Interleukin-8 (IL-8) profile in Nigerians with *Schistosoma haematobium* infection

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ABSTRACT: The profile of serum interleukin-8 (IL-8) among 46 Nigerian volunteers with *Schistosoma haematobium* infection was investigated. Significantly elevated levels of IL-8 were seen in heavy infections (2278.33±274.56 pg/ml) than light infections (1738.33±384.83pg/ml) at (χ^2 = 72.6, p<0.05). Mean sera levels of IL-8 for age group <16 years was 2072.86 pg/ml and age group >16 years was 1642.50±274.56 pg/ml. This difference in mean IL-8 levels was statistically significant (χ^2 = 49.84, p<0.05). The intensity of *S. haematobium* infection showed positive correlation with IL-8 cocentration (r = 0.9).The relationship between IL-8 profile and age was negatively correlated (r = -0.9). We deduce that this elevated IL-8 can be used as biomarker of *S. haematobium* in our locality. [The Journal of American Science. 2008;4(4):21-24]. (ISSN: 1545-1003).

INTRODUCTION

Schistosomiasis infection remains an important infection in many tropical areas, especially Africa. Two hundred million are estimated to be infected while 600 million people are thought to be at risk (Chan *et al.,* 1996). Recent analysis estimated that about 280,000 deaths due to schistosomiasis infection occur annually in sub-Saharan Africa (King *et al.,* 2005). *Schistosoma haematobium* infection has been implicated to elicit a range of responses among inflammatory cytokines (Mutapi *et al.,* 2007).

Interleukin-8 (IL-8) is a chemokine and a chemotactic factor secreted by activated monocytes and macrophages that promotes the directional migration of neutrophils, basophils and T lymphocytes (Baggiolini *et al.,* 1989; Rossi and Zlotnick, 2000). This cytokine (IL-8) has been found to play important roles in autoimmune and inflammatory responses and also in infectious disease pathogenicity (Harada *et al.,* 1994; Koch *et al.,* 1992; Smyth *et al.,* 1991). *In vitro* experimentation of the activity of schistosome on the expression patterns of cytokines revealed a down-regulation of IL-8 (Fusco *et al.,* 1993). Schistosomal worm diagnosed among school children in Gabon has been documented to induce the production of IL-8 (van der Kleij *et al.,* 2004). Also, investigation among rural Zimbabweans infected with schistosomiasis showed an increased level of IL-8 with intensity of infection (Erikstrup *et al*., 2006).

Schistosome immuno-epidemiology studies have shown that the development of antigen responses is related to cumulative exposure to parasite antigen (Anderson, 1987; Woolhouse and Hagan, 1999) and the rate of development of different components of these responses, give distinct profiles across host age range (Mutapi *et al.,* 1997). Cytokine responses to *S. haematobium* infection have been reported to show contrasting profiles with age (Mutapi *et al.,* 2007).

Despite the impact of schistosomiasis on public health and the role cytokines play in the immunopathogenesis of the disease, there is dearth of information on the profile of IL-8 responses to *S. haematobium* infection in our locality. In this study therefore, we investigate the profile of serum IL-8 concentration with intensity of infection and establish the relationship between IL-8 and age and intensity of infection.

MATERIALS AND METHODS

This study was carried out in Ihieve-Ogben; a rural community in Owan East local government area of Edo State. The study area is located within the guinea savanna region of the State at latitude 6˚N and longitude 6˚E. Agriculture especially farming and hunting is their predominant activities, while a few of them, mostly women, are traders. The village has a stream which the inhabitants use as their source of water and recreational activities. There are about 1,000 inhabitants in this community.

This investigation commenced during a community mobilization campaign at Ihieve-Ogben. This involved educating them regarding the significance of the study as well as seeking their consent. Ethical permission was obtained from the State Ministry of Health, Benin City, Nigeria. Mid stream urine samples were collected from volunteers between 11:00 and 13:00 GMT after slight physical exercise. The specimen was kept in a wide-mouthed screw capped 50(ml) size container. These bottles containing the urine

samples were immediately transported to our parasitological laboratory for examination for the ova of *S. haematobium.* The ova were quantified and classified as light infection ≤50 ova/10 ml and heavy infection >50 ova/10 ml according to WHO standards (WHO, 1983).

