

2. Materials and methods

2.1. Study area and population

The study was carried out in selected primary schools in Giwa Local Government Area of Kaduna State, Nigeria. This study population consists of one hundred (100) children (5-12) years old from selected schools in Giwa Local Government Area, from June 2012 – July 2012.

2.2. Ethical approval

Ethical approval was obtained from the School Management Board and informed consent was obtained from the parents of the children.

2.3. Sample collection and processing

Structured questionnaire was used and children were interviewed prior to collection of samples. Each questionnaire was designed to obtained data of the respondent. Blood samples were collected by the assistance of medical personnel, and laboratory numbers were used to ensure the anonymity of patient to facilitate the laboratory procedures and to minimize the chances of error during handling of samples. Samples were taken to the laboratory for processing using Enzyme Linked Immunosorbent Assay (ELISA) using the Measles IgM Assay kit (Diagnostic Automation, U.S.A.)

2.4. Assay procedures

The assay was carried out in accordance with the manufacturer's instruction. The desired number of coated strips will be place in a holder, 1,40 dilutions will be prepare by adding 5µl of the test samples, negative and positive controls and a calibrator into 200µl of absorbent solution and will be mix well. 100µl of each of the dilutions will be dispense into appropriate wells, ensuring that there is no air bubbles present in the liquid by tapping the holder, it will then be incubated at room temperature for 30 minutes. After incubation, liquids from all wells will be removed by washing it three times with a washing buffer. 100µl of enzyme conjugate will be dispensed to each well and incubate for 30 minutes at room temperature; excess enzyme conjugate will be removed by washing three times with a washing buffer. 100µl of chromogenic substrate will be dispensed to each well and will be incubated for 30 minutes at room temperature, the reaction will be stop at specific time by the addition of 100µl of HCl by ensuring that there is no air bubbles present in each well before taking the reading. All samples were read at 450nm using the ELISA (microplate) reader.

2.5. Data analysis

The data generated were analyzed using ANOVA to determine the level of significance between IgM positivity and sex, age immunization status as well as some disease symptoms.

3. Results

The seroprevalence of measles IgM among the subject studied (children 5-12 years) was 32.2%. A breakdown of the seropositive subjects reveals that 18.9% of the infected children were males while the females accounted for the rest of the 13.3% as presented in figure 1

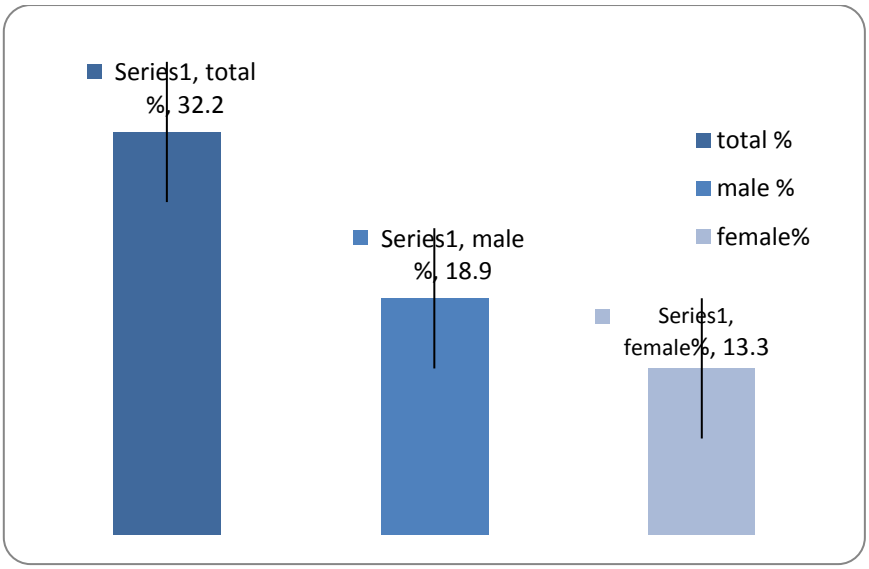

Fig. 1. The seroprevalence of measles IgM in children 5-12 years.

In relation to age difference of the subjects studied, the prevalence significantly decreased with increased in age of the children (P = 0.006), with children between 5-6 years having the highest prevalence of 50% while those between 11-12 years had the lowest of 12% (table 1). The seroprevalence based on sex shows a prevalence of 38% among male children and 26% among female children. This indicates a higher prevalence rate among male children compared to the female children although it was 44 males and 46 females. The difference was however not statistically significant (P = 0.207) (table 2). It was observed that 16 (17 8%) of the children had fever and of these number, 68.75% tested positive for measles. However, rashes were most associated with measles in the studies as all the children with rashes were positive for measles IgM. The result is presented in tables 3 below. The study also revealed that only 7.7% of the immunized children tested positive for measles IgM (table 4).

