ORIGINAL ARTICLE

Trends of HIV Seropositivity among Blood Donors over Six Years Period (1995-2000) in Jimma Zone, Southwest Ethiopia

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ABSTRACT

Background: *Since few years back HIV/AIDS has become a threat to global development. Developing countries especially those in the sub-Saharan area are highly victimized by the tolls of its morbidity and mortality. Circumstantial evidences and reports from sentinel studies indicate that the problem is progressing from time to time. However, there is no adequate information in Ethiopia as to what the trend of the infection looks like in healthy population over a period of time.*
The objective of this study was to determine the trend of HIV positivity among blood donors at the Jimma Hospital Blood Bank.
Methods*: A retrospective cross-sectional study was carried out among blood donors during the period of January 1995 to December 2000 at Jimma hospital blood bank, Jimma zone, Southwest of Oromiya, to determine the trend of HIV seropositivity and associated factors. All subjects who donated their blood at Jimma hospital blood bank during the specified period were included in the study. Data on socio-demographic variables, and serologic status of the subjects were abstracted from their records using structured questionnaire. The data were cleaned edited and entered in to computer and analysis was done using SPSS version 7.5.*
Results*: A total of 3394 subjects donated blood over the last six years, 3020 were male and 360 were female. The prevalence of seropositivity tended to decrease from 1995 some how until 1999 and started to rise in 2000 this difference in the prevalence of seropositivity was statistically significant (P<0.05). The study revealed that 189 (5.6%) donors were positive for HIV upon screening by ELISA method. The sex specific prevalence of HIV infection was 9.3% for females and 5.8% for males. This difference in the sex specific prevalence of HIV infection was statistically significant (P=0.002, OR = 0.565, 95%CI =0.395-0.810). There is also a statistically significant difference in the prevalence of HIV infection along the years (P =0.003). The age specific prevalence is highest in the age group of 18-30 followed by that of the age group of 31-40 as compared to other age groups, this difference was statistically significant (P =0.028). Single subjects showed the highest (5.8%) prevalence followed by Married ones (5.6%), the difference was not statistically significant (P>0.05).*

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Pertaining the literacy status, the highest prevalence (7.2%) was observed in those subjects who attended Junior secondary and high school followed by those who attended grades 1-6(5.4%), the difference was not statistically significant (P<0.05). Seropositivity was higher(6.9%) among Christians as compared to Muslims (4.1%) and the difference was statistically significant (P <0.001, OR =1.68, 95%CI=1.25-1.27).
Conclusion: *Based on the results of the study, appropriate recommendations were made.*

Key words*: HIV, Seropositivity, Trends, Blood donors*

INTRODUCTION

Occurrence of HIV/AIDS pandemic has called the attention of the world's population and organizations that are concerned with public health. Cognizant of the continued emergence of new cases of HIV/AIDS at an alarming rate, WHO and UNAIDS released a striking report on the global HIV/AIDS epidemic in 1997. It was then estimated that at the end of 1997 over 30 million people in the world were living with HIV (1, 2). Recently, it was estimated that the prevalence of HIV infection is greater than 10% in 13 countries and in others it is as high as 30% (3,4). The majority of cases of HIV Infection are found in the most productive age groups, 15-49 years (1, 5). The number of young children orphaned by AIDS grows daily (2). The economic costs and negative social impacts of the disease on African society are keenly felt (6).

In Ethiopia, HIV/AIDS started spreading rapidly in the 1980's after the notification of the first case in 1986 (1,7). The prevalence of HIV infection in Ethiopia has rapidly increased over the past few years. It is estimated that adult prevalence had increased from 3.2% in 1993 to 10.63% in 2001(2,7,9). The total number of adults and children infected with HIV in 1997 was estimated to be 2-3 million (1,7). Of all infected cases, it was estimated that 20% were in the age group between 15-24 years (8). Currently the prevalence of HIV infection in the general population is estimated to be 10.6% of which 2.9 million of them are adults in the age ranges of 15-49 years (9).

A number of reports had also indicated that the prevalence of HIV infection is high among females as compared to males (1). This could be attributed to various biological, social and economic reasons (10).

