Final Report on

Prevalence of pulmonary tuberculosis among HIV infected persons in Pokhara, Kaski, Nepal

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Prevalence of pulmonary tuberculosis among HIV infected persons in Pokhara, Kaski, Nepal

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CHAPTER-I

1. INTRODUCTION

Human immunodeficiency Virus (HIV) causes progressive impairment of the body's cellular immune system leading to increased susceptibility to tumors, and the fatal conditions knows as acquired immunodeficiency syndrome (AIDS). Due to lack of vaccines and/or effective easily accessible therapies, the disease is posing a life long devastation not only to the individual but also to the society. Nepal's social economic status, prevailing norms and values, cultural myths on sex and sexualities and huge population of marginalized communities make it extremely vulnerable to the HIV/STIs epidemic. Furthermore, the high migration rate, more particularly as we see in hilly regions of western Nepal, is still a major factor for steep increase of HIV/AIDS epidemic in Nepal.

The unique feature in the pathogenesis of HIV/AIDS is that the primary target cell for HIV is immune cells bearing CD4 marker at their surface. With the infection of HIV, there will be gradual decrease of human immune cells bearing CD4 antigen receptor, the most important being T helper cells (CD4 T cells), B lymphocytes, macrophage and natural killer cells leading to development of wide varieties of opportunistic infections (OIs) i.e. severe infections induced by agents that rarely cause serious diseases in immune competent individual. In this way AIDS related mortality and morbidity, which is significantly higher in number as compared to other diseases, is actually due to OIs rather than HIV itself. So, the success of any HIV/AIDS care and management project depends on effective diagnosis and treatment of opportunistic infections.

Tuberculosis is a chronic disease caused by *Mycobacterium tuberculosis* (also known as tubercle bacilli) primarily affecting the lungs and transmitting from persons to persons by droplet (air borne) method. Tuberculosis kills more people than any other single infectious diseases (Grange 1990). Realizing the serious public health threat posed by tuberculosis, WHO in 1993 declared it a 'global emergency' (Cheesebrough 2002) The disease is more prevalent in crowded, low income groups, alcoholics, smokers, close-contacts of known tuberculosis cases and surprisingly high in immuno-compromised persons, particularly in HIV infected persons, both in persons

with prior tuberculosis infection who are newly infected with HIV and in persons with prior HIV infection who are newly infected with tuberculosis (Sonneberg 20004, Hanna 2005).

Mycobacterium tuberculosis is an opportunistic pathogen. Not all people infected with this bacilli develop tuberculosis but only