Table 1
Seroprevalence of Measles IgM according to age of children.

Age in years	Number screened	Number infected	Percentage infected (%)
5 – 6	30	15	50
7 – 8	16	6	37.5
9 – 10	19	5	26.5
11 – 12	25	3	12
Total	90	29	32.2

Table 2
Seroprevalence of Measles IgM according to sex of children.

Sex	Number screened	Number Positive	Percentage positive
Males	44	17	38
Females	46	12	26
Total	90	29	32.2

Table 3
IgM Seroprevalence in relation to Symptoms presented by the Children.

Symptom Presented	Number / Percentage with symptom	Number / Percentage IgM Positive	Percentage of the positive cases	P-value
Fever *	16(17.8%)	11(12.22%)	68.75	0.000
Sore throat	22(24.4%)	10(11.11%)	45.45	0.875
Rashes	6(6.7%)	6(6.7%)	100	0.000
Koplik's spots	3(3.3%)	2(2.22%)	66.67	0.010
Cough	8(8.9%)	7(7.78%)	87.5	0.000

*Body temperature above 37oC)

Table 4
IgM seroprevalence in relation to immunization status of children.

Number Screened	Number (%) Immunized	Number (%) Immunized and positive for IgM	No (%) Un-immunized	No (%) Un-immunized and Positive for IgM
90	79 (87.8)	6(7.6%)	11(12.2%)	11 (100)

4. Discussion

From the result, it can be seen that measles virus remain endemic in the community studied with a prevalence of 32.2%. This finding is agrees with the work of Bassey, et al in 2010, as his work showed a prevalence of 30.2%. The study used IgM which detects acute or recent infection, thus showing that these children has recent contacts with the virus which may go unnoticed or present with mild fever conditions and overlooked or wrongly diagnosed. It was found that the prevalence decreased with increasing age of the children, a phenomenon also reported in the work of Bassey, et al (2010). The finding also revealed that the prevalence is higher in male children than the female children. The finding may be connected with the general life style of the male children, males are often involved in playful acts among their peers and also carry out more outdoor activities than the females. In this part of the country, females are more restricted and few even mingle in schools than the male counterpart. Children in the lower age group had the highest cases of infection. This could be an indication of low protective circulating antibodies and this decreased with increasing age as noticed in children in the higher age group. The main symptoms associated with Measles IgM seropositivity were fever, presence of rashes, koplik spots and cough. The Study population that received measles vaccine was over 87%, though slightly below the threshold

(>90%) necessary to interrupt measles transmission (Manirakiza et al., 2011). In most Nigerian states, measles vaccine is administered once in lifetime. Our studies found that measles IgM antibodies were absent in 92.3% of the children. This was low as compared with report in Addis Ababa, which showed an absence of measles specific IgM and IgG antibody in 99% and 98% of serum samples, respectively (Nigatu et al., 2003). This is also because measles vaccination is administered widely in Nigeria and thus able to prevent severe reinfection with the wild type. The incidence of the infection among some of the children that were vaccinated could be as a result of vaccine failure. The National immunization programs must determine the optimal age for the first dose by weighing the risk for primary vaccine failure at younger ages against the risk for measles virus infection before vaccination (Manirakiza et al., 2011). This is presently put at nine months after birth in Nigeria. This is because reduced vaccine effectiveness, due to compromised vaccine or unique host characteristics such as nutritional status and sanitation that negatively affect seroconversion as well as exposure to circulating measles virus may all play a role leading to the infection in adult life. Immunity is for life time and this is boosted by constant encounter with the wild strain, it can also be as a result of the physiological status of the individuals and variation in the prevailing environmental factors. Thus, children in the lower age group may have less exposure and thus high chances of acquiring the disease and eventually the high IgM Seroprevalence.

5. Conclusion

This study reveals an incidence of 32.2% among children from selected schools in Giwa local Government area of Zaria of Kaduna State. The research shows that measles IgM is more prevalent among the younger age group compared to the older age group as shown by its high prevalence, hence indicating that measles is a common childhood disease. Also the infection is more prevalent in male children than female. This research work also indicates that measles remains endemic in Giwa Local Government area. Despite the administration of vaccines, children tend to come across or infected with the wild strains of the virus and thereby making them to have acute latent infection that may go beyond recognition. It is therefore recommended that a booster immunization be given to these children and those presented with fever and rashes be tested for measles and treated if found positive.

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