Among the risk factors for HIV/AIDS transmission that are pointed out are: unsafe Sex with multiple partners, commercial sex, extramarital sex, non-faithful partnership, sexually transmitted diseases, infected blood and blood products, traditional malpractice and sex with partner especially for women. Heterosexual transmission of HIV-1 is the predominant mode of infection among adults world wide, while mother to child transmission accounts for most of HIV-1 infection in children (11, 12).

The national HIV/AIDS control program at the ministry of health estimates that 88% of all infections in Ethiopia result from heterosexual transmission (8,13). Initial reports indicate that the urban population is more affected than rural (14), however, circumstantial evidences indicate that the scope of the problem is increasing as the disease spreads from urban centers to rural communities.
Continuous and active surveillance of such a contagious communicable disease is critically important in order to plan the

intervention measure and also see the impacts of the different interventions.

Information gap as to the actual extent of the problem of HIV/AIDS is one of the limitations of HIV/AIDS control activities in Ethiopia (1, 13). This could be attributed to the fact that the disease has a longer incubation period and it is difficult to distinguish healthy carriers by any means unless a serologic survey is done.

Community based Serologic surveys conducted among sexually active population in early 1993 in six rural cities found in four administrative zones: North Shoa, Tigray, Arsi, Bale and South Oromiya showed that 0-7% of the population was infected (7). But this study was just a one-time assessment and does not tell us the trend of the problem with time.

It is clear from these surveys and other health service based data that HIV infection is present in all regions of the country (1, 7, 9, 14-17). The problem of HIV infection is beyond being limited to special groups of the population that are considered to be a high risk. As long as there is a risky behavior, everybody is practically at risk of the infection. Determination of the prevalence of the problem in the general population is believed to give an idea as to what needs to be done as an intervention (7). Prevalence of HIV infection in adults (15 years or more old) is one commonly used measure of the extent of the problem in the population.

To have an estimate of the extent of the problem, sentinel surveillance had been conducted so far mostly on antenatal care attendants, commercial sex workers in the cities like Addis Ababa (14, 18) and on pulmonary tuberculosis cases and other patients in the regions (1,14,17).

There is inadequate information about the trend of HIV infection over the years from data of similar kind and similar set up

to allow comparison of the seropositivity over the course of time.

Most of the studies that had been conducted so far (3,5,15,20-26) are focused on either specific age or sex groups of the population or on specific year leaving an information gap in visualizing the progression of the disease in the advent of time. The validity of the surveillance data generated from such studies have been questioned and commented upon (1).

The close association of HIV infection with economic and social problems has made it difficult to check its rapid progression in the developing countries. Evidences from Africa (27-30) and Southeast Asia (31-32) indicate that it still has an increasing trend.

Some other studies conducted in African countries indicated that there is a decreasing trend in some segments of the population. For example, a population based survey among women aged 15-54 years of age in Kagere region of Tanzania in 1993 showed that the sex specific prevalence had decreased from what had been indicated in 1987 (20).

In Ethiopia, interventions against HIV/AIDS have been going on starting from few years in the past. While the main aim of all efforts being made is to reduce the prevalence and incidence of HIV/AIDS, circumstantial evidences and data from sentinel surveillance show that there is an increasing trend of HIV infection over the years (1,13,33,34). However, there is no sufficient data that indicates what the trend of the epidemic looks like in the healthy population. As blood donors are healthy people aged from 18-65 years coming to the blood bank on their own, it is assumed that they would represent the adult population of the same age group in the community from which they came from. Therefore, this study aimed to provide information as to what the trend of HIV

seropositivity looks like among the blood donors at the Jimma Hospital Blood Bank over the study period. Besides, the study tried to see the different socio-demographic factors associated with seropositivity in order to provide a baseline data for further studies.

MATERIALS AND METHODS

The study was conducted in the setting of Jimma hospital blood bank, Jimma zone of Oomiya, Southwest Ethiopia from May 30 to June 20, 2001. Jimma Hospital is a regional referral and teaching hospital situated in Jimma town, which has a total projected population of 106,111. The hospital gives different inpatient and outpatient services to the population in the surrounding area of Jimma town and referral service to the southwestern population of the country. There is a blood bank service in the hospital recently run under the auspices of the zonal red-cross society. All the blood donated at this center is screened one time using Enzyme Linked Immunosorbent Assay (ELISA) method for HIV at the Jimma Zonal Laboratory.

