



RESEARCH ARTICLE

EFFECT OF SOCIO-ECONOMIC CLASS ON THE CLINICAL STAGES OF HIV INFECTION AT PRESENTATION

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ABSTRACT

**Objective:** One of the factors determining susceptibility to infection is the socioeconomic environment of individuals. This study is therefore to determine the effect of socioeconomic factors on the clinical stage of HIV at which patients present.

**Patients and Methods:** One hundred and sixty-five (165) adult HIV positive patients who were managed at HIV clinic of University of Ilorin teaching hospital, Ilorin were recruited for the study. The patients were recruited before the commencement of antiretroviral (ARV) drugs over a period of 13 months. Fifty (50) age and sex matched, HIV negative patients served as controls.

A questionnaire was administered to the patients to assess their socioeconomic class as well as demographic factors. The subjects were grouped into the stages using clinical and immunological criteria. The clinical staging was done through clerking and physical examination while immunological staging was by CD4 cell count. The CD4 count was done by flow cytometry using Partec cyflow counter machine made in Germany, with strict adherence to the manufacturer's standard operating procedure. Total lymphocyte count were determined using standard haematological technique. They were also grouped into various socio-economic class using the Oyedjeji social class categorization (similar to Registrar General social class). Statistical analysis of data was done using statistical package for social sciences (SPSS) and statistical significance of data was based on P value of less than 0.05.

**Result:** Statistically significant association was observed between the socioeconomic class and the stages of HIV infection (p-value 0.001). Majority of the patients in socio economic class 1 (SEC1), which are the high socioeconomic class were found in clinical stage 1. Most of the SEC 3 and 4 which are the low socioeconomic class group were found in late stages of HIV infection irrespective of high CD4 count.

**Conclusion:** It can be concluded from this study that patients with high socioeconomic status tend to present with less severe disease than their low socioeconomic counterpart. Thus improving the socioeconomic status of the populace (especially people living with HIV infection) may facilitate early detection with eventual reduction in morbidity and mortality due to their better quality of life.

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INTRODUCTION

A syndrome which was later called acquired immune deficiency syndrome (AIDS) was observed by Gottlieb, in California in 1981 among 3 homosexuals with *Pneumocystis carinii* (P. jiroveci) and in 26 homosexuals with aggressive type of Kaposi sarcoma.<sup>1</sup> AIDS caused by Human Immunodeficiency Virus(HIV), is now recognized to be the end stage in the spectrum of clinical complications of HIV infection with advanced immunodeficiency leading to opportunistic infections and constitutional symptoms.<sup>2</sup> In Nigeria, the prevalence rate was 1.4% in 1991, rose to 5.0% in 2005 and down to 4.1% by 2011. HIV infection has been found to be commoner among commercial sex workers, and

people with other sexually transmitted diseases.<sup>3</sup> The HIV epidemic is also linked with the upsurge of tuberculosis, declining economic growth due to decrease in productive age group, and high number of orphans. People with low socioeconomic and educational status, have been found to be more prone to various infections. This vulnerability may be due to increased exposure to infectious agents, nutritional deficiencies and ignorance on the mode of transmission and prevention of HIV.<sup>4</sup> Association between lower socioeconomic status and increased morbidity and mortality has been observed within large populations and in other diseases.<sup>5</sup> Good socioeconomic factors leading to (i) good personal hygiene, (ii) reduction of risk behaviour (i.e. reducing exposure to infections such as other sexually transmitted diseases, drug abuse), (iii) maintaining good health and (iv) good nutritional status, have been discovered to be helpful in the performance of the immune status of people living with

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HIV infection.<sup>6</sup> Hence the need to examine the link between some socioeconomic factors and the clinical and laboratory stages of HIV infection at presentation.

## MATERIALS AND METHOD

One hundred and sixty-five consecutive adult patients with HIV were clerked and examined as they presented at the blood bank of University of Ilorin Teaching Hospital for HIV screening. These included those that are already screened, but not yet in care. The Hospital Ethical Review committee's approval was obtained before the study was conducted. The consent of each patient was obtained before recruitment into this study. Included in this study were adult HIV patients who had just been screened, while children, and adults who were HIV negative, or HIV positive but were already on antiretroviral therapy were excluded. Referred patients who were screened and found to be HIV negative were recruited as controls. A questionnaire capturing the demographic and socioeconomic details of the patients was also administered. HIV screening was done using the WHO parallel testing algorithm using rapid kits. These were further validated using the generation ELISA, which had been shown to provide results as reliable as the Western blot at a much lower cost.<sup>7</sup> The CD4<sup>+</sup> lymphocyte count was done on fresh samples taken by aseptic procedure into EDTA bottles using Flow cytometry (Partec cyflow counter machine made in Germany). Patients were grouped into various clinical stages using the WHO clinical staging while the socioeconomic status were derived using the socioeconomic classification scheme by Oyedeji<sup>8</sup> (similar to Registrar General social class). Statistical analysis of data was done using statistical package for social sciences (SPSS) and statistical significance was based on p-value of less than 0.05. Results were presented in tables. Mean value were compared using Anova while categorical value were compared using chi square method. Conclusion and recommendations were based on scientific evidence from the results.

