



INTERLEUKIN (IL) – 10 AND TUMOUR NECROSIS
FACTOR – ALPHA (TNF – α) PROFILES OF INDIVIDUALS
WITH *Schistosoma haematobium* INFECTION
IN EWAN COMMUNITY, EDO STATE, NIGERIA



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Abstract: The researched evaluated the profile of interleukin (IL)-10 and tumor necrosis factor-alpha (TNF- α) of 35 volunteers infected with *Schistosoma haematobium* in Schistosomiasis endemic communities in Ewan, Akoko - Edo Local Government Area, Edo State, Nigeria. Serum IL-10 levels were significantly higher in Heavily positives than control subjects ($P < 0.001$). The difference in serum IL-10 concentrations between Lightly, Moderately and Heavily infected stages of infection was statistically significant ($P < 0.001$). The level of TNF- α for Lightly positive, Moderately positive and Heavily positive were significantly elevated when compared with the control subjects at $\chi^2 = 6.37$, $P > 0.01$; $\chi^2 = 22.79$, $P < 0.001$, $\chi^2 = 35.57$, $P < 0.001$, respectively. The mean difference in serum TNF- α concentrations between this levels of infection was statistically significant ($P < 0.0001$). We therefore suggest that the elevated levels of IL-10 and TNF- α may implicate these cytokines as mediators of host response to *Schistosoma haematobium* infection in the locality.

Keywords: Ewan Community; Interleukin-10; Ewan; Cytokine Tumour necrosis factor-alpha (TNF- α); *Schistosoma haematobium*.

Introduction

Schistosomiasis, one of the most common tropical diseases which poses serious health hazard due to its associated morbidities (Akogun, 1996a). Globally, over 200 million are infected with this parasitic infection (Akogun, 1996b). In developing nations, the true epidemiological picture appears difficult because of inadequate researchers in this direction despite its relevance in planning its control in any locality (Akonai *et al.*, 1992). This problem is compounded by the poor habits of people in developing countries like Nigeria in visiting hospitals for treatment (Arewa, 2003). Also self-medication is still practised as manifested by antihelminthics abuse (Anosike, 1992). This act is worsened by presence of inadequate health facilities (Arinola, 2005). One of the consequences of the self-medication and antihelminthics abuse includes the suppression of the egg laying capacity of the worms (Bello and Edungbola, 1992). The net effect is erroneous diagnosis using oval in urine in any locality (Eltoum *et al.*, 1992). This may also become evidence in sub clinical cases and period of immaturity of the worms when they are yet to commence egg laying (Hoftman, 2002). Another obvious difficulty occurs during very low grade infections (Hogan *et al.*, 2002). Although the uses of serological diagnosis are available, poverty poses a major serious impediment to the applications of serology in the epidemiological work in these countries (Moore *et al.*, 2001). To this end, this paper evaluated the prevalence rate urinary schistosomiasis in an endemic community like Ewan which will broaden the existing epidemiological picture of this parasitic infection in this part of the globe and has a direct consequence on planning adequate control programme.

Material and Methods

This study was carried out in Ewan community in Akoko Edo Local Government, Edo State, Nigeria. The community lie 70N and longitude 60E with population of over 4,000. The people in the studied community are predominantly farmers. The ethical permission was

approved by the Edo State Ministry of Health, Benin City, Edo State, Nigeria. Prior to the commencement of this investigation, community mobilization campaign was carried out where we explained the nature, objectives and benefits of the investigation so as to obtain informed consents.

Collection of sample

Sera obtained from venous blood were used to categorize the level of infection by double serial dilution as: Lightly positive (1:2-1:4), Moderately positive (1:8-1:16) and Heavily positive ($\geq 1:32$) according to the manufacturer's instruction (Intituut voor Tropische Geneeskunde, Antwerpen, Belgium). Volunteers with the overt diseases such as malaria, viral hepatitis B, HIV, measles, sickle cell anaemia were excluded from this study using standard procedures. Venous blood were obtained from 35 seropositive volunteers and the sera analysed to determine IL-10 and TNF- α concentrations using standard Enzyme linked Immunosorbent Assay (ELISA) according to the manufacturer's instruction (Abcam Plc, United kingdom).

