ASSESSMENT OF HIV SERO-PREVALENCE AMONG REGISTERED TUBERCULOSIS PATIENTS IN ARSI ZONE

By

Kedir Wajisso (MD)

A thesis Presented to The school of Graduate Studies of Addis Ababa University
In partial fulfillment of the Requirements for the Degree of Master of Public Health

April 2003
Addis Ababa
Ethiopia.

Addis Ababa University
School of Graduate Studies

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Department of Community Health
Faculty of Medicine, Addis Ababa University

Approved by the Examining Board

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Acknowledgement

First of all I would like to pass my heart felt thanks to Ministry of Health and Oromia heath bureau for the sponsorship and financial assistance.

I am very much grateful to my advisors Mr. Fikre Inquselassie and Dr. Negussie Deyessa for their unreserved advise, encouragement and constructive comment through out the study with out which it would have not been possible to bring the study to this stage.

Arsi zonal health department, Asela Hospital, Asela Health center, Segure, Bekoji, Assassa, Cofelle, Huruta, Dhera, Addis hiwot and Abomssa health center
Staffs, particularly the head of tuberculosis section and laboratory technicians are very acknowledged for their vital assistance during the data collection work. The staffs of community health library who have been providing materials relevant to the study are also acknowledged.

Finally, I would like to thank my wife Sr. Zahara Beshir for her continous moral and financial support through out the two year study period.

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List of Abbreviations

AFB:- Acid fast Bacilli

AIDS:- Acquired Immunodeficiency syndrome

BCG:- Bacillus Calmettes Guaerrin

ELISA:- Enzyme Linked Immuno-Sorbant Assy.

EP:- Extra-pulmonary

HIV:- Human Immunodeficiency Virus

OR:- Odds Ratios

MOH:- Ministry of Health

PPD:- Purified Protein Derivative

SPSS:- Statistical Package for Social Sciences

STD:- Sexually Transmitted Diseases

TB:- Tuberculosis

WHO:- World Health Organization

Abstract

Health institution based cross-sectional study was undertaken in Arsi zone, Oromia regional state from October 2002 to may 2003. The objective of the study was to determine the sero prevalence and their determinants among registered tuberculosis patients. The HIV antibody was determined using a single ELISA technique.

A total of 419 tuberculosis patients aged 15 years and above was enrolled in the study. The over all HIV sero prevalence rate was 37.2%. The highest rate was observed in the age group 20 to 39 years. Almost equal proportions of male (37.9%) were found to be HIV sero positive compared to the females (36.3%). Being married was found to be associated with serum HIV positivity. Those divorced and widow/widower patients had high proportion of HIV positivity. Being urban was found to be associated with serum HIV positivity. The HIV positivity rate was higher for pulmonary tuberculosis compared to extrapulmonary tuberculosis. Smear negative pulmonary patients were found to be significantly associated with HIV sero positivity compared with smear positive pulmonary tuberculosis (30.5%).

It was concluded that HIV infection is highly prevalent among smear negative pulmonary tuberculosis patients, young age group, people who had history of STD, history of multiple sexual partners. Finally, the need for dual strategy in controlling the dual epidemic is recommended.

INTRODUCTION

Tuberculosis (TB) is a chronic infection disease that has a major health problem over the centuries and it has accounted for more human misery suffering and loss of earning and failure of economic and social development than any other disease (1). According to World Health Organization (WHO) estimation, about one third of the world's population is infected with tuberculosis bacteria, about ten million cases of active disease are estimated to occur each year, and annually three million people die of tuberculosis (2).

The burden of tuberculosis is greatest in the developing world, where together with human immune deficiency virus (HIV), tuberculosis is over whelming health services, and it accounts for 26% of avoidable deaths, 80% of those who are in their most economically productive years of 15-54 (3). In 1999 there were estimated to be 8.4 million new cases of TB worldwide. Sub Saharan Africa is the region most severely affected by tuberculosis disease (4). Nearly three quarters of people infected with both HIV and tuberculosis live in sub-Saharan Africa (4) and WHO predicts that by 2005 there will be 3.4 million tuberculosis cases in Africa (4). Ethiopia is one of the sub-Saharan African countries where the number of reported new cases had increased from 55,000 to 100,000 in the last ten years (5). These figures are considerably very likely to increase significantly due to the HIV/AIDS epidemic.

The HIV/AIDS pandemic has substantially altered the epidemiology of tuberculosis (6) the results of various studies have documented that persons coinfected with mycobacterium tuberculosis and HIV have a 5-8% annual risk of developing active TB. Thus confected patients have the same probability of developing TB in one year as HIV negative tuberculosis positive patients have in their entire lives (6). The double impact of TB and HIV is keeping large number

of people trapped in poverty and diseases that reinforced each other (7). New approaches are needed to tackle the current and impeding disaster of TB its let that combination with HIV will continue unless the detection and treatment of both infections improved simultaneously. Hence as HIV is the main responsible for the current epidemic of TB in Africa, an integrated program has greater chance of affecting the tuberculosis burden here than any course of action undertaken by control program alone.

As TB & HIV in Ethiopia are major public health problems, accurate information about the extent & trends (comparing results from different years) of the dual infection is important for effective prevention & control programs. However, there are only limited studies that describe the association between the two disease so far in Ethiopia and these previous studies have mainly focused in major cites and urban centers.

This study is, therefore undertaken to determine the prevalence of HIV among TB patients and associated factors such as the predisposing behaviors, characteristic clinical presentation of TB&HIV co-infection patients in Aris zone. The finding of this study would indicate the current co-infection rate that might help program planners to design and integrated prevention and control strategies.

LITERATURE REVIEW

1. MAGNITUDE OF TUBERCULOSIS

According to WHO estimation, nearly one third of the worlds population is infected with tuberculosis bacteria which is at risk of developing active disease, 8.4 million people develop active tuberculosis disease every year and 2.3 million die of the disease (7). TB accounts for 2.5% of the global burden of diseases, for 26% of preventable death and a leading infections cause of death among young women (8,9) and among the top ten causes of global mortality (6). As revealed in WHO monitoring and surveillance project record, 68 million tuberculosis cases since 1980 and 10 million new smear positive cases since 1997 were reported. Approximately 80% of tuberculosis cases are from 22 countries the highest incidence rate found in Africa &East Asia (2,10).

In Ethiopia, according to the Ministry of health report, there were 94,954 of all forms of tuberculosis cases, and 33,028 of new smear-positive pulmonary cases from directly observed short course chemotherapy (DOTS) implementing areas by the end of 2001 (7). On the other hand TB&HIV co-infection rate was high and it, was estimated that about 40% of adult tuberculosis cases in urban areas are HIV Sero positive (7,11,12). Therefore the burden of tuberculosis in Ethiopia is one of the highest in the world.

TB affects individuals of all ages and both sexes with in every socio-economic group in the population. There is however groups, which are more vulnerable to develop tuberculosis disease in a given community. Poverty, malnutrition, crowded living condition and HIV infection have been reported to increase the risk of developing the diseases in poor countries like ours. (7). Globally, the prevalence of infection with mycobacterium tuberculosis is similar in males and females until adolescent age after which it is higher in male's (3,7,13). Both sexes in present

notification in many developing and industrial countries are similar & is ranged between 15-34 years (3,12)

Sex and age specific HIV prevalence in the general population peaks in women aged 15 to 24 and in men 29-35 years (8,14). several studies conducted in sub-Saharan Africa shows similar age and sex patterns of prevalence. A study conducted in Tanzania among smear positive TB cases found significantly high prevalence of HIV in females than males in the 15 to 24 age group (10). In another study, the prevalence of HIV infection among 346 tuberculosis patients in Lusaka Zambia, revealed 74% of women in age group 14-24 as compared with 48% of men of the same age group (3,8,14). This probably shows that females start sexual intercourse relatively earlier than males. After the age 24 years, men had greater number of notification of tuberculosis, but the prevalence of HIV infection was similar in males and females with tuberculosis (3). Because of their higher risk of HIV infection at a time when they appear to be at increased risk for progression from tuberculosis infection to diseases, dual infection may have a particularly sever impact on young women in low income setting. Very high incidence rates of TB in dually infected individuals have been reported in both industrialized and developing countries, millions of people infected with the Mycobacterium tuberculosis are now developing the disease because their immune system is under attack from HIV. Study in sub-Saharan African countries found that people who were infected with mycobacterium tuberculosis who were also infected with HIV were 30-50 times more likely to develop active tuberculosis than those without HIV (15,16,17). Unlike HIV, mycobacterium tuberculosis can spread and pass by close contact if left untreated for a year; One individual can typically infect 10 to 15 other people (13,17,18). Therefore, once HIV is introduced into community where there are people infected with mycobacterium tuberculosis, the population faces parallel epidemics of AIDS and TB.