A cross-sectional retrospective study design was employed, as it is appropriate to see the prevalence of seropositivity among all blood donors over the specified period

Therefore, all healthy subjects who donated their blood at the Jimma hospital blood bank within the period of six years (1995-2000) were included in the study. It is felt that the result of this study is extrapolated to all healthy adults (18-65 year old) population that live in Jimma and it's surrounding over the six years.

Data on Socio-demographic variables like age, sex, marital status, religion, educational status, occupation, place of residence or address were abstracted from records of subjects at the Blood Bank. Using their identification numbers, serologic status of subjects were linked to their Socio-demographic data except their names from their records.

An experienced laboratory technician who has been working in the regional laboratory for over 10 years collected the data. Structured format was used to abstract the raw data from the records.

The data collector was briefed about the process of data collection and investigators verified at least 10 percent of the data during data collection. The raw data were checked using range and consistency check methods. The data were cleaned and edited and analyzed using SPSS for window version 7.5. Statistical tests for significance were carried out where appropriate at a level of significance of 5%.

Permission was obtained from the principal of Jimma hospital before the commencement of data collection. The Jimma University ethical committee approved the study. Anonymity was maintained in such a way that serologic status of the subjects was registered in unlinked way. For this reason, the names of subjects were not registered on the data collection format.

RESULTS

A total of 3390 subjects donated blood at the Jimma Hospital Blood Bank over the last six years, of which 3020 were male and 360 were female, giving a male to female ratio of 8.4:1. Most of the subjects are in the age group 18-30 followed by those in the age group of 31-40 years. The majority (65.1%) of donors were from urban areas and the rest were from rural areas. Most (84.8%) of the subjects were from Jimma zone and the rest came from different zones and cities like Bonga, Metu, Bedele, Addis Ababa, Wellega, etc. (Table 1). The two predominant religions of the subjects were Christian and Muslim (Table2). Higher proportion of subjects lives on the

occupation of farming, followed by being government employee.

Overall 189(5.6%) of the blood donors were positive for HIV. The overall prevalence varied from 8.3% in 1995 through 4.3%, 6.7%, 4.1%, 3.9% in 1996, 1997, 1998, 1999, respectively to 5.8% in 2000 (Fig. 1), this difference was statistically significant (P = 0.003). The prevalence showed a marked increase in female sex in the year 2000 (Fig. 2).

With regard to literacy status, the highest prevalence (7.2%) was observed in the subjects who attended Junior and high school followed by those who attended grades 1-6(5.4%), the difference was not statistically significant (P>0.05) [Table 4]. Better educated sections of the society like the government employees, junior and high school students are also the victims of the problem.

The sex specific prevalence of HIV infection was 9.3% for females and 5.8% for males. This difference in the sex specific prevalence of HIV infection was statistically significant (P=0.002) OR= 0.565, 95%CI =0.395-0.810) [Table3]. This trend indicates that the problem is increasing in the rural areas, which is not a much-expected event (Fig. 3).

The prevalence of the infection was also higher among the urban population as compared to the rural, though this difference is not statistically significant. However, in the year 2000, the prevalence was higher in those who reside in the rural areas (8.3%) as compared to those who live in the urban areas (4.8%) [Fig.4].

The age specific prevalence was highest in the age group of 18-30 followed by that of the age group of 31-40 as compared to other age groups, this difference was statistically significant (P =0.028).

Higher prevalence of seropositivity (6.9%) was recorded among Christians as compared to Muslims (4.1%) and the difference was statistically significant (P < 0.001, OR =1.68, 95%CI=1.25-1.27) [Table1]. Higher prevalence of HIV seropositivity was found among males, Christians, housewives.

Regarding marital status, even if there was no statistically significant association between marital status and prevalence of seropositivity, single subjects showed the highest (5.8%) prevalence followed by married ones (5.6%) [Fig.5].

HIV seropositivity was found to show an increasing trend over the years in general, however, rapid increases were observed in the year 2000 in female sex, government workers, house wives, students, farmers, subjects who attended 7-12 grades and rural population (Figures 2- 5).

Table 1. Prevalence Of HIV Sero-Posetivity by Different Socio-Demographic Variable of Subjects Who Donated Blood at Jimma Hospital Blood Bank over Six Years (1995-2000).

