

SERUM IMMUNOGLOBULINS AND CIRCULATING IMMUNE COMPLEXES IN NIGERIANS ON THE JOS PLATEAU

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SUMMARY

There has not been any published work that has determined the serum circulating immune complexes (CICs) and immunoglobulins (Igs) on the Jos Plateau, Nigeria. This was the purpose for which the present study was carried out. This has become pertinent, as it will help assess disease conditions whenever levels are found to be higher than what will be determined to be "normal" in this community.

There were a maximum of 224 participants in the study. They were apparently healthy and consented to participate in the study. Assay for CICs were measured by the Polyethylene glycol (PEG) 6000 precipitation method, while immunoglobulins G, A, and M from sera were estimated using the modification of single radial immunodiffusion technique.

Our result showed that levels of serum CICs, IgG, IgA and IgM were between the ranges of 0-65.06mg%, 658.09-1163mg%, 0-190.79mg% and 17.91-237.43mg% respectively. The mean values in the same order were as follows:- 15.39mg%, 910.57mg%, 85.53mg% and 127.67mg%. The circulating immune complexes and the same immunoglobulin levels between males and females were not significantly different.

The levels as found in the present study although relatively high, are correlated with the works of other researchers, but may not be unconnected with our tropical environment, which is expected to predispose even apparently healthy individuals to heightened immune complexes and immunoglobulins.

Key words: Serum, immunoglobulins, immune complexes, Nigerians

INTRODUCTION

Factors that account for higher levels of serum gammaglobulins in persons living in the tropical regions that those in temperate regions include endemic infections, age sex and seasonal changes^{1,2,3}. Circulating immune complexes (CICs) have been detected in persons with variety of diseases. It may not be certain what relevance these complexes and higher immunoglobulins have if levels in apparently healthy individuals are not determined. Added to this is the fact that environmental factors play a crucial role in the amount of serum levels of these substances. This makes it necessary for each region to find out its own range of normal values in apparently healthy individuals.

The development of immunoglobulins in individuals is a means of defense where they combine to inactivate the antigens in the blood and tissues. They also activate complement system causing the release of factors that enhance migration of phagocytes to the antigenic site. Some serve as opsonic antibodies while others as cytophilic antibodies to enhance phagocytosis. On the other hand the antigen-antibody complexes formed when not cleared by the Reticulo-endothelial system (RES) become circulating immune complexes, which can get deposited on tissues and organs leading to other disease conditions.

Studies on the immunoglobulin levels in Nigerians have mostly been carried out in the Southern region in specific age groups and particular disease conditions^{4,5,6,7}. There is no previous report on the Jos Plateau located in the Northern region of Nigeria where the present study was carried out.

The present study was conducted to determine the levels of circulating immune complexes (CICs), immunoglobulins G, A and M among apparently healthy individuals.

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MATERIALS AND METHODS

Participants

Only those who were apparently healthy were used. The participants were also testified that were feeling well and hearty. They had body temperatures equal to or below 37.5°C. The participants were all who consented to participate in the study (after an explanation had been made to them on the nature of the research) of those who accompanied their sick relatives to the Department of Medical Microbiology of the Jos University Teach-

Serum concentrations of total IgG, IgA and IgM were estimated using the modification of single radial immunodiffusion technique (usually called Mancini test)^{9,6}. Serum concentrations of total IgD and IgE were not determined because their standards were not available.

RESULTS

The immunoglobulin and circulatory immune complexes levels among the apparently healthy individuals is shown in Table 1.

Table 1 mean immunoglobulin (mg%) levels and circulating immune complexes (mg%) in apparently healthy individuals

	N	Mean (mg%±SD)	Range (mg%)
Circulating immune complexes (CICs)	224	15.39 ± 24.85	0 – 65.06
Immunoglobulin G (IgG)	219	910.57 ± 126.24	658.09-11.63
Immunoglobulin A (IgA)	219	85.53 ± 52.63	0-190.79
Immunoglobulin M (IgM)	219	127.67 ± 54.88	17.91-237.43

ing Hospital for various laboratory tests between the months of July and December 1998. Their ages ranges from 9-60 years, from different ethnic groups, social/educational status but all resident in different parts of the Jos metropolis.