A study has shown that, in the USA a long-standing annual decline in TB case ended abruptly in 1985, at the peak of HIV spread (17,18,19). Other studies, in Asia, indicates that14% of all TB cases were attributable to HIV by the end of the 1990 (17,54). And it was suggested that, because the largest proportion of the worlds' tuberculosis infected people live in Asia, and because HIV infection is increasing in several large Asian cities, the number of people in Asia who could develop TB because of dual infection may multiply nearly seven folds (9, 54). Therefor the growing wave of TB is not only a menace for those infected with HIV, but also it can able to spread through the air to HIV – negative people. And it is the only major AIDS-related opportunistic infection to pose this kind of risks. Africa, where HIV has spread widely since the late 1970s, already faces dual epidemic in some countries. TB cases have doubled or even tripled since 1985, More than 5 million of the 13 million African, living with HIV, are expected to develop TB, and over 4 million will die unnecessarily early death because of TB (17).

2. Tuberculosis and HIV/AIDS Co-existence

The incidence of reported tuberculosis disease has been increasing worldwide since the beginning of the 1980s (9). Several studies have suggested that this trend was closely associated to the human immuno deficiency virus (HIV) pandemic. According to WHO estimation 11 million peoples were infected with both HIV and mycobacterium tuberculosis worldwide (17,21). The interaction between the HIV epidemic and the tuberculosis epidemic is lethal (17,22) where tuberculosis adds to the burden of illness of people with HIV and shortens their life expectancy, while the HIV epidemic spurs the spread of tuberculosis (17,21). The impact of the HIV epidemic on TB in sub-Saharan Africa become apparent during the 1980s when, after years of steady decline, reported dramatically (2,53)

As indicated by centers for disease controls (CDC) tuberculosis is now a major cause of death among HIV infected patient's (8). Several authors have suggested that tuberculosis may be an independent matter of advanced immune suppression in HIV – infected patients and it could also be a cofactor in accelerating the courses of HIV infection (17,19,21,23). It was pointed out that, the containment of tubercle bacilli with in a granuloma requires the generation of cytokines, including tumor necrosis factor alpha. And this tumor necrosis factor alpha may probably enhance HIV replication that in turn may increase the viral burden leading to a faster evolution to a clinical Acquired Immune Deficiency Syndrome (AIDS) and death (18,24). Another study pointed out TB can accelerate the progression of HIV by accelerating the decline of CD_4 counts and creating 6-7 fold increasing in the viral load as compared to those with out TB (16,22).

According to cohort study in Aquitaine, France (1994) revealed that, tuberculosis diseases affect survival but not occurrence of subsequent opportunistic infection or rate of CD_4 lymphocyte count (18). With regard to survival, HIV infected patients with tuberculosis appear to have

shorter survival than HIV negative patients despite an adequate anti tuberculosis therapy (25) and similar results were reported from a cohort study in Bordeaux, France between 1988 – 1994(18,25). There fore, because of the high early mortality rate in HIV infected patients with tuberculosis diseases, care providers for HIV infected patient must maintain a high level of suspicion for TB diseases. The HIV pandemic has substantially altered the epidemiology of tuberculosis. Various investigations have documented that persons co-infected with mycobacterium tuberculosis and HIV have a 5.8% annual risk of developing active tuberculosis (16). Thus co-infected patients have the same probability of developing TB in one year as HIV – negative tuberculosis patients have in their entire lives (16,17).

Millions of people infected with tuberculosis bacteria, which would otherwise have escaped active tuberculosis, are now developing the diseases because their immune system is under attack from HIV. And because mycobacterium tuberculosis can spread through the air, the increase in active tuberculosis cases among dually infected people means, more transmission of the TB, more TB carriers and more TB disease in the whole population. As a consequence the HIV/AIDS epidemic is reviving an old problem in developed countries and exacerbating an existing one in the developing world. . Hence, HIV pandemic will worsen tuberculosis situation in developing countries in three ways over & above the existing situation. These are, reactivation of a latent TB infection among dually infected person, newly infection with tubercle bacilli & rapid progression to active diseases in HIV infected person, and by increasing the number of cases in the general population whose infection & disease is the result of transmission from HIV individual developing TB by either reactivation or recent infection. On the other hand, the impact of HIV infection on the epidemiology of tuberculosis depends on several factors (25). These are the prevalence of HIV infection in the community and its trend. The prevalence of tuberculosis

infection in general population aged 15-49 years, the rate of development from tuberculosis infection to active tuberculosis infection, and the detection rate of new and relapse cases of TB and the cure rate of smear positive cases.

3. Clinical picture of tuberculosis and HIV

The clinical presentation of tuberculosis patients with HIV-infection mainly depends, on the stage of HIV-infection. And could broadly be classified as early and late presentation (22) Smear positivety rates among HIV-positive tuberculosis patients are the same as among HIV – negative tuberculosis patient except in the advanced stages when there is a tendency to develop smear – negative tuberculosis (22). In the early stages of HIV-infection the clinical presentation is almost indistinguishable from that in HIV negative tuberculosis patients. However in the advanced stages, the presentation can be a typical and extra pulmonary form like TB pleurisy, miliary TB and TB lymphadenitis occur with a relative higher frequency. However it is unclear whether HIV- associated TB is usually, the primary, reactivated type or secondary exogenous infection. But whatever the source, people infected by both HIV and mycobacterium tuberculosis have an accelerated progression to overt TB. Patients with both HIV infection and tuberculosis can present in various ways, while many have the typical clinical and radiological feature of TB. Most patients seem to produce no sputum, or have negative sputum results, chest X-ray may show little change, or there may be diffuse pulmonary infiltrates with out cavitations and extra pulmonary disease also appears to be more common (7,18). There fore, such change in sputum results and chest x-ray patterns would probably made diagnosis of TB more difficulty (18).

The common denominator of AIDS is said to be a profound immune suppression predominantly of cell-mediated immunity that leads to a variety of opportunistic infection. As HIV slowly weaken the immune systems, the individual gradually becomes unable to fight off opportunistic infection with viruses, bacteria, parasites and fungi that would normally pose little threat (10,22). The main cause of the immune defect in AIDS is a qualitative and quantitative deficiency in the

subset of lymphocytes namely the T4 population (23). In Immune competent individuals, approximately 5-15% of those infected with mycobacterium tuberculosis will develop active TB with in their lifetime. Of those, roughly one third will develop tuberculosis with in one year of initial infection, and at least 30% of persons with previous TB infection were capable of undergoing reactivate following HIV infection (15). More over if the sputum smear remains negative a chest X-ray can be of additional valve in the diagnosis. However in advanced stages of HIV – infection TB tends to be disseminated with absence of cavitations and abnormalities in the lower rather than in the upper lobe (6,7,10,23)

A study has indicated that, only 35-50% of HIV-positive people have pulmonary tuberculosis detectable from just a sputum sample while the reminder develop or disseminated tuberculosis which can be diagnosed only with special laboratory facilities (26). Hence a high index of suspicion and an aggressive diagnostic approach is required to avoid missing HIV related tuberculosis, which is communicable to the general population. Because of their synergistic effect upon one-another, a real progress in controlling TB and HIV can only be made with dual strategy targeted both epidemic, where, one of the dual strategy is to control tuberculoses by detecting cases and ensuring that the person gets through antibiotic treatment. It is important for people with HIV to have treatment when they have active TB. They can be cured of their active tuberculosis as well as avoiding transmission to others. However treating and preventing TB in HIV-infected people extends only their survival, it cannot prevent them dying from other infection. Hence, TB control is not the sole answer to the TB and HIV epidemic. Therefore vigorous action to prevent HIV/AIDS is the other arm of the dual strategy.

4.Tuberculosis and HIV confection in Ethiopian Situation

Tuberculosis (TB) remains a major public health problem in Ethiopia (7,13,27). This is exemplified by the statistics for 1994 where the number of patients notified under DOTS increased from 10,000 to about 100,000 in 2001, which has been a nearly 10 folds increment (7,27,). More over nearly 4000 excess cases were detected in 2001 compared to 2000 of which 2500 were smear positive and the proportion of notified pulmonary cases that are smear positive has increased steadily from 27% in 1997 to 36% in 2001(27). According to 2003 WHO monitoring and surveillance report, Ethiopia ranks 10^{th} globally, and estimated incidences of all forms of TB cases were 282. Among 100,000 populations of which 123 were smear negative (7,27). These Excess numbers of cases reported were probably reflects an increase in the underlying incidence of tuberculoses associated with the spread of HIV. However the most reliable way to determine the prevalence of tuberculosis infections in Ethiopia is by tuberculin testing with purified protein derivative (PPD) of the non-BCG vaccinated population. According to the tuberculin survey conducted from 1953 – 1955 by WHO, UNICEF and MOH in Ethiopia, among 609,321 people, tested net positive rate was 35.9% (13). Another study in 1990 revealed 55 smears – positive pulmonary TB cases per100, 000 population were reported (13). The survey, results has shown that the risk of infection in rural children is 1.4% annually, compared to results obtained from Addis Ababa, which shows over 50% higher. More over, according to WHO recent report (2003). The global incidence rate of tuberculosis is growing at approximately 0.4% per year, but much faster in sub-Saharan Africa including Ethiopia, which is 5% per year probably linked to spread of HIV (.27), and this fact realizing the rapid spread of HIV infection simultaneously with tuberculosis in the country. Hence, several reports from national surveillance (MOH) reflect the progressively increasing epidemic over time & shows that, the adult HIV prevalence in the country was o% in1984, 2.7% in 1989, 6.2% in 1993, 7.1% in 1997,

7.3% in 2000 and 6.6% in 2001. While the adult HIV prevalence in urban Ethiopia was estimated to be much higher, 13.7 % than in rural areas where the adult HIV prevalence was estimated to be3.7% in 2002(29). Several studies were conducted in sub-Saharan African countries on HIV sero-pevalene among tuberculosis patients and, sero prevalence rates of grater than 40% were reported from difference African countries. 66% and 30 % of in newly diagnosed tuberculosis patients were HIV positive in Uganda and Kenya respectively (30.)