Variable	Positive No (%)	Negative No (%)	Total No (%)	Bi-variate OR (95%CI)	Multi-variate OR (95%CI)
Marital Status					
Married	143(5.6)	2395(94.4)	2538(100)		
Single	45(5.8)	729(94.2)	774(100)	1.06 (1.05-1.07)	1.45 (0.97-2.18)
Divorced &					
Widowed	-	119(100)	12(100)		
Literacy Status					
Read & Write	90(5.1)	1673(94.9)	1763(100)		
Grade 1-6	37(5.4)	646(94.6)	683(100)		
Grade 7-12	34(7.2)	441(92.8)	375(1000	0.86 (0.64-1.16)	0.959(0.78-1.15)
> 12 grade	7(4.4)	151(95.6)	158(100)		
Age Group					
18-30 years	116(5.9)	1839(94.1)	1850(100)		
31-40years	62(6.4)	903(93.6)	132(100)	0.42 (0.23-0.77)	1.10 (0.87-1.40)
41-50 years	10(2.6)	376(97.4)	386(100)		
51-60 years	1(2.3)	43(97.7)	44(100)		
Residence					
Urban	134(6.2)	2042(93.8)	2176(100)	0.76 (0.56-1.03)	1.08 90.76-1.55)
Rural	55(4.7)	1120(95.3)	1175(100)		
Zone					
Jimma	152(5.4)	2686(94.6)	2838(100)		
Other				0.57 (0.40-0.81)	0.63 (0.41-0. 99)
	37(7.2)	474(92.8)	511(100)		
Occupation					
Gov. Employ	50(7.5)	619(92.5)	669(100)		
Merchant	11(4.5)	235(95.5)	246(100)		
Housewife	9(8.7)	94(91.3)	103(100)		
Farmer	37(3.2)	1115(96.8)	1152(100)	1.06 (1.05-1.07)	0.96 (0.89-1.03)
Student	23(5.7)	379(94.3)	402(100)		
Housemaid	0(0.0)	17(100)	17(1000		
Bartender	0(0.0)	1(100)	1(100)		
Others	59(7.8)	702(92.2)	761(100)		
Total	189(5.6)	3162(94.4)	3351(100)		

Table 2. Overall Prevalence of HIV Sero-Posetivity by Religion of Subjects Who Donated Blood at Jimma Hospital Blood Bank Over that Last Six Years 1995-2000.

Religion	HIV Sero-Status		Total	Bi-variate	Multi-variate	
	Positive	Negative				
	No (%)	No %	No (%)	OR (95% CI)	OR	(95%CI)
Christian	126 (6.9)	1750 (93.1)	1876 (100)			
Muslim	60 (4.1)	1410 (95.9)	1470 (100)	1.68 (1.25-2.27)	1.69	(1.17-2.44)
Total	186 (5.6)	3160 (94.4)	3346 (100)			

Table 3. Overall Prevalence of HIV Sero-Posetivity by Sex of Subjects Who Donated Blood at Jimma Hospital Blood Bank Over Six Years (1995-2000).