Whole venous blood of individuals positive with *S. haematobium* infection (3 ml) was collected from a peripheral vein by venipuncture in the sterile EDTA bottle. Blood was processed by the centrifugation and the serum was immediately subjected to cytokine assays. The serum IL-8 concentration was determined by a standard Enzyme-Linked Immunosorbent Assay (ELISA) kits obtained from Abcam plc, Cambridge, United Kingdom according to the manufacturer's instructions. From the information supplied by the manufacturer, the upper limit of normal serum IL-8 concentration is 76pg/ml with the mean serum IL-8 level of 44pg/ml.

The data obtained in this study were subjected to statistical analysis, namely, correlation and chi-square tests using Microsoft Excel Statistical package.

RESULTS

Table 1 shows the mean serum IL-8 levels of *S. haematobium* infected volunteers with light and heavy infections. Forty six individuals infected with *Schistosoma* egg were categorized based on their parasite load. Heavy infections of >50 ova/10 ml were observed in 18 volunteers with mean IL-8 level of 2278.33±274.56 pg/ml; while the 28 individuals with light infection of (≤50 ova/10 ml) had a mean IL-8 concentration of 1738.33±384.83 pg/ml. The difference in the IL-8 levels of heavy infection and light infection was statistically significant ($\chi^2 = 72.6$, $p<0.05$).

The mean IL-8 concentration of 14 children (<16 years) with *S. haematobium* infection and 32 adults (<16 years) age groups had mean sera of 1642.50±363.81 pg/ml and 2072.86±400.21pg/ml, respectively (table 2). The difference in the sera levels for age group <16 years and >16 years was statistically significant ($\chi^2 = 49.84$, $p<0.05$). The relationship between IL-8 levels and age was negatively correlated (r = -0.9). The relationship between the intensity of *S. haematobium* infection and the IL-8 concentration was positively correlated (r = 0.9).

Table 1: Intensity of *S. haematobium* infection and mean serum IL-8 concentration

Intensity of infection/μL	Mean IL-8 (pg/ml)	No. infected
Light ≤50 ova/10 ml	1738±384.83	28
Heavy >50 ova/10ml	2278.33±274.56	18

Table 2: Mean IL-8 concentration with age group

Age group (years)	Mean IL-8 (pg/ml)	No. infected
<16	2072.86±400.21	32
>16	1642.50±363.81	14

DISCUSION

We reported significantly elevated IL-8 level in heavy infection. This supports the report of Erikstrup *et al.* (2006) and implicates IL-8 in the immunopathogenesis of schistosomiasis infection. IL-8 has been documented among other stimulants to be induced by lipopolysaccharide (Baggiolini *et al.,* 1994; DeForge *et al.,* 1993). A schistosomal phosphatyldiserine has lipopolysaccharide-like effect (van der Kleij, 2004). Also biochemical analysis of schistosome revealed chemical composition of glycolipids which has been shown to induce the production of IL-8 in *S. haematobium* infected children (van der Kleij, 2004). So the higher the level of infection, the more phosphatyldiserine and glycolipids in circulation, which probably explains the increased level of IL-8 with intensity of infection.

It was observed that serum IL-8 concentration among age group <16 years was significantly higher than age group >16 years. This contradicts the report of Mutapi *et al.* (2007) in the light that schistosome-infection induced the production of IL-10 which has been documented to be potent inhibitors

of IL-8 (Mukaida *et al.,* 1994; Xie, 2001). IL-10 with the intensity of infection peaked in childhood and thereafter declined in adults suggesting that IL-8 increased with age (Mutapi *et al.,* 2007). Previous studies have suggested that antihelminth-immune responses fall into a Th1 (pro-inflammatory) and Th2 (anti-inflammatory) dichotomy with resistance to schistosome infection associated with Th2 responses (Medhat *et al.,* 1998; Wilson, 1993; Capron *et al.,* 1999; Dunne and Mountford, 2001). Our finding suggests a shift from Th1 to Th2 patterns with increase in age which probably elucidates the reduced IL-8 concentration with increase in age and therefore implicates age in conferring immunity.

This study shows that IL-8 is induced by *S. haematobiun* infection which implicates this cytokine in the immunpathogenesis of schistosomiasis infection. Also, we reported a negative correlation of IL-8 levels with age. Our finding implicates age in conferring immunity; and suggests that IL-8 can be used as biomarker of *S. haematobium* infection especially in heavy infection in our locality. Since there is dearth of information on other cytokine responses to schistosomiasis infection, it is recommended that investigation in this regard be carried out in order to establish their roles in the disease pathogenicity, taking into account the role of cytokines in immunopathology of diseases and the global public health significance of schistosomiasis.

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