In Ethiopia few studies were conducted regarding HIV &tuberculosis co-infection. Of these, a study done in 1988 among 106 solders of tuberculosis patient revealed that 6.6% sero positive (31). Another study in Sheshemane southern part of the country in 1994 also indicated that 44.4% of tuberculosis patients were found to be HIV positive (32). Similar study in Harar in 1997 revealed 22% of the smear positive and 20.4% of culture positive were sero positive respective (33). A recent institution based study in Addis Ababa among 236 AFB confirmed tuberculosis patient's showed 45.3% sero prevalence (34).

Rationale Of the Study

In Ethiopia, the magnitude of tuberculosis is ever increasing despite progress made in DOTS implementation, in control programs. These figures are very likely to increase significantly due to spread of HIV infection. However, there were limited studies undertaken that would describe the association between TB and HIV co-infection. More over those previous studies were conducted in big cities/towns with higher HIV/AIDS prevalence then the current study area. In addition, changes have occurred in adult HIV prevalence during the year 2000/2001 that could need to be substantiated by further prevalence study. This study is there for undertaken to determine the current prevalence of HIV among TB patients and also try to explore the associated risk factor for HIV infection &clinical presentation among registered TB patients in Arsi zone. And come up with recommendation to enable the responsible bodies to design an integrated &appropriate prevention and control strategy.

OBJECTIVE OF THE STUDY

1.General Objective

To determine the prevalence of HIV infection and the associated factors among registered TB patients in Arsi Zone.

2. Specific objectives

- To measure the sero-prevalence of HIV among TB patients.
- To assess the associated risk behaviors and clinical characteristics in HIV sero positive and sero negative TB patients.

MATHODS AND MATERIALS

1.Description of the study area

The study was undertaken in Arsi Zone of Oromia regional state. The zone shares boundaries with East Showa, West Hararghe, Bale zones, and South Nation and Nationalities Regional state. Asella is the capital town of Arsi Zone, which is located 175 km South East of Addis Ababa. Based on 1994 Housing and population census, the total population of Arsi is projected to be 2.7 million in 2002, of which 90% of the population is estimated to be rural residents. Administratively, the zone is divided in to 22 woreda having an area of 23,679.7km^2. The average altitude ranges from 1700 to 4000 meters above sea level. The average temperature varies from 10 to 24^{0}C(35).

According to the existing health service delivery system, there are 2 hospitals, 13 health centers, 103 health stations, 57 private clinics, 105 rural drug venders, 10 drug shops and 5 pharmacies with potential health coverage of 52% (36).

Regarding the TB – control program, the national tuberculosis and leprosy control program integrated tuberculosis treatment in the general health services in 1997 with the frame work of the health sector development plan (HSDP) (7,27). Accordingly, the service delivery was progressively decentralized to peripheral health units in woreda with the aim of reaching the most remote population with out compromising the quality of services. As reported by MOH, more than half of the Ethiopian people live farther than 10km from nearest health facility particularly in regions with poor transportation system (5). Therefore reaching these people is critical in fighting the spread of TB. It was in 1992 that a standardized and well-organized tuberculosis program incorporating directly observed short course treatment (DOTS) was implemented in a few areas of the country (7). Arsi is one of the pilot areas where this program was initially implemented in eight health centers and Asella hospital during1992 in collaboration

with Italian government. Hence the DOTS expansion has now further decentralized and implemented in almost all health institution in the zone. Hospitals and health centers were used as the diagnostic center after which referral was made to health institution near by patient's residence for treatment. The magnitudes of tuberculosis patients were rising from time to time as seen from annual TB report in the zone. During the study period a total of 4780 tuberculosis patients of all forms of tuberculosis were registered and on treatment.

2.Study population

Health institutions based cross sectional study design were used. The study was undertaken between December 2002 and May 2003 in Arsi zone. All tuberculosis patients age 15 years and above, were included in the source population. All TB patients in the zone who are 15 years of age and above, registered in master registration book and are under treatment until the first date of the study, in Asella Hospital and 9 heath centers in the zone were included in the study

3. Sampling procedures

All TB patients who were registered in master registration book in 9 health centers and Asella hospital were taken as a sampling frame and then, identification number was given to all tuberculosis patients in registration book and the study subjects were drawn by using simple random sampling technique.

4. Sample Size Estimation

The sample size was calculated using the formula for of single population proportion.

$$n = \frac{(P)\,(1-p)\,(Z\alpha/2)^2}{d^2}$$

Where n is the sample size, Alpha is the critical value corresponding to 95% confidence interval (CI), P is the estimated prevalence which was obtained from similar studies done in Shashemane (1994).

d = is the degree of margin of error for which 5% is taken.

Accordingly, using P = 44% with marginal error of 5% and 10% allowance for lost cases, the required sample size was fond to be 419.

5. Data collection procedures

Ten data collectors who are working as head of TB program in the respective health institutions were used. Training on the data collection procedures was given for one day. Similarly ten

laboratory technicians were recruited and appropriate training was given concerning their duties and responsibilities. A pre tested structured questioner were used to collect information on background and other relevant variables. . The nurse (TB coordinator) filled the questionnaire after doing physical examination and taking medical history of the patients. After completion of the questioner, the nurse explained about the procedures & advice the patient to give blood sample for ESR tests for those who were on treatment. But, if the patient was newly diagnosed during data collection period, the blood sample was collected as other routine investigation. The blood sample was drawn from the study subjects anonymously. Each patient were given code having the first two alphabet from the name of their corresponding health center & a number that goes from 001 to 999. A given code is unique for each sampled patient enrolled in the study. The laboratory technician draw 4ml of blood from brachial vein, then rest the tube in vertical position for 15-30 minutes before centrifugation that would facilitate blood coagulation. The samples were centrifuged for 10 minutes at 2000rpm & draw 0.5-1ml of serum with pipette than aliquot in to another special tube; labeled with the corresponding patients code number. The serum was stored in the refrigerator blew 0 degree centigrade. These specimens were collected from each health center using cold box and transported to Asella hospital for analysis. In the Hospital serum was analyzed for HIV antibody by using ELISA technique. Procedures were preformed according to the kit instruction. Chest x-ray and sputum results, were collected from individual patient's record. Hence the serological testing was anonymous & confidentiality was maintained. Immediately the serological results were handed over to the investigator.

In this study, unlinked, anonymous testing model were used, because of: (a) There were no trained health personnel for counseling to provide care & support to those who are HIV positive in those health institution. (b) Because the person's consent is not asked for, persons who would

otherwise not agree to HIV testing are included as well, hence minimizing selection bias (c) Because single ELISA technique were used that would need confirmatory for declaring patients as HIV positive, Unlinked anonymous testing is there for chosen.

6. Data Quality Assurance

Questionnaires were designed carefully and pre-tested on patients who are not included in to the study. The collected data were checked for completeness, accuracy, clarity and consistency by the supervisors, on daily basis and by the principal investigator. The data collectors were made appropriate correction for any error or ambiguity and incompleteness in the following days before preceding the next day activities.

7. Study Variables

a. Dependent

HIV sero-status (HIV positive, HIV negative)

b. Independent

The independent variables include socio-demographic variables (Age, sex, residence, religion, ethnicity), socio economic variable (occupation marital status), clinical symptoms (fever, weight loss, and cough,) clinical signs (lymphadenopaty oral candidiasis, herpeszoster, hepatomegaly, splinomegaly, and generalized body itching.), and risky behaviors for HIV/AIDS (multiple sexual partner, commercial sexual partner, condom use & history of sexually transmitted diseases).

8. Data Entry and Analysis

The collected data was entered in to the computer and analyzed using an SPPS version 10 - statistical package and EPI-info version6.4. Variables were described using frequency tables and computation of proportions. Odds ratio with confidence intervals were used to assess the presence and degree of association between HIV serostatus and its determinants. P-value of 0.05 was set as a cut-off point for the significance of the association between dependent and independent variables. Logistic regression was used to control the confounding variables.

9. Communication of results

The result of this study will be sub-meted to the Department of Community Health Faculty of Medicine Addis Ababa University as a partial fulfillment of the master's degree of public health. Further, it was communicated to Ministry of Health, Oromiya Health Bureau, Arsi Zonal Health Department and other concerned bodies through report or publication on reputable scientific journals.

10. Ethical Consideration

Ethical clearance was initially obtained from Addis Ababa University Faculty of Medicine Ethical Committee. Further, written consent was secured from the Regional and Zonal Health management Offices. Official letters were written to each health institution from Zonal health Department for cooperation. Permission of the patients to provide information and blood samples was sought in advance. The result was confidential and the secrecy of respondents was kept because of anonymity and double blind nature of data collection.