Sex	HiV Sero status				Total		Bi-variate	Multi-variate
	Positive		Negative					
	No	%	No	%	No	%	OR (95%CI)	OR(95%CI)
Female	33	9.2	325	92.8	358	100		
Male	156	5.2	2837	94.8	2993	100	1.77(1.23-253)	1.58(1.0-2.5)
Total	189	5.6	3162	94.4	3351	100		
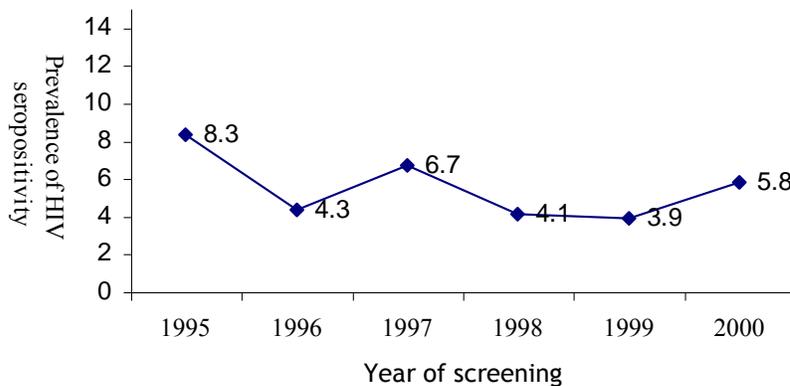
Figure 1. Trend of HIV Seropositivity among Blood Donors at Jimma Hospital Blood Bank over Six years(1995-2000).
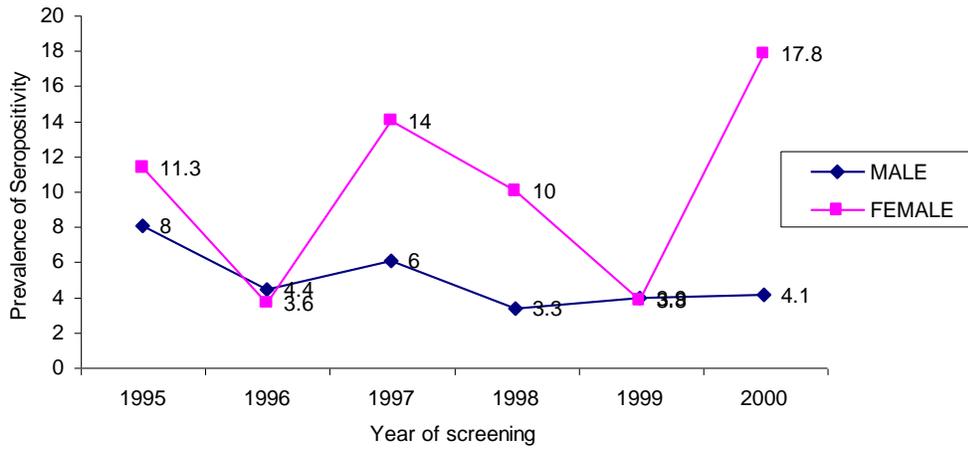
Figure 2. Trend of HIV Seropositivity Among Blood Donors at Jimma Hospital Blood bank Over Six Years(1995-2000)by Sex of Subjects
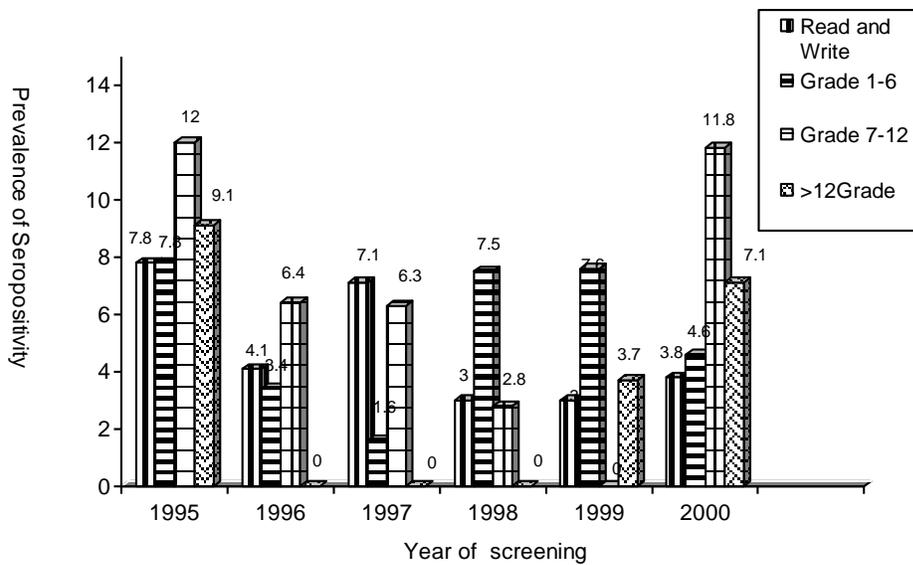

