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EVALUATION OF THE IMMUNE FUNCTION IN HIV/AIDS PATIENTS USING MIGRATION INHIBITION FACTOR (MIF) TEST

G. E. UMUKORO AND N. O. EGHAFONA

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ABSTRACT

Several mechanisms have been described regarding HIV/AIDS immunopathogenesis. Some are related to the humoral response and others to the cellular immune response. Migration inhibition factor (MIF) test is one of the *in-vitro* methods used in monitoring the cell-mediated immunity of delayed type hypersensitivity (DTH) This study monitored MIF level in symptomatic HIV seropositive AIDS patients (n=50) and asymptomatic HIV seropositive patients (n-40); HIV seronegetive (n=40) were included as control subjects. The various MIF percentage values for the HIV seropositive (symptomatic: 110.86 ± 14.97%: asymptomatic: 91.22±14.62%) groups were significantly higher ($p<0.05$) than the control group (64.68±13.20%). This suggests that the cellular immune function in HIV seropositive and AIDS patient is highly compromised.

KEY WORD: Immune function, Evaluation in HIV/AIDS.

INTRODUCTION

Ever since human immunodeficiency virus type 1(HIV-1) was identified as the causative agent of acquired immune deficiency syndrome (AIDS), investigators have tried to elucidate the factors that determine the course HIV infection. Acute infection is characterized by marked viraemia and CD4 lymphocyte depression; followed by phase in which CD4 count approaches normal level and viral load is held in check (OHO, 1998). This symptomatic phase has been credited to host immunity, but the mechanisms involved remain controversial. CD8 lymphocytes are believed to mediate antiviral activity against HIV This notion was sequel to an observation that depletion of CD8 cells from peripheral blood mononuclear cells of HIV infected subjects resulted in marked increase of viral replication (OHO,1998; Fauci, 1996; Panteleo, and Fauci,1995; Poli,1999; Fahey, 1998). It has been suggested that decreases in the *in vitro* production of some cytokines and increases in others may play a role in the progression of HIV disease though, this has not been universally observed (Clerici, and Shearer,1994; Breen, *et al* 1997; Fan, *et al* 1993; Graziosi *et al*1994; Maggi,*et al* 1994).

This present investigation attempts to measure some immune response parameters in seropositive asymptomatic and seropositive symptomatic HIV/AIDS patients, using the *in-vitro* delayed type hypersensitivity A migration inhibition factor level to purified protein derivative (PPD) was then monitored. It is hoped that this research would contribute to the accumulating knowledge that would be required for understanding the pathogenesis of HIV/AIDS.

MATERIALS AND METHODS

Patients selection: Forty seropositive HIV patients were selected from University of Benin Teaching Hospital (UBTH) blood donor bay This group is laballed as group A. Another set of fifty HIV/AIDS patients who were seen in the out patient Department of Dermatology and Respiratory Clinics were also enlisted and grouped as B. Forty HIV seronegative individuals taken from the blood donor bay were enlisted as control group C. These people were of the same age bracket (25 yrs to 40yrs). There were fifty male and forty female in the HIV/AIDS group and twenty eight male and twelve female in the control group. The control subjects also fall within the same age bracket with the HIV patients.

Migration Inhibition Factor Estimation The method of Rosemberg and David. (1970), was used Five milliliter of blood obtained by venopuncture in a haparinized tube was allowed to settle for one hour The supernatant which counted mainly of mononuclear cells was collected and washed three times using minimum essential medium (MEM) by centrifugation at 1800rpm for ten minutes. After the last wash the cells were then pipetted into microtubules and centrifuged to obtain precipitate.