About 5ml of blood was collected by venepuncture and dispensed into screw capped plastic tubes and allowed to clot in a slanting position. This was later spin for 5 minutes and the serum decanted into serum bottles. Only this freshly collected serum stored at 20°C and having been thawed once was used.

Among the three immunoglobulin, IgA had the lowest range of between 0 – 190.79mg%, followed by IgM (17.91 – 237.43mg%). The immunoglobulin with the highest range was IgG (658.09-1163mg%).

In table 2, there were no significant differences ($P>0.05$) in the levels of immunoglobulins G, A, and M between the sexes. The males however had consistently higher levels for IgG and IgA, although without significant difference ($P>0.05$). On the contrary, IgM levels were higher among the females than the males but again without any sig-

Table 2 Mean immunoglobulin levels among apparently healthy individuals according to their sex

	Female (n=110)	Male (n=109)	T-test	P-value
Mean immunoglobulin G (mg%)	894.53	928.39	0.5673	$P>0.05$
Mean immunoglobulin A (mg%)	77.16	94.72	0.7024	$P>0.05$
Mean immunoglobulin M (mg%)	130.32	124.72	0.2161	$P>0.05$

Assay of circulating immune complexes (CICs) and immunoglobulins (IgG, IgA, and IgM) from sera

The concentrations of CICs in the sera were measured by the polyethylene glycol (PEG) precipitation method as described by Haskova *et al*⁸.

nificant difference ($P>0.05$).

DISCUSSION

The levels of CICs among groups in various studies have varied from place to place. Two studies from Northern Nigeria got mean CICs of zero¹⁰

and 2.88mg/100ml or 2.88mg%¹¹ among healthy individuals and control groups respectively. From the Western Nigeria mean CICs in two studies were 2.99mg%⁶ and $16.8 \pm 0.4\text{mg}/\%¹²$ among patients suffering from joint pains and schistosomiasis respectively. The present study showed mean CICs of 15.39mg/100ml (mg%) with the above-mentioned studies especially that in disease conditions CICs level are expected to be significantly higher than the controls.

The level of CICs among apparently healthy individuals in the present study is relatively high, especially that elsewhere, as stated before, the amount was zero¹⁰. However, this can be understood against the background that in tropical environment like Nigeria, people are susceptible to a variety of infections. For example malaria remains a major health problem and most adults do require the continued presence of the parasites to maintain a partial immunity-premunity¹⁰. This means that parasitaemia can be detected in apparently healthy individuals. The tropical situation is therefore expected to predispose the formation of immune complexes.

Apparently healthy individuals had mean immunoglobulin levels for IgG, IgA and IgM as 910.57mg%, 85.53mg% and 54.88mg% respectively. These values are within the ranges of previous studies carried out in Nigeria, although from the Southern parts of Nigeria^{5,6,7}.

Sex is one of the factors that influences the level of immunoglobulins¹³. The result of the present study showed that males had higher levels of IgG and IgA, while females had higher levels of IgM. In all, the differences were not significant ($P>0.05$). There appear not to be a clear-cut sex related differences in the levels of immunoglobulins. While some studies have shown higher levels among females^{14,15}, because of sex hormone related reasons¹⁶, others have favoured the males^{17,18}. The result of the present study is therefore consistent with the above references.

It is now that the serum levels of CICs, IgG, IgA and IgM have been established on the Jos Plateau, that disease conditions can be assessed more easily. This will be based on significant higher levels from what has been obtained of these complexes and immunoglobulins in the present study.

Measurement of serum levels to immune complexes and immunoglobulins in individuals can best serve as preliminary laboratory investigations

so as to establish disease conditions. Although this recommendation may not be feasible on a routine laboratory diagnosis and in rural areas because of the cumbersome nature of the tests and the dearth of equipment, the tests are still pertinent for research purposes.

The differences in the levels of these immunoglobulins as well as others (not included in this study) and the immune complexes in individuals using other parameters such as social status, age groups, seasons and so on will still need to be investigated.

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