Figure 3. Trend of HIV Seropositivity Among Blood Donors at Jimma Hospital Blood Bank Over Six Years (1995-2000) by Literacy Status of Subjects
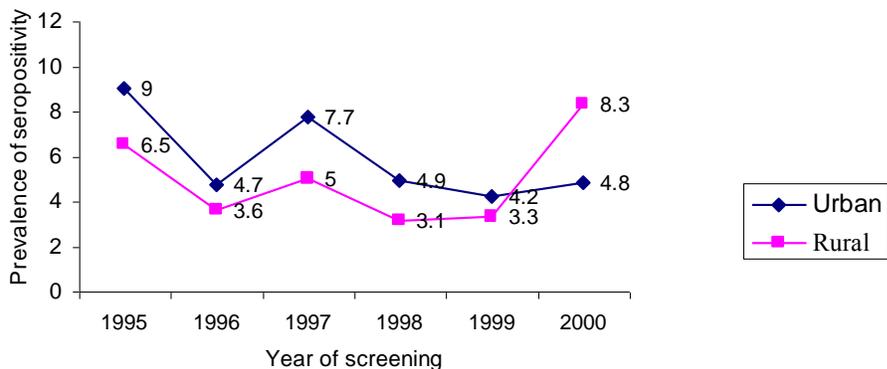
Figure 4. Trend of HIV Seropositivity Among Blood Donors at Jimma
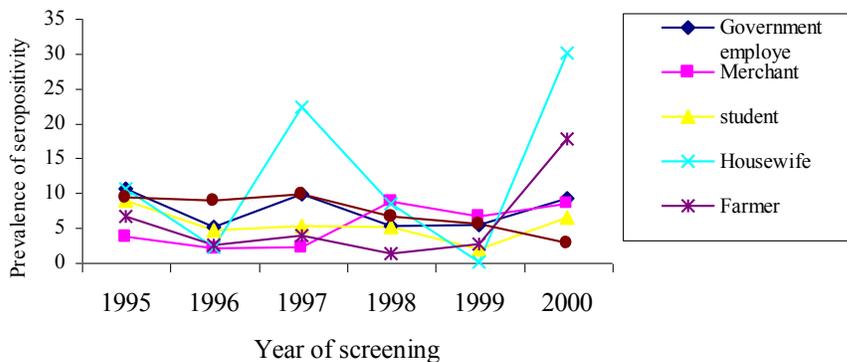Hospital Blood Bank over Six years(1995-2000) by Residence Area

Figure 5. Trend of HIV Seropositivity among Blood Donors at Jimma
Hospital Blood Bank over Six Years(1995-2000) by occupation

DISCUSSION

Out of 3394 donors 189(5.6%) were positive for HIV up on screening by ELISA method. The sex specific prevalence of HIV infection was 9.3% for females and 5.8% for males. This is consistent with the reports of other studies that reported a higher prevalence among females (1,35). Females are more vulnerable to HIV infection as compared to their male counter parts due to biological, social and economic disadvantages related to their gender counterpart (10).

There is a statistically significant difference in the prevalence of HIV infection along the years (P=0.003). The prevalence of seropositivity was higher in 1995 after which it seemed to decrease up to 1999, however, there was a an upward direction in 2000 that indicates an increasing trend. This study showed a similar increasing trend as in the National surveillance studies by the MOH of Ethiopia which has shown an increasing trend over the years (35,36). The fact that there was somewhat a decrease in the prevalence of HIV infection between 1995 and 1999 could be attributed to the increased awareness of the public about the problem and decrease in the incidence, or it could be due to selection bias. That is to mean those subjects who suspect them selves may not be volunteer to donate their blood due to an increase in their awareness of the problem.

The prevalence of the infection is also higher among the urban population as compared to the rural, though this difference is not statistically significant. Other studies also have similar findings (14). Even though the urban population is more affected than the rural, this study indicated that the infection is spread to rural population more than one expects.

The age specific prevalence is highest in the age group of 18-30 followed by that of the age group of 31-40 as compared to other age groups, this difference was statistically significant (P =0.028). This finding is consistent with the reports of other studies conducted earlier by other investigators (1,5,35,37). This is due to the fact that this group of the population is sexually active and the main mode of transmission of HIV is heterosexual (8,11-13).

Single subjects showed the highest (5.8%) prevalence followed by married ones (5.6%), the difference was not statistically significant (P>0.05) this is in agreement with surveillance studies in Ethiopia that indicated higher prevalence in single subjects (35).

Pertaining the literacy status, the highest prevalence (7.2%) was observed in the junior and high school students followed by those who attended grades 1-6 (5.4%), the difference was not statistically significant (P>0.05).

The study showed that seropositivity was higher (6.9%) among Christians) as compared to Muslims (4.1%) and the difference was statistically significant (P=0.000, OR =1.68, 95%CI=1.25-1.27).