The microtubules were then cut at the

G. E. Umukoro, Department of Medical Microbiology and Parasitology, Faculty of Basic Medical Sciences Delta State University, Abraka Nigeria
N. O. Eghafona, Department of Microbiology, Faculty of Science University of Benin, Benin City, Nigeria.

cell/liquid interface. The portion containing the cells was then placed in a migration chamber and the chambers filed with MEM containing purified protein derivation (PPD), fetal calf serum (FCS). The test was conducted in duplicates. The control was treated was the test but without PPD. Cover slips were then placed on these chambers and sealed with silicone grease. The chamber plates were incubated in a perfectly flat position 37^{0}C for 24 hours. The areas of migration were read by projecting it with microscope onto a sheet of graph paper, and counting the number of squares covered by the areas projected.

The percentages of migration inhibition were calculated from the following formula;

$$\text{Migration inhibition \%} = \frac{\text{Area of PPD}}{\text{Area without PPD}} \times 100$$

Statistical Analysis: The Student's t-test was used to compare two mean values at a time, and the level of significant difference was estimated at the 5% probability level.

RESULT

Table 1: Migration inhibition factor (MIF) level in asymptomatic HIV seropositive patients, symptomatic AIDS patients, and control subjects.

Group	MIF%Mean (SD)
A. Asymptomatic (n = 40)	91.221(14.62) (46-116)
B. Symptomatic (n – 50)	110.86(14.97) (85- 126)
C Control subjects (n = 40)	64.68 (13.20) (40-88)

t-value (DF = 88)
B vs C 17.34*
A vs B 6 05*
A vs C (Df =78) 7 23*
(t-critical = 1.99) *<0.05

The data (Table 1) show the various MIF percentage values. The mean MIF values for the asymptomatic and symptomatic HIV/AIDS patients were significantly higher (P<0.05) than the values for the control subjects. The findings agree with observation of Rosemebery and David(1970) who also determined the reference range (60% - 80%). The data obtained from this study show that the asymptomatic and the symptomatic patients lack this important arm of cell mediated immunity (Delayed type hypersensitivity).

DISCUSSION

Migration inhibition factor (MIF) inhibits further macrophage migration beyond the site of delayed type hypersensitivity reaction In this study, MIF was studied as an *in-vitro* test of DTH. It has been observed that percentage MIF values were significantly higher in both the asymptomatic and the symptomatic HIV/AIDS patients than the control subjects. This higher percentage values suggest that the HIV seropositive and AIDS patients lacked DTH(Rosemberg. and David1970). DTH is an important arm of cell mediated immunity and when compromised will lead to very serious consequences with multiple infection including opportunistic ones. From the research, it can also be observed that there were significant differences in the MIF values between the asymptomatic group and the symptomatic group (P<0.05). This may lead to suggesting a critical MIF level that may be required to maintain a balance between the two groups. This observation agree with other researchers who noticed such functional changes in TH 1 function for a TH 2 type. Effective MIF demonstrated TH 1 function while lack of DTH is TH 2 function(Clerical and Shearer1992; Graziosi, *et al* 1994).

The immune system is progressively affected during HIV infection. Several mechanisms have been suggested regarding the HIV/AIDS immune pathogenesis, some related to the humoral response and others to cellular immune response The changes in the cytokine production by peripheral blood mononuclear cells (PBMC) have been particularly studied in order to better understand the immunoregulation in HIV disease progression (Graziosi *et al* 1994). It has been reported that PBMC production of interleukin 2 (IL - 2) and interferon gamma (IFN – γ) know as T-helper type 1 (TH1) cytokines, decreases with progression of HIV infection (Clerical and Shearer1992; Duarte *et al* 1997)
Macrophages are activated by IFN– γ and membrane bound tumor necrotic factor Beta (TNF-β). This activation leads to macrophages releasing this factor, called MIF (Clerical. and Shearer1992; Barcellini, *et al*1994; Kuby, 1997). Activated macrophages destroys cells harboring intracellular pathogen by lytic enzymes it release. This is the mechanism applied by DTH in getting rid of intracellular pathogens and infected cells.

The research finding is very important since it has attempted to explain the key immunoregulatory deficiencies in HIV/AIDS pathogenesis. It has also, perhaps, contributed to the understanding of the failures in immunoregulation which eventually leads to collapse of the immune responses in HIV infection.

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