11.Operational Definition

Case of TB: - A patient whom TB has been bacteriological confirmed, or has been diagnosed by physician.

Smear – positive pulmonary: A patient with at least two initial smear examinations positive for AFB by direct microscopy or A patient with one initial smear examination positive for AFB by

direct microscopy and culture positive or a patient with one initial smear examination positive for AFB by direct microscopy and radiographic abnormalities consistent with active TB as determined by a clinician.

Smear negative: pulmonary tuberculosis not meeting the about criteria for smear positive diseases, diagnostic criteria should include at least 3 sputum smear examinations negative for AFB, and radiographic abnormalities consistent with active pulmonary TB, and no response to a course of broad spectrum antibiotic, and decision by a clinician to treated the patient with a full course of anti-tuberculosis therapy or positive culture but negative AFB sputum examination.

Extra pulmonary cases: - patient with tuberculosis of organs other than the lung

New cases: patient who has never had treatment for tuberculosis, or who has taken anti tuberculosis drugs for less than one month.

DOTS program: Directly observed short course treatment and is the WHO recommended policy package for tuberculosis control program.

Results

1. Description of study participants

Of the total tuberculosis patients who were under treatment in Arsi Zone during December 2002 to February 2003, a total of 419 patients were enrolled in the study. All of the participants have completed the interview and blood sample was taken in all study sites making the response rate of 100 percent.

Among these, 237 (56.6%) were males and 182 (42.4%) were females, making the male to female ratio 1.3:1

The mean (±SD) age of respondent enrolled in the study was 30.1 ±11.8 years. Within the age rage 15-79 years nearly half of the study participant, 211 (50.4%), were reside in urban while 208 (49.6%) were from rural setting.

Concerning marriage, the majority 195 (46.5%) were married, 146 (34.8%) were never married 32 (7.6%) were divorced, 16 (3.87) were partner dead and 12 (2.9%) were separated with regarding Education 129 (30.8%) were illiterate, 25 (5.9%) were only able to read & write 103 (23.9%) have Educational level b/n grade 1 to 6 and 162 (38.7%) have Educational level of grade Seven and above.

Ethically, 280 (66.8%) of the study participate were Oromos followed by Amhara, which were 127 (30.3%).

The majority of the study participants 231(55.5%) were followings of orthodox religion, while 180(42.3) were Muslims.

Regarding to occupation, 111 (26.55%) were farmers, 112 (26.7%) were housewife, 77 (18.4%) were Student, 52 (12.4%) were daily Laborers and 35 (8.35%) were Prostitute.

The over all prevalence of HIV among registered tuberculosis patients who were enrolled in the study was found to be 156(37.2%). The mean (±SD) age of HIV positive tuberculosis patients were 32.4 (±9.1) years with age range 15---. 55 of these the mean age for male who were HIV positive was 34± 8.7 years and both sex had the moment while for similar age ranges (15-58) years. The majority 61.6% of HIV positive patient were in the age group of 20-39 years in relation to HIV Sero positively, 90 (37.1%) of the male were found to be HIV positive, while the corresponding figures for the females was 66(36.26%) regarding residence 111(52.6%) of Urban resident TB Patient were found to be HIV Sero positive while 45(21.6%) of the rural residing TB Patients were HIV positive.

In relation to marital status & HIV Sero positively, 77(39.5%) of married 31(21.2%) of never married & 23 (71.9%) of divorced were found to be HIV positive.

Regarding to the religion, 35 35(19.4%) of Muslim TB Patients were HIV Positive while 116(50.2%) of Orthodox TB Patient were HIV-Positive Ethnically, 79(28.2%) of Oromos were HIV Positive while 74(58.3%) of Amharas were found to be HIV Sero Positive. In relation to occupation 25(22.5%) of farmers TB Patients were HIV Positive 43(65.4%) of daily Laborer were found to be HIV Positive 17(70.8%) of merchants were found to be HIV Sero Positive and 23 (65.7%) Prostitute was found to be HIV Sero positive. In relation to Education, 27(20.9%) of illiterate, 39((37.9%) of Patients which level of Education is b/n grade 1-6 and 78(48.1%) of TB Patients whose level of education grade 7 and above were found to be HIV Sero Positive.

Table 1**. Socio demographic characteristics of study subjects, Arsi, 2002/2003**

Characteristics		HIV Positive N =156 No. (37.2%)	HIV Negative N = 263 No. (62.8%)	Total N = 419 No. (100%)
Sex	Male	**90 (37.9)**	**147 (62.1)**	**237 (56.6)**
	Female	66 (36.3)	116 (63.7)	182 (43.4)
Age	15 –19 year	14 (17.9)	64 (82.1)	78 (18.6)
	20 – 29	44 (31.7)	95 (68.3)	139 (33.2)
	30 – 39	62 (55.5)	53 (44.5)	115 (27.4)
	≥ 40	63 (38.6)	51 (61.4)	83 (19.8)
Residence	Urban	111 (52.6)	100 (47.6)	211 (50.4)
	Rural	45 (21.6)	163 (78.4)	208 (49.6)
Ethnicity				
	Oromo	79 (28.21)	201 (71.8)	286 (66.8)
	Amhara	74 (58.3)	53 (41.7)	127 (30.3)
	Gurage	3 (25)	9 (75)	12 (2.9)
Religion	Muslim	35 (19.4)	145 (80.6)	180 (42.9)
	Orthodox	116 (50.2)	115 (49.8)	231 (55.1)
	Protestant	5 (62.5)	3 (37.5)	8 (1.9)
Occupation				
	Farmer	25 (22.5)	86 (77.5)	111 (26.5)
	Student	9 (11.7)	68 (88.3)	77 (18.4)
	House wife	43 (38.4)	69 (61.6)	112 (26.7)
	Daily laborer	34 (65.4)	18 (34.6)	52 (12.4)
	Soldiers	4 (66.7)	2 (33.3)	6 (1.4)
	Merchants	17 (70.8)	7 (29.2)	24 (5.7)
	Gov't Employee	1 (50)	1 (50)	2 (0.5)
	Prostitute	23 (65.7)	12 (34.3)	35 (8.4)
Education				
	Illiterate	27 (20.9)	102 (79.1)	129 (30.8)
	Only read and write	13 (52)	12 (48)	25 (5.9)
	1 – 6 grade	39 (37.9)	64 (62.1)	103 (24.6)
	7 - 10	44 (44)	56 (56)	100 (23.9)
	11 -12	25 (51)	24 (49)	49 (11.7)
	> 12	9 (69.2)	4 (30.8)	13 (3.1)
Marital Status				
	Never married	31 (21.2)	115 (78.8)	146 (34.8)
	Currently married	77(39.5)	118 (60.5)	195 (46.5)
	Separated	4 (33.3)	8 (66.7)	12 (2.9)
	Divorced	23 (71.9)	9 (28)	32 (7.6)
	Partner died	21 (6)	14 (40)	16 (3.8)

2. Study sites or health institutions entered in to the study.

Of the total respondents 138 (32.9%) were from Asella Hospital, 100 (23.9%) were from Asella health centers 66 (15.8%) were from Huruta health centers and the lower respondents were from Addis Hiwote health center 10 (2.4%).

The prevalence of HIV Sero positiveity among the study participants varies depending on the total number of case per health institute being enrolled, However the highest proportion were found from Aslella hospital 35.3% sero positivity, Asella health center Huruta health center and decrease as we go from the center to the prefer

Table 2: Distribution of study population by study site, Arsi, 2002/2003.

Health Institution	HIV Positive N =156	HIV Negative N = 263	Total N = 419
Asella Hospital	55 (35.3)	83 (31.6)	13 (32.9)
Asella Health Center	40 (25.7)	60 (22.8)	100 (23.4)
Huruta Health Center	30 (19.2)	36 (13.7)	66 (15.8)
Dhera Health Center	11 (7.1)	9 (3.4)	20 (4.8)
Addis Hiwot H. Center	4 (2.6)	6 (2.3)	10 (2.4)
Abomsa Health Center	5 (3.2)	21 (7.9)	26 (6.2)
Segure Health Center	6 (3.8)	11 (4.2)	17 (4.1)
Bekajo Health Center	3 (1.9)	11 (4.2)	14 (3.3)
Assassa Health Center	2 (1.3)	15 (5.7)	17 (4.1)
Koffele Health Center	0	11 (4.2)	11 (2.6)

3. The mean age of TB patients and their HIV status.

The mean age of respondents enrolled in the study was 32.4_+9.1. Out of 237 male respondents the mean age of HIV sero-positive was 34_+8.7and for female was 30.2_+9.4. The age range for male was 15-79 and that of female was15-58. Of these the age range for male who were HIV positive was 15-58 and for female was 15-58

Table 3: The mean age of male and female tuberculosis patients and HIV status, Arsi, 2002/03.

Characters	HIV positive N= 156 Mean age Range	HIV negative N = 263 Mean age Range
Male	34 15-58	30.9 15-79
Female	30.2 15-58	29.4 15-58
Total	32.4 15-58	30.3 15-79

Table 4: The socio demographic variables evaluated for possible association with HIV Sero- Status among Tuberculosis patients Arsi 2002/03.