A higher prevalence of HIV seropositivity was found among government workers and housewives followed by students. A similar pattern was reported by surveillance studies (34,36). This could be due to the reason that even though government workers may have better awareness about the disease, they are the ones with good income and have access to multiple sexual partners. Besides, they are likely to be away from home due to their job getting exposed to casual partners. The higher prevalence of the infection in students may be due to coupling of coupling of young schoolgirls with older adults with history multiple sexual partners and traditional believe that school girls are free of the infection leading to unsafe sex.

Upon logistic regression analysis, female sex, Christian religion, single and married subjects were found to have higher risk as compared to their males, Muslim religion and divorced and widowed counter parts, respectively.

This might be due to the fact that marriage is being committed without premarital screening. Besides, being married is not itself enough to prevent the disease, but the couples should stick to a one to one partnership, short of this the risk of infection is double. This study calls further serial community based investigation of the trend of seropositivity and the determinant factors. Information communication and education using different mechanisms and through multisectoral approach is recommended to change this increasing trend of the HIV infection.

REFERENCES

1. Kebede D, Aklilu M, Sanders E. The HIV epidemic and the state of its surveillance in Ethiopia. *Ethiop Med J* 2000; 38(4): 283-302.
2. UNAIDS. Expanding the global response to HIV/AIDS through focussed action, joint United Nations programme on HIV/AIDS, 1998.
3. Boillot F, Peeters M, Kosia A, Delaporte E. Prevalence of human immunodeficiency virus among patients with pulmonary tuberculosis in Sierra Leone, established from dried blood spots on a filter paper. *Int J Tubercl Lung Dis* 1997; 1(60: 493-7.
4. Tegbaru B, Meles H, Fisseha B, Mekonen Yand Haile H. Evaluation of the five commercial assays for detecting HIV 1 & 2 antibodies in Addis Ababa, *Ethiop J Health Dev* 1999; 13(3): 175-180.
5. Demissie M, Lindtjorn B, Tegbaru B. Human immunodeficiency virus infection in tuberculosis patients in Addis Ababa. *Ethiop J Health Dev* 2000; 14 (3): 277-282.
6. West EG, Ayehunie S. First International Conference in Ethiopia, Addis Ababa, 1999.
7. MOH. AIDS in Ethiopia: Background projects, impacts and intervention. MOH, Epidemiology and AIDS Department, 1998.
8. UNAIDS Ethiopia. The HIV/AIDS situation in Ethiopia. Newsletter NO.4. 2000.
9. UNAIDS and WHO report on global HIV/AIDS pandemic. UNAIDS/WHO joint United Nations program on HIV/AIDS, Geneva, 2000.
10. Bere M, Sunada R. Women and AIDS: social economic and political factors that increase risk for women. Great Britain, Scot Print LTD 1993.
11. Quinn TC. Global burden of HIV pandemic. *Lancet* 1996; 348: 99-106.
12. Zang H, Dornadula M, *et al*. Human immunodeficiency virus type-1 in semen of men receiving highly active anti retroviral therapy. *N Eng J Med* 1998; 339: 1803-9.
13. Negassa H. Current HIV/AIDS situation in Ethiopia. Proceedings of the 11th annual scientific conference of the Ethiopian public health association, Awassa, Nov. 16-18, 1998.
14. Eshetu M, Libnedengil T, Ali Y. HIV infection among pregnant mothers attending ANC in Jimma Hospital. *Bulletin of JIHS*.1997; 7(2): 87-94.
15. Rahlenbeck SI, Yohannes G, Molla K, Reif R, Assefa A. Infection with HIV, syphilis and hepatitis B in Ethiopia: a survey in blood donors. *Int J STD-AIDS.* Apr. 8(4): 261-4.

16. Adray AG, Melaku BK, Zenebe CG. Pleural TBC in patients with HIV in Addis Ababa. *Cent Afr Med J* 1996; 42(12): 337-40.

17. Surur F. Descriptive analysis and seroprevalence of HIV among cases of condyloma accuminata. *Bulletin of JIHS.* 1997; 7(2): 105-112.