Data analysis

Data obtained were subjected to statistical analysis, namely, Welch t-test, Chi-square test and Tukey-analysis of variance (ANOVA) using Instat and Microsoft Excel packages.

Results and Discussion

Table 1 shows IL-10 concentration among 3 categories of seropositive individuals. The level of IL-10 for Lightly positive (64.98 ± 11.38 pg/ml) and Moderately positive (76 ± 20.3 pg/ml) when compared with the control subjects (73.59 ± 6.85 pg/ml) were not significant at $\chi^2 = 1.01$, $P > 0.01$; $\chi^2 = 0.078$, $P > 0.01$, respectively. Serum IL-10 levels were significantly higher among Heavily positive volunteers (235.5 ± 22.83 pg/ml) than control subjects ($\chi^2 = 1.01$, $P < 0.001$). There was significant differences in the serum IL-10 concentrations of the 3 categories of the seropositive volunteers ($F = 294.43$, $P < 0.0001$).

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Table 1: IL-10 concentrations among categories of seropositive volunteers

Level of Infection	Lightly Infected n=9	Moderately Infected n=12	Heavily Infected n=14	Control n=15
Mean	64.98 ± 11.38	76 ± 20.3	235.5 ± 22.83	73.59±6.85
χ^2	1.01	0.078	355.78	
F - value	294.43			

Table 2: TNF- α concentrations among categories of seropositive volunteers

Level of Infection	Lightly Infected	Moderately Infected	Heavily Infected	Control
Mean	24±2.81	32.5±2.18	73.5 ± 22.83	14.41±0.41
χ^2	6.37	22.79	35.57	
F - value	39.73			

The level of TNF- α for Lightly infected (24 ±2.81 pg/ml), Moderately infected (32.5±2.18 pg/ml) and Heavily infected (73.5 ±22.83) were significantly elevated when compared with the control subjects $\chi^2 =6.37$, $P>0.01$; $\chi =22.79$, $P<0.001$, $\chi^2=35.57$, $P<0.001$, respectively. The differences in the serum TNF- α concentrations for the 3 categories of seropositive subjects, was statistically significant (F = 39.73, $P<0.001$) (Table 2).

Increased levels of sera IL-10 was observed in the Heavily positives and among volunteers. These observations suggest that IL-10 may be implicated in the immunopathology of *Schistosoma haematobium* infection. Our findings corroborate the report of (Mutapi *et al.*, 1998) who observed higher levels of IL-10 in the serum of individuals in schistosomiasis. The elevation of IL-10 may be ascribed to antigen inhibition properties which results in abrogated proliferative responses (Nmorsi *et al.*, 2001a). Also, this result is expected considering the fact that IL-10 enhances proliferation, differentiation and immunoglobulin secretion of B-cells (Waal *et al.*, 1998).

We observed that serum TNF- α concentration was higher among the seropositive individuals than the control subjects (WHO, 2007). Our finding of increase in serum TNF- α concentrations with disease progression supports the report of (Woolhouse *et al.*, 1991). Where it was documented that the levels of serum TNF- α of *Schistosoma haematobium* infected patients correlated with disease severity (Waal *et al.*, 1998). TNF- α has been suggested to be involved in *Schistosoma haematobium* growth control in the face of increase in the schistosome number and lifespan when anti-TNF- α was introduced into cultures of microphages and schistosome parasite (Mutapi *et al.*, 1998).

Conclusion

In conclusion, we therefore hypothesize that the greater the severity of Schistosome infection the more GPI-anchored Schistosome VSG in blood circulation and hence greater production of TNF- α . This therefore suggests that the elevated serum TNF- α level in Schistosomiasis patients may implicate this cytokine in the immunopathogenesis of the disease. Furthermore, the imbalance between pro and anti-inflammatory cytokines could contribute to the chronicity of this infection as the elevated TNF- α could not be sufficiently down-regulated by the anti-inflammatory property of IL-10 in the serum of *Schistosoma haematobium* infected individuals. Elevated levels of IL-10 in serum infected subjects. Also, TNF- α levels were elevated in the serum of infected volunteers. We therefore conclude that these cytokines may be

implicated in the immunopathogenesis of Schistosomiasis. Furthermore, the data suggests that IL-10 could be a biomarker of *Schistosoma haematobium* infection.

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