	HIV Status		Crude	Adjusted
	Positive (%) N = 156	Negative (%)	OR (95%CI)	OR (95%CI)
Sex				
Male	90	147	1.00*	1.00*
Female	66	116	0.93(0.61,1.41)	1.16(0.67,2.00)
Age				
15 –19	14	64	1.00*	1.00*
20 – 29	44	95	2.12 (1.02,4.43)	5.18(1.91,14.02)
30 – 39	66	53	5.69 (2.74,11.96)	2.54(1.09,5.90)
≥ 40	32	51	2.87 (1.31,6.35)	0.75(0.33,1.74)
Residence				
Urban	111	100	1.00*	1.00*
Rural	45	163	0.25(0.16,0.39)	0.28(0.18,0.43)
Occupation				
Farmer	25	86	1*	1.00*
Student	9	68	0.46 (0.18, 1.11)	2.43(0.14,41.1)
House wise	43	69	2.14 (1.15, 4.02)	6.04(0.33,111.4)
Daily	34	18	6.50 (2.97, 14.37)	
Laborer			1.72(0.10,28.95)	
Soldiers	4	2	6.88 (1.00, 58.03)	0.61(0.03,10.61)
Merchants	17	7	8.35 (2.85, 25.34)	0.54(0.02,14.69)
Gov't Employee	1	1	3.44 (0.00, 131.53)	0.62(0.03,11.74)
Prostitute	23	12	6.59(2.68,16.48)	0.007(0.00,2.4E+.9)
Education				
Illiterate	27	102	1.00*	1.00*
Literate	130	160	4.09 (1.54, 10.96)	0.25(0.15,0.43)
Marital Status				
Ever married	125	148	1.00*	1.00*
Never married	31	115	3.13 (1.93,5.11)	0.30(0.16,0.58)

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5.Clincal sign and symptoms of TB patients &their HIV status

Regarding to Clinical Sign & Symptoms of tuberculosis patients enrolled in the study, the majority 377 (89.98%) had history of fever 59(14.08%) had diarrhea, 339(80.9%) had cough 362(86.4%) had weight loss. Finding 50(11.93%) had lymphadeno pathy 81(19.35%) had generalized body itching 26(6.2%) had harps Zoster scar. In relation to HIV –Status. 145(38.5%) of Patients with fever, 129(38.1%) of Patients with cough 138(38.1%) of Patients with weight loss, 41(69.5%) of Patients with diarrhea, 84(44%) of Patients with numerological findings, 24 (48%) of Patients presented with Lymphadeno pathy, 50(61.7%) of Patients with generalized body itching and 23(88.5%) of Patients with Herps Zoster scan were found to be HIV Sero Positive.

Table5: Some clinical finding on tuberculosis patients and their HIV status in Aris Zone 2002/203.

Characteristics	HIV Status		OR (95%CI)
	Positive	Negative	
Fever			
Yes	145 (38.5)	232(61.5)	1.76 (0.82, 3.85)
No	11(26.2)	31(73.8)	
Diarrhea			
Yes	41(69.5)	18(30.5)	4.85 (2.58, 9.21)
No	115(31.9)	245(68.1)	
Cough			
Yes	129(38.1)	210(61.9)	1.21 (0.70, 2.08)
No	27(33.8)	53(66.2)	
Neurological findings			
Yes	84(44)	107(56)	1.70 (1.12, 2.59)
No	72(31.6)	156(68.4)	
Lynphadenopathy			
Present	24(48)	26(52)	1.66 (0.88, 3.12)
Absent	132(35.8)	237(64.2)	
Generalized body Lesion (itching)			
Present	50(61.7)	31(38.3)	3.53 (2.07,6.03)
Absent	106(31.4)	232(68.6)	
Harps Zoster Scar			
Present	23(88.5)	3(11.5)	14.99 (4.18, 63.88)
Absent	1.33(33.8)	260(66.2)	
Weight Loss			
Present	138(38.1)	224(61.9)	1.03 (0.46, 2.31)
Absent	12(37.5)	20(62.5)	

6. Sites of infection of TB patients by mycobacterium tuberculosis and their HIV status

Concerning organs involved, the majority 338(80.67%) had pulmonary infection, while the rest 81(19.3%) had extra Pulmonary involvement. Of these Patients presented with extrapulmonary, the majority 41 (50.6%) were TB eymphadentis relation to there HIV Sero Status 132(39.1%) of Pulmonary tuberculosis cases & 23(28.4% of Extra Pulmonary tuberculosis Patients were found to be HIV Positive. TB Lymphadentis 17(41.5 %) of TB Lymphadenitis was found to be HIV Sero Positive.

Table 6: The association between sites of Infection by Tuberculosis and HIV/AIDS sero-positivity.Arsi. 2002/2003.

Characteristics	HIV Status		OR (95%CI)
	Positive	Negative	
Pulmonary	132 (39.1)	206 (60.9)	1*
Lymphnode	17 (41.5)	24 (58.5)	1.11 (0.54, 2.24)
Bone	2 (18.2)	9 (81.8)	0.35 (0.05, 1.75)
Intestine	2 (12.5)	14 (87.5)	0.22 (0.03, 1.05)
Plural	2 (25)	6 (75)	0.52 (0.07, 2.9)

7. Chest X-ray and Sputum result of pulmonary TB patients and their HIV status

Regarding to sputum result of Pulmonary tuberculosis Patients, 179(52.9%) were sputum Positive, While 159(49.9%) were sputum negative of all sputum negative pulmonary tuberculosis Patients, nearly half 80(50.3%) were found to be HIV Positive where as only 52(29.1%) of sputum positive patients were found to be HIV Sero Positive.

Of 136 chest X-ray films reported by radiologists, 32(23.5%), 60(44%) and 44(32.4%) showed upper lobe involvement, middle and lower lobe infiltration and pulmonary cavitations, respectively In relation to HIV status & chest x-ray findings, 14(43.7%) of the tuberculosis patients having upper lobe involvement were found to be HIV. Positive, while 35(58.3%) and 13(29.5%) of mobile & lower love, and pulmonary cavitations respectively were found HIV Sero positive.

Table7: The association between among pulmonary tuberculosis and HIV sero-status by sputum result and chest X-ray findings. Arsi. 2002/2003.

Characteristics	HIV Status		OR (95%CI)
	Positive	Negative	
Smear Negative	80 (50.3)	79 (49.7)	2.31 (1.44, 3.7)
Smear Positive	54 (30.5)	123 (69.5)	
Upper zone	14 (43.7)	18 (56.3)	1*
Middle/Lower zone	35 (38.3)	25 (41.7)	1.80 (0.69, 4.70)0.26
Cavities	13 (29.5)	31 (70.5)	0.54 (0.19, 1.55) 0.300

8. Risk behaviors for HIV of tuberculosis patients and their HIV status

Assessments of risk behaviors for HIV/AIDS has revealed that 123(29.36%) had no multiple sexual partner, 109(17.42%) had one to three and seventy-three had more than three sexual partners. Of the sexually active males, 103(45057%) had history of contact with commercial sex workers. Regarding condom use 14(5.32%) of the respondents had used regularly 141(53.61%) had use occasionally and 54(20.53) had never used. Lack of knowledge, negligence and inaccessibility are some of the barriers to condom use among the responsibility the majority of the study particigants, 282(67.3%), had knowledge about sexually transmitted diseases history of STDs showed 66(15.75%) had reported having genital ulcer and 97(23.15%) of the responds had reported of having genital discharge with in the past ten years.

In relation to HIV status, 19(15.5%) of TB patients reported having had no sexual contact with non commercial sexual partners, 63(60%) of TB patients were reported having had one to three sexual partners, and 47(64.4) of TB patients were reported having had more than three sexual partners were found to be HIV positive.

64(62.1%) of sexually active male TB patients reported having had sex with commercial sex workers were found to be HIV sero positive.

Regarding to condom use and HIV Sero positivety, 6(42.9%) of the respondents who had used regularly, 82(58.2%) of the respondents who had used occasionally and 31(57.4%) of the respondents who had never used were found to be HIV Sero positive. In relation to STD, & HIV Sero Status among tuberculosis patients, 26(44.7%) of respondent having had knowledge of STD, 52(78%) of TB patients were reported having had history of genital ulcer and 66(68%) of TB patients were reported having had history of genital discharge were found to be HIV sero positive.

Table 8: Some risk behaviors for HIV/AIDS evaluated for possible association with HIV sero-positivity Among Tuberculosis patients. Arsi 2002/2003.

Characteristics	HIV Status		Crude OR 95% CI
	Positive N=	Negative	
Multiple Sexual partners			
None	19 (15.5)	104 (84.5)	1*
1 – 3	63 (60)	42 (40)	8.21 (4.21, 16.17)
> 3	47 (64.4)	26 (35.6)	9.89 (4.74, 20.89)
No response	23 (19.5)	91 (80.5)	1.38 (0.67, 2.85)
Commercial sex worker			
Yes	64 (61.5)	44 (38.5)	4.67 (2.61, 8.40)
No	33 (24.8)	106 (.1)	
Condom use			
Every time	6 (42.9)	8 (57.1)	1*
Some times	82 (58.2)	59 (41.8)	1.85 (0.55, 642)
Not at all	31 (.4)	23 (42.6)	1.80 (0.48, 6.91)
No response	16 ()	38 ()	0.56 (0.14, 2.21)
Reason for non use of condom			
Lack of Knowledge	4 (33.3)	8 (66.7)	1*
Didn't think of it	52 (60.5)	34 (.5)	3.06 (0.75, 13.27)
Not available	45 (52.9)	40 (47.1)	2.25 (0.55, 9.73)
No response	16 (29.6)	38 (70.4)	0.84 (0.19, 3.93)
Knowledge of STD			
Yes	126 (44.7)	156 (55.3)	3.14 (1.90, 5.22)
No	28 (20.4)	109 (79.4)	
History of genital ulcer			
Yes	52 (78)	14 (21.2)	8.81 (4.51, 17.46)
No	105 (29.7)	249 (70.3)	
History of Genital Discharge			
Yes	66 (68)	31 (32)	5.49 (3.27, 9.25)
No	90 (27.9)	232 (72.1)	

In order to know the independent effect of specific variable logistic regression was done using SPSS Statistical package.

Table 1 shows 90 (37.9%) of males were found to be HIV Sero positive compared with 66(36.3%) of females, but no statistical significance was observed after controlling for age (OR = 1.08, 95% CZ: 0.71, 1.64 P>0.05).

110(42.6%) of age group b/n 20-39 year were found HIV –Sero Positive compared to 14(17.9%) of those patients age b/n 15-19 year and statistical significant were noted after allowing for Sex (OR = 5.69, 95% CZ: 2.74, 11.96 P< 0.05). The age groups forty and above was negatively associated after Adjusting for Sex. (OR = 0.504, 95% CI: 0.284, 0.891). The Marital Status of TB Patients was divided in to two categories, Ever Married (Currently Married, divorced Separated & partner died) and never married (Single). 125(45.6%) of ever married were found to be HIV Positive compared with 31(21.2%) of never married TB. Patients and there was significant association between marital Status & HIV Sero positively (OR = 2.42 95% CI: 1.44, 407 P<0.05).

The association persisted even after adjusting for age & sex. Patient who were divorced, partner died, and separated were showed strong association.

Regarding Ethnicity, 58.3% of Amharas were found to be HIV Sero positive compared with 28.2% of the Oromos. The association Persisted even after adjusting for residence religion, Education and Occupation

Occupationally, being daily laborer, housewife merchant and prostitute were found significantly associated with HIV Sero positively.

High prevalence of HIV antibody were found among urban residing TB Patients 111(52.6%) then among those rural residing tuberculosis patients and strong association were found b/n residence and HIV Sero positively (OR = 4.02 95% CI 2.57, 6.31 P< 0.05) Educationally, 130 (44.8%) of Literate were HIV positive compared with 27(20.9%) of illiterate tuberculosis patient and Education was found to be strongly associated with HIV Sero positively. (OR =3.11, 95% CI: 1.91,5.08 p<0.05)

Table shows the association between Site of infection by tuberculosis and HIV Sero positivity 132(39.1%) of those pulmonary origin were found to be HIV Sero positive compared with 23(28.4%) of Extra pulmonary origin, higher prevalence were observed among TB lymphadenitis than other Extra pulmonary tuberculosis. There was no significance association observed even after adjusting for age &sex.

High prevalence rate of HIV antibody was found among smear negative pulmonary patients (50.3%) then smear positive pulmonary tuberculosis patients (30.5%) and statistical significance were noted between sputum out come pulmonary TB patients with HIV Sero positivity. (OR = 2.31, 95% CI: 1.44, 3.7 P<0.05)

Table. Shows the association of clinical Sign symptom of TB patients with HIV Sero positively HIV Sero positively were found significantly associated with diarrhea (OR = 4.85, 95 % CI: 2.58 9.21 P<0.05) numerological finding (OR = 1.7 95% CI: 1.12, 2.59), generalized body itching (OR = 3.53, 95% CI: 2.07, 6.03 and harps zoster scar (OR = 14.91 95% CI: 4.18, 63.88 P<0.05)

Table shows some risk behavior, for HIV/AIDS evaluated for possible association with HIV Sero positivity among tuberculosis patient.

High prevalence rate was observed among TB patients having had one or more non-commercial sexual partners (61.8%), then those TB patients who had no sexual contact with non-commercial sexual partners (15.5%), and show strong association (OR = 8.21, 95% CI: 4.21, 16.17 P< 0.05). 64(62.1%) of sexually active male TB patients having had sex with commercial sex workers were found HIV Sero positive compared with 23(17.8%) of sexually active male who had no sexual contact with commercial sex workers and have strong association (OR = 4.67 95% CI: 2.61, 8.4 P<0.05)

126(44.7%) of those who had knowledge of STD were found to be HIV Sero positive compared with 28 (20.4%) of those who lack knowledge of STD & Shows strong association (OR = 3.14 90% CI 1.90, 5.22 P <0.05) 52(78%). Of TB patients who had genital ulcer were found to be HIV Sero positive comparing with 104(29.6%) of those who had no genital ulcer and have strong association (OR = 8.81, 95% CI 4.51, 17.46, P < 0.05). 66(68%) of TB patients who had genital discharge were found to be HIV positive comparing with 90 (17.9%) of those who had no genital discharge, and show significant association (OR = 5.49, 95% CI: 3.27, 9.25)

Discussion

Tuberculosis has long been and remains major public health problem in Ethiopia. Its co-infection with HIV /AIDS epidemic has been compounded and had further aggravate the situation and facilitated its transmission (7). HIV prevalence is higher among tuberculosis patients than the general population as observed in northern Thailand which is 40 percent among TB patient compared to 8 percent among anti - natal clinic attendant (17). In Ethiopia, the prevalence of HIV among general population varies from 3.7% in rural to 13.7% for urban area (37). Similarly, in this study the over all prevalence of HIV among registered tuberculosis patients aged 15 years and above is found 37.2% which is higher than adult HIV prevalence in the general population. And is consistent with other studies in sub-Saharan Africa, between 20 – 60% (34). However, this rate is lower than studies in Southern Ethiopia in 1994 (32) and Addis Ababa in 2000(34). This discrepancy would be probably attributed to the study area, where all studies were conducted in big towns /cities and that they are potentially high-risk areas, while, the current study is mainly focused on rural and small-towns and that could be expected with potentially less risk areas, and therefore would probably represent general tuberculosis patients in the region.

The most unusual characteristic of HIV/AIDS among Africans are the equal distribution of cases between men and women (38) Similarly the present study is consistent with this finding where HIV prevalence were, 37.9%, 36.3% for male & female respectively. & There was no significant difference between sex in Serum HIV Sero- Positivity.

Tuberculosis can affects individuals of all ages in the population. However in HIV/AIDS epidemic the age group mainly affected is between 15 and 45 years (3,7), and according to MOH, AIDS case report indicate that, the mean age of patients with AIDS were 27 for females, 32.5years for male, and 30years for both sex (39). Similarly, the current study revealed that there is statistical significance between age and HIV Sero-

Positivity, the higher Sero Positivity was observed among the age group of 20-39 years. That can reinforce the above facts and which is comparable with other studies in African country (39). The mean age for females in this study was found 30.1 years and for males were 34year.These mean age differences probably may indicants that females start sexual intercourse relatively earlier than males, and infections were likely acquired several years earlier, suggesting that young people are becoming infected in their teens. Hence, this age prevalence of HIV in tuberculosis patients would probably reflect the age specific prevalence of HIV in the community.

The estimated adult HIV prevalence varies between rural and urban areas of Ethiopia (37,39). Similarly in this study a significant difference were observed between urban and rural TB patients, & that could also consistent with other studies in Addis Ababa in 2000 (34.) And would indicate that there is a substantial risk for the rapid spread of HIV infections among urban populations in the country. There fore health workers & all other concerned bodies have to attempt in minimizing risk behaviors by adopting preventive strategy through strong health education.

In this study Ethnicity was strongly associated with HIV Sero- Positivity. Even after control for possible cofounders. Since as no one have been immune from HIV/AIDS infection & would need attention for further investigation

This study shows that there were significant difference between various occupation and HIV Sero Positivity and the trend was cited in descending order, higher among prostitute, daily laborers merchant and housewife. Which is also consistent with other previous studies done in the country (34,38). There fore, this finding would probably pointed out high risk group in the community & that might help health personnel to

impart knowledge by including these target group and try to prevent risk behaviors, and limit the spread of the disease in the community. .

The significance difference among housewife would explained probably by the fact that he/she, had multiple sexual partners or he may carry the virus home to his wife, or he/ she might Acquired earlier to their marriage, implies pre marital HIV- VCT is very important in minimizing risks prior to their marriage, therefore in, these setting, the power of positive behavioral change messages may be reinforced by HIV voluntary counseling and testing.

The present study showed that, being educated was significantly associated with HIV and the strength of association was higher among educational level above grade 12. This is against the fact that people, which are more knowledgeable, could take care of themselves, as they easily understood both the transmission and prevention methods. Similarly, other study conducted among young Zimbabwean males, with lack of association between knowledge & practices, which would probably indicate that, perhaps because those who were more educated had more access to information and also had money to spend on prostitute (26,39). Hence knowledge alone as seen in this study, may not be protective unless behavioral change attained.

One of the Slogans of the anti – HIV/AIDS club to prevent HIV infection and spread in a population is protected being one-to-one primarily though marriage. However the present study does not support this reality, & shows that there were strong association among married TB patients and HIV sero- positivity. Therefore it needs attention with pre-marital HIV VCT supported by strong health education to bring about behavioral change in the community.

The highest association among participants who were divorced or lost their partners by death observed in this studies is also consistent with other study's done in Ethiopia (32,39). Suggesting that family separation would probably leads to risky behaviors, which eventually leads to HIV infection.

Although the risk of HIV is highest for commercial sex workers any one engaging in sex with multiple partners is at risk of getting HIV. Study has shown extra-marital sexual practice & multiple sexual partners is wide spread among sexually active young people in Ethiopia. Thus, individuals and many families acquire HIV perhaps through these kinds of transmission (39). Similarly this study showed that having sex with one or more non-commercial sexual partners or having had sex with commercial sex workers were found to be strong association with HIV sero Positivity. Hence, frank information about how to prevent transmission through sex, building of skills for condom use & mix of other approaches in health education will help the community.

Sexually transmitted diseases (STD) have been reported to enhance the likely hood of heterosexual transmission of HIV/AIDS (39). Study conducted in two STD clinics in Addis Ababa shows that 30%-40% of STD patients were infected with HIV (40). In another study conducted in 1991 Sero positvity rates in those presenting with genital ulcer and urethral discharge were 16% and 7% respectively (30) It was also shown in other study, HIV positive patients with genital ulcer was significantly higher than rate seen patients with non ulcerative STD (30,41). Similarly, the current study revealed that in 78.8% of tuberculosis patients reported having had genital ulcers and 68% of tuberculosis patients reported having had genital discharge were found to be HIV positive. This findings support that STD which disrupt the genital epithelium may increase the efficiency of HIV transmission, & in addition to the effect of STDS on HIV -1 transmission dynamics there is increasing evidence that HIV-1 has important repercussion on the

transmission of other STDs (38) in the country. This finding pointed out that having had history of STD with tuberculosis would increase index of suspicion to HIV diagnosis.

As shown in table 3, the majority of our tuberculosis patients reported of having had fever and cough. Where as both HIV positive and HIV negative patients had also similar complaints and this finding is consistent with other studies (32,33). This could be suggested as both tuberculosis and HIV infection was lead to chronic ill health and wasting and both are associated with persistent cough and fever and this finding shows some symptoms of HIV positive tuberculosis patients were similar and indicating the difficulties in clinical diagnosis.

IT has also been reported that weight loss, lymphadenopathy, and harps zoster were best predictor of AIDS diagnosis among tuberculosis patients in ranking order (10). Similarly in this study those tuberculosis patient reported having had diarrhea, generalized body itching and Herpes zoster scar was strongly associated with HIV-Sero Positivity that is consistent with other study (32). and these clinical finding may assist in identifying patients with dual infection with tuberculosis and HIV infection.

Tuberculosis is a disease with diverse clinical manifestation and studies has indicated that the proportion of pulmonary tuberculosis account for 80% of all tuberculosis cases (7, 25,27). This study also revealed, lung was the commonest site of infection by tuberculosis and this finding were also goes with WHO, recommendation in DOTS control strategies. Based on studies WHO recommended that the proportion of smear negative pulmonary tuberculosis account for 20-25% of all pulmonary tuberculosis, however, in this study the proportion of smear negative pulmonary tuberculosis are much higher 47.32%? This discrepancy could have resulted from the impact of HIV on clinical manifestation of tuberculosis patient, indicating that in pulmonary tuberculosis of HIV positive patients the immunity tends to be suppressed &the patient would

probably unable to produce sputum. And commonly, presented with dry cough. Thus leading to diagnostic difficulties. And indicating those missing pulmonary tuberculosis patients with HIV would be common phenomena that could have impact on patient's survival. .

The clinical presentation of tuberculosis patients with HIV-infection mainly depends on the stage of HIV-infection. Studies have shown that tuberculosis detection rate based on sputum smear examination would be comparable with that of HIV negative pulmonary tuberculosis only during the early stages of HIV infection (10,25,27). Except in the advanced stages when there is a tendency to develop smear negative tuberculosis (7,18) similarly this study have also shown that 50.3% of smear negative pulmonary tuberculosis were found to be HIV positive and have strong association with HIV sero Positivity compared with Smear positive pulmonary tuberculosis patients. This finding is different from other studies undertaken in shashamene and Harar which revealed that where most HIV positive patients to have a positive sputum (32,33). This discrepancy would be accounted for the level of immuno-suppression posed by HIV infection and later exposure to tuberculosis infection in our study population.

IT was indicated that in the advanced stages of HIV infection the clinical presentation would be atypical and extra pulmonary forms like TB lymphadenitis would occur with a relatively higher frequency (25). Similarly in our study among extra pulmonary tuberculosis, lymphadenopathy was the most frequent (50.6%) forms of extra pulmonary tuberculosis. This finding is consistent with other studies reported from, Kenya, Zambia and Ethiopia (17.32,10). Probably in this study, the majority of the cases may be at advanced stage of the disease.

However unlike other studies in Southern Ethiopia (32), Zaire Zambia (10) in this study patients with extra pulmonary tuberculosis had lower HIV Sero Positivity (28.4%) compared with sputum positive pulmonary

tuberculosis which is 30.5%. The difference could have resulted from the dual epidemic. This increase in HIV sero positivity among sputum positive cases would probably shows that there is an interaction between HIV and TB, which consequently lead to an increase in the transmission of TB with in the community. Therefor dual strategies are more helpful to control dual epidemic.

Chest X-ray can be of additional value in the diagnosis of tuberculosis. Particularly in smear negative pulmonary TB.The classic form of TB, with cavetation &, upper lob pulmonary lesion, is known to be determined by the interaction between the host immune system. And so that in the presence of immunodeficiency a deferent out comes may be expected and. there fore, the appearance of the X-ray may be not typical for TB (7,25,30). Especially in the advanced stages of HIV infection TB tends to disseminated with absence of cavitations and abnormalities in the lower rather than in the upper lobes (7, 25).

In this study from all chest X-ray findings, 23.5% involve the upper lobe, 44.11% infiltrate middle and lower lobe and 32.4% cavities among pulmonary tuberculosis. Moreover, pulmonary cavitations was observed more (70.5) in HIV – Sero Negative patients and upper lobe involvement was also observed more 56.3% in HIV – Sero negative pulmonary tuberculosis patients while middle. &Lower lobe involvement was observed 58.3% more among HIV Sero Positive patients. The findings is also comparable with other studies (32) and strengthen the radio logic finding of late stage of HIV/AIDS infection (7, 23,25).

Strength and Limitation of the study

The present study has covered large number of rural health institution and hence it is attempted to reflect the magnitude of the problem of HIV/AIDS and Tuberculosis co-infection could be reliable. Moreover, due to fact that health professionals did the data collection work, it can be said that the result obtained is fairly reliable.

The fact that the study design was cross-sectional the validity of the result may be compromized.

Conclusion and Recommendation

The current study revealed that there is high prevalence rate of HIV among tuberculosis patient. There for, with high burden of tuberculosis infection, poor living condition, and HIV epidemic in the country like ours, the risk of developing active tuberculosis will be much higher and eventually over load the health services in the near future. This shows tuberculosis and HIV co-infection has synergistic effect to one another that would adversely affecting health services and economic productivity of the country, unless control measure is taken. A real progress in controlling TB&HIV can only be made with dual strategy targeted both epidemic. Hence, controlling tuberculosis means detecting cases and ensuring that a person gets antibiotic treatment, if he had HIV infection, he can be cured of his active tuberculosis as well as avoiding transmission to others and extends his survival. It cannot prevent him dying from other infection. On the other hand vigorous action to prevent HIV is one of the dual strategy. There, for dual strategy in control program deserve a high priority.

The study has reveled that Smear negative pulmonary tuberculosis has strong association with HIV sero posetivity, and usually, at latter stage due to immuno-supression, the patient may not able to produce sputum, with simple laboratory investigation one cannot detect mycobacterium tubercles in the sputum. There fore an aggressive diagnostics approach is required to avoid missing HIV co-infected TB cases.

This study showed that the age groups between 20-39years among TB patients are more affected by HIV infection, which is commonly a breadwinner of the house- hold in the community. There fore TB&HIV co-infection would leads to a negative consequence on the socio-economic status of the country and the future generation. Marital status, having multiple sexual partners and having had sex with commercial sex worker were found to have strong association with HIV sero-positivity. The power of positive behavioral change message to create awareness and eventually brings attitudinal and behavioral change so that individuals will limit the number of their sexual partners and avoid unsafe sexual practices. Moreover, TB patients residing urban setting shows strong association with HIV sero-positivity. This implies that because of poverty there is high mobility of population through the country, prostitution has flourished in urban setting, military moves from place to place and they are potentially capable to both direction, therefore HIV is no more confined to urban area, but speared to rural setting. And attention should be given to preventive strategies.

Hence, the following recommendation has been made to possibly alleviate the existing problems: -

Recommendation

1. The national HIV/AIDS secretariat office and the national Tuberculosis control Program should make a dual strategy targeting both epidemics at all levels.
2. As smear negative pulmonary tuberculosis cases might be missed in-patients with HIV, which eventually affects their survival rate, all suspected cases after screening for HIV should supplied with prophylacsis. Hence, the HIV/AIDS controlling program should give attention to incorporate prophylacsis in control

Strategy

3• To reduce HIV spread in the community, IEC activities should be strengthen, and so as to create awareness and eventually bring attitudinal change so that individuals will limit partners and avoid unsafe sexual practices.

4• Pre-marital HIV-VCT should be encouraged

5• Training of more counselors and expanding VCT services at all level should be given attention.

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Annex 1

Questionnaire for Assessment of HIV sero prevalence among registered TB patient in Arsi zone

This survey only interviews tuberculosis patient aged 15 years and above who are on treatment in respective Health Institution.

001. Patient Identification number----------

002. Name of Health Intuition----------

003. Woreda ----------

004. Kebele ----------

005. Resident

Urban =1

Rural = 2

006. Date of Interview ----------

007. Interviewer name ----------Signature----------

008. Supervisor Name _____ signature

_____

Introduction: My name_____; I am working as data collector in a cross sectional survey of determination of prevalence rate to

run by Addis Ababa University Medical Faculty, Department of Community Health In collaboration with Oromiya Health Bureau. We are interviewing registered TB patients in Arsi Zone to find out social background & medical situation of these patients that would help in prioritization & planning purposes. I kindly request you to participate in the survey that will be very much useful for the Zone as well as the region.

I am going to ask some personal questions pertaining to the above issues in which all your answers kept completely confidential. Your name will not be written on this form, & will never be used in connection with any of the information you tell me. You do not have to answer any questions that you do not want to answer; you may end this interview at any time you want to. However, your honest answers to these questions will help us better understand the social background & clinical characteristics of TB patients in the Zone. We would greatly appreciate your help in responding to this survey. Thank you.

Part I: Socio Demographic Characteristics and Risk Behavior

No.	Questions	Coding Categories	Skip to
101	Sex of the respondent	Male 1 Female 2	
102	How old were you at your last birth day	♦ Age in completed year _____ ♦ Don't know 88 ♦ No response 89	
103	Have you ever attended school?	♦ Yes 1 ♦ No 2	→105
104	What is the highest level of education you completed? Circle one	♦ Only read & write 1 ♦ Grade 1 - 6 2 ♦ Grade 7-10 3 ♦ Grade 11-12 4 ♦ Above grade 12 5 ♦ No response 89	
105	What is your religion?	♦ Muslim 1 ♦ Orthodox 2 ♦ Catholic 3	

		♦ Protestant 4 ♦ Other (specify) 5	
106	To which ethnic groups do you belong	♦ Oromo 1 ♦ Amhara 2 ♦ Tigrie 3 ♦ Other (specify) 4	
107	What is your occupation?	♦ Farmer 1 ♦ Student 2 ♦ House wife 3 ♦ Daily laborer 4 ♦ Soldier 5 ♦ Merchant 6 ♦ Government employees 8 ♦ Prostitute 9 ♦ Other (Specify)	
108	How is your current living condition?	♦ Alone 1 ♦ With family 2 ♦ With friends 3 ♦ On the street 4 ♦ Other (specify) 5	

109	What is your current source of income?	♦ Self 1 ♦ Relative 2 ♦ Spouse 3 ♦ Friends 4 ♦ Other (specify) 5	
110	What is your family size?	In number_____	
111	Have you ever been married?	Yes 1 No 2	
112	If married, how old are you when you first married?	♦ Age in year _____ ♦ Don't know 88 ♦ No response 99	
113	Are you currently married	Yes 1 No 2	
114	If married Men: do you have more than one wife? Women: does your husband have other wives	Yes 1 No 2 Yes 1 No 2	
115	Currently if you are not married, your marital status is	♦ Partner Died 1 ♦ Divorced 2	

		♦ Separated 3	

116	How many non-commercial sexual partner(s) you had in the last ten years?	♦ Non 1 ♦ 1-3 2 ♦ More than three 3 ♦ No response 89	
117	Have you had sex with commercial sex worker during the least ten years? (Only for men)	♦ Yes 1 ♦ No 2 ♦ No response 89	
118	If the answer is yes for Q116 & Q117, how often do you use condom when you practice sex?	♦ Not at all 1 ♦ Sometimes 2 ♦ Every time 3 ♦ Don't know 88 ♦ No response 89	
119	If no for question number 118, why didn't you use condom at that time? (Don't read out, circle all mentioned more than one answer is possible)	♦ Not available 1 ♦ Expensive 2 ♦ Partner objected 3 ♦ Don't think of it 4 ♦ Don't know 88 ♦ No response 89	
120	Have you ever heard of disease that can be transmitted through sexual	♦ Yes 1 ♦ No 2	

	intercourse?	♦ Don't know 88 ♦ No response 89	
121	have you had a genital ulcer during the past ten years	♦ Yes 1 ♦ No 2 ♦ Don't know 88 ♦ No response 89	
122	Have you had genital discharge during the last ten years?	♦ Yes 1 ♦ No 2 ♦ Don't know 88 ♦ No response 89	
123	Did you have history of blood transfusion during the last ten years?	♦ Yes 1 ♦ No 2	
124	Have you ever had history of hospitalization due to tuberculosis?	♦ Yes 1 ♦ No 2 ♦ Other (specify) 3	

Part II: Clinical information

For this part the interviewer should take medical history and do physical examination

No.	Questions	Coding Categories	Skip
201	Have you ever had BCG vaccination during child hood? (check for BCG scar on the right deltoid)	♦ Yes 1 ♦ No 2 ♦ Don't know 88 ♦ No response 89	
202	Have you had history of fever before coming to health institution?	♦ Yes 1 ♦ No 2	
203	If yes what was the duration?	♦ For less than one month 1 ♦ For greater or equal to one month 2 ♦ Don't know 88	
204	Have you had diarrhea before coming to the health institution	♦ Yes 1 ♦ No 2	
205	If yes, for how long does it persist?	♦ Less than one month 1 ♦ Greater or equal to one month 2 ♦ Don't know 88	
206	Have you had history of cough before coming to health institution	♦ Yes 1 ♦ No 2 ♦ Don't 88	

207	If yes, what was the duration?	♦ Less than one month 1 ♦ Greater than or equal to one month 2 ♦ Don't know 88	
208	Have you had any neurological findings such as weakness of limbs, facial palsy, sever head ache, vomiting etc)	♦ Yes ♦ No ♦ Don't know 88	
209	Ask for history of generalized lymphadenopathy?	♦ Present 1 ♦ Absent 2	
210	Have you had oral candidiasis? (Look for oral mucosa)	♦ Present 1 ♦ Absent 2	
211	Generalized body lesion/Itching?	♦ Present 1 ♦ Absent 2	
212	Look for Harps zoster scar	♦ Present 1 ♦ Absent 2	
213	Splenomegaly (palpate the abdomen)	♦ Present 1 ♦ Absent 2	
214	Hepatomegaly (do abdominal examination)	♦ Present 1 ♦ Absent 2	
215	Did you lost significant body weight during the last 6 months?	♦ Yes 1 ♦ No 2 ♦ don't know 88 ♦ No response 89	

216	If yes, what was the maximum body weight loss?	♦ Less than 10% of body weight 1 ♦ Greater or equal to 10% of body weight 2 ♦ Not measured 3	

Part III: Results from investigation. This part will be field from patient card

No.	Questions	Coding Categories	Skip to
301	Type of patient	♦ New case 1 ♦ Relapse 2 ♦ Defaulter 3 ♦ Not specified 4	
302	Form of TB	♦ Pulmonary 1 ♦ Extra pulmonary 2 ♦ Disseminated 3 ♦ Not specified 4	

303	If extra pulmonary, indicate the organ involved?	♦ Lymph node 1 ♦ Cardiac 2 ♦ Bone 3 ♦ Intestine 4 ♦ Gonadal 5 ♦ Plural 6 ♦ Other (specify)	
304	Record laboratory investigation done for the patient?	♦ AFB 1 ♦ X- ray 2 ♦ Biopsy 3 ♦ Other (specify)	
305	If AFB was done lab result for pulmonary Tuberculoses patient	♦ Positive 1 ♦ Negative 2	
306	If chest x-ray was done for pulmonary TB patient the part involved is?	♦ Middle and lower zone 1 ♦ Upper zone 2 ♦ Cavities 3	

		♦ No finding 4 ♦ Not reported 5	
307	Sero status of the patient	♦ Positive 1 ♦ Negative 2 ♦ Not identified 3	