18. Mengistu M, Lev K, Zewdie D, Ayehunie S, Shanko B, Gizaw G, *et al.* HIV-1 infection and related risk factors among female sex workers in urban areas of Ethiopia. *Ethiop J Health Dev* 1990; 2: 163-170.

19. Buzingo T, Alary M, Sokal DC, Saidel T. The prevalence of HIV and risk behaviors of prostitutes living in two populous regions of Bujumbura (Burundi). *Sante* 1997; 7:355-60.

20. Kwesigabo G, Killewo J, Godoy C et al. Decline in the prevalence of HIV-1 infection in young women in Kagera region of Tanzania. *J Aquir Immune Defic Syndr Hu Retrovirol* 1998; 17(3): 262-8.

21. Mbizvo MT, Latif AS, Machekano R, et al. HIV seroconversion among factory workers in Harare: Who is getting newly infected? *Cent Afr J* Med 997; 43(5): 135-9.

22. Kuaban C, Bercion R, Kolla Shiro-S. HIV Seroprevalence rate and incidence of adverse skin reactions in adults with pulmonary tuberculosis receiving thiacetazone free anti tuberculosis treatmnet in Yaonde, Cameroon. *East Afr Med J* 1997; 74(8): 474-7.

23. Gellet A., Kebede D, Berhane Y. Tuberculosis and HIV infection in southern Ethiopia. *Ethiop J Health Dev* 1997; 11(1): 51-59.

24. Mitike G, Kebede D, Yeneneh H. HIV infection and anti tuberculosis drug resistance among pulmonary tuberculosis patients in Harar tuberculosis centre, Ethiopia. *East Afr. Med J* 1997; 74 (3): 154-157.

25. Demissie K, Aimre D, Tsega E. HIV infection in relation to educational status of hypodermic injection and other risk behavior in Ethiopian sailors. *East Afr Med J* 1996; 73:819-22.

26. Tsega E. The demographic, social and clinical presentation of 100 patients with HIV infection. *Ethiop Med J.* 1990; 28: 81-88.

27. Bertherat E, Georges-Courbot -MC, Nabias R, Georges AJ, Renaut A. Seroprevalence of four sexually transmitted diseases in semi urban population of Gabon. *Int J STD-AIDS.* 1998; 9 (10): 31-36.

28. Taha TE, Dallabetta GA, Hoover DR *et al.* Trends of HIV-1 and sexually transmitted diseases among pregnant and post partum women in urban Malawi. *AIDS.* 1998; 12: 197-203.

29. Malkin JE, Prazuck T, Simonnet F, et al. Tuberculosis and human immunodeficiency virus infection in west Burkina Faso: clinical presentation and clinical evolution. *Int J Tuberc Lung Dis* 1997; 1: 68-74.

30. Williams ESU, Mulanga KC, Takena H. Seroprevalence of HIV-1 and HIV-2 group in Nigeria: evidence for a growing increase in HIV infection. *J Acquir Def Synd Human Retrovirol* 1997; 16: 204-210.

31. Ray K, Mahajan M, Misra RS. Seroprevalence of HIV infection in high risk groups and in suspected AIDS cases in New Delhi Hospital. *J Commun Dis.* 1997; 29: 275-82.

32. Makroo RN Salil P, Vashist RP, Shivlal. Trends of HIV infection in the blood donors of Delhi. *Indian Pathol Microbiol* 1996; 39: 139-42.

33. Lamont AC, Grieff M, Rosemberg DS, Wiggin TR. AIDS in Africa: What drugs do the careers want or need? *Tropical Doctor* 1996; 25 (1): 72-76.

34. Jordan IB, Haworh A. The contribution of counseling in hospital and home based care in a small town and surrounding rural in Zambia. *Tropical Doctor* 1995; 25 (1): 21-24.

35. National AIDS Control Program. AIDS case surveillance in Ethiopia, Ministry of Health, Addis Ababa, April 1994.

36. National AIDS Control Program. AIDS case surveillance in Ethiopia, Ministry of health, Addis Ababa, October 1993.

37. Fontanet AL, Messele T, Dejene A, *et al*. Age and sex specific HIV-1 prevalence in the urban community setting of Addis Ababa, Ethiopia: special issue on HIV/AIDS in Ethiopia in collaboration with the Ethio-Netherlands AIDS Research project. *Ethiop Med J* 1999; 37(1): 27-34.