## RESULTS

One hundred and sixty-five HIV positive patients at different stages of infection were studied. The subjects were within age range of 21-66 years with a mean age of 37 years  $\pm$  1SD. There were 69 males and 96 females with mean age of 41 and 34 years respectively. The patients consisted of 22 (13.3%) singles, 127 (77%) married, 9 (5.5%) divorced, 7 (4.2%) widowed among the patients. One hundred and thirty-five (81.8%) of these patients lived in urban areas while thirty (18.2%) were from rural areas. These patients include traders (35.2%), artisans (21.2%), and civil servants (17.0%). These three occupational groups constituted about 73.4% of the patients studied. Of these, one hundred and sixty-five patients, thirteen (7.9%) were of socioeconomic class 1, forty (24.2%) were of socioeconomic class 2, fifty-nine (35.8%) were of socioeconomic class 3, forty-seven (28.5%) were of socioeconomic class 4, while six (3.6%) were of socioeconomic class 5 (Table 1). Majority of the HIV negative patients belong to socioeconomic class 1-3 (80%) unlike the HIV positive patients who are majorly of the lower socioeconomic class 3, 4 and 5. Majority of the HIV positive patients in socioeconomic class 1 (61.5%) presented at clinical stage 1, while majority of those in socioeconomic

class 3 and 4 (67.9%) presented in late clinical stages 3 and 4 (Table 2)

## DISCUSSION

Various factors have come to play in the development of HIV - related infections at a particular CD<sub>4</sub> level such as nutrition, personal hygiene, education and economic status.<sup>9</sup> HIV patients at similar level of immunological progression may present at different clinical stages of the disease (WHO improved clinical staging)<sup>10</sup>, as was found in some cases in this study (Table 5). Some patients in category 1C, were asymptomatic at CD4 count <200 cells/ $\mu$ l while some in category 3A, had severe HIV related disease even at CD4 count >500 cells/ $\mu$ l. Studies done on disease progression and health promotion in various areas of public health such as infectious diseases, environmental health, chronic disease, infant mortality, corroborate the importance of socioeconomic factors in the prevention of infection and health promotion even in the infected individual<sup>4</sup>. There is also more emotional stress and chronic ill health in the lower occupational classes. Human history had shown that there have always been inequalities in the health of classes and populations, caused by social factors.<sup>12</sup> Lack of education, access to food, economic support and access to healthcare services may increase the risk of malnutrition in vulnerable population.<sup>9</sup> Malnutrition, independent of HIV infection has been associated with decline in immune function. Thus adequate calories, protein and micronutrient intake are essential to the maintenance and restoration of malnutrition related immune dysfunction.<sup>9</sup>

The above has been corroborated in our evaluation of the effect of socioeconomic class on the stages of HIV infection at presentation. Majority (62%) of patients who belong to socioeconomic class 1 (SEC1) which are the high socioeconomic class were found in clinical stage 1. Majority (68%) of the SEC 3 and 4 which are the lower socioeconomic class were found in late stages of HIV infection (Table 2). The patients from high socioeconomic class, either have no symptoms or have minor illnesses whereas the low socioeconomic class counterpart were found to present with more serious HIV related diseases. HIV related diseases such as wasting syndrome, diarrhea with significant weight loss, pulmonary tuberculosis were found commonly in patients of low socioeconomic class irrespective of CD4 count level in this study. The finding of more serious illness in the lower SEC than the high SEC was statistically significant (P. value 0.001). It is also of note that these patients were evaluated at diagnosis before they were commenced on antiretroviral drugs. This significant finding may be related to the cumulative effect of adequate nutrition, better hygiene, and prompt seeking of appropriate health care that is commonly found in the high socioeconomic class than the low socioeconomic class. This agrees with the finding by Benjamin and Obinna that socioeconomic factors play an important role in the prevention of infection and health promotion in the infected individual.<sup>4</sup> Judith and colleague also found that there were more emotional stress and chronic ill-health in the lower occupational classes with inequalities caused by social factors.<sup>4</sup> It was found that a large percentage (61.5%) of socioeconomic class 1 patients have CD4 count less than 500 cells/ $\mu$ l and should have presented with symptoms, while 38.5% were expected to be asymptomatic,

**Table 1: Socioeconomic class (sec) of HIV positive subjects and HIV negative controls**

SEC	HIV POSITIVE PATIENTS		HIV NEGATIVE CONTROLS	
	Frequency	Percent	Frequency	Percent
1	13	7.9	6	12.0
2	40	24.2	12	24.0
3	59	35.8	22	44.0
4	47	28.5	9	18.0
5	6	3.6	1	2.0
Total	165	100.0	50	100.0

**Table 2: Relationship between socioeconomic class and stages of HIV infection**

SOCIOECONOMIC CLASS	CLINICAL STAGE				Total
	1	2	3	4	
1	8	2	2	1	13
2	6	10	20	4	40
3	6	10	30	13	59
4	7	11	15	14	47
5	3	1	2	-	6
Total	30	34	69	32	165

P value = 0.01

**Table 3 : socioeconomic class and mean Cd4 + cell count**

Socioeconomic Class	CD4+ cell count			Total Number
	Mean	Minimum	Maximum	
1	387.0769	4.00	962.00	13
2	276.6250	5.00	897.00	40
3	204.7627	3.00	1373.00	59
4	347.0426	6.00	1599.00	47
5	254.0000	15.00	594.00	6
Total	278.8667	3.00	1599.00	165

P value= 0.94)

**Table 4: Sec class and frequency of symptoms in HIV positive subjects**

SYMPTOMS	SOCIOECONOMIC CLASS					Total
	1	2	3	4	5	
Asymptomatic	8	6	5	5	3	27
Mucocutaneous lesions	1	6	6	6	1	20
Fever, lymphadenopathy	-	1	4	2	-	7
Weight loss & diarrhea alone	3	9	14	3	1	30
Weight loss, cough & fever	-	8	7	9	-	24
Weight loss, Pulmonary TB,	-	3	5	7	-	15
Wasting syndrome	1	3	13	9	-	26
Total	13	36	54	41	5	149

**Table 5: relationship between cd4 count and stages of HIV infection**

CD4 group	STAGE				Total
	1	2	3	4	
A (>500/ $\mu$ l)	12	10	6	0	28
B (200-499/ $\mu$ l)	12	10	18	8	48
C (<200 / $\mu$ l)	6	14	45	24	89
Total	30	34	69	32	165

p-value = 0.00

considering the natural course of the disease. On the other hand, for patients in SEC 3 and 4, 61 out of 106 (57.5%) had CD4 counts above 500 cell/ $\mu$ l and were all expected to be asymptomatic, however only 12% were found to be asymptomatic. Thus more patients than expected in SEC 3 and 4 were symptomatic while more patients than expected in SEC 1 were asymptomatic. It can therefore be concluded that SEC of patients may affect clinical severity of disease, irrespective of CD4 count level. This agrees with the finding by Hogg RS

and colleagues in the study that evaluated the relationship between lower socioeconomic status and shorter survival following HIV infection.<sup>5</sup> In the Hogg RS study it was found that the severity of the manifestations of HIV infections was associated with low nutritional status, which is related to socioeconomic status. In another study at Jos University Teaching Hospital, Nigeria, it was found that in non-industrialized or developing countries such as Nigeria, common infections such as streptococcus pneumoniae,

mycobacteria tuberculosis and salmonella species are prevalent.<sup>13</sup> This, they found to be related to the poor socioeconomic circumstances in overcrowded communities in these countries.

The commonest AIDS defining illness found in this study (65.6%) is wasting syndrome, which was found more among the low socioeconomic class (Table 4). This agrees with the earlier study done by Okany and Akanmu in which wasting syndrome was found to be the commonest AIDS defining illness in Lagos-Nigeria, constituting 77%, as it is elsewhere in most countries in Africa South of Sahara.<sup>14</sup> This may also be due to inadequate facility to diagnose other AIDS defining illnesses. Pulmonary tuberculosis was found to be a common AIDS related illness among the patients in this study. Angyo in the Jos study found 26.1% patients with PTB in children with AIDS.<sup>13</sup> Again, majority of these patients are from the low socioeconomic class (Table 4).

It was found in the study by Crew P. et al that the severity of the manifestations of AIDS was associated with nutritional status and age at onset of symptoms.<sup>15</sup> The relationship between low socioeconomic status and severity of manifestation of HIV infection was also confirmed by Worthington and Krentz,<sup>16</sup> and in another study by Centeville and colleague among HIV infected children in Brazil.<sup>17</sup> On the other hand, none of the demographic and socioeconomic factors was found to significantly affect the immunological stage of HIV infection. This agrees with one of the findings by Armbruster and colleague that increased intake of nutritional supplements (which is related to the socioeconomic status) had positive effects on the mortality among HIV infected individuals but had no impact on CD<sub>4</sub> cell count or plasma viral load.<sup>18</sup> In the statistical analysis, the socioeconomic status was found not to affect the immunological (CD<sub>4</sub>) stage of the patients in this study (Table 3). It is of note that majority of the patients found in this study are from low socioeconomic class. Socioeconomic class 1, 2, 3, 4 and 5 constituting 7.9, 24.2, 35.8, 28.5 and 3.6% respectively (Table 3). Majority (68%) being socioeconomic class 3 and below. This may be a reflection of the socioeconomic situation in the country or suggest that HIV infection is a disease of the poor. This may need further studies for a reasonable conclusion.

## CONCLUSION

In conclusion, this study has revealed that the clinical stages at which HIV patients presents is also a function of socioeconomic class. Irrespective of the CD<sub>4</sub> count, low socioeconomic status was also found to be associated with more serious HIV-related illnesses. Socioeconomic class however, has no significant effect on the immunological stage. This has a great implication in the management of HIV infection in a nation where access to antiretroviral drug is still very low, and where ART may be too expensive to maintain by the individual or government. Thus, improving the socioeconomic status of people living with HIV infection may reduce the morbidity and mortality associated with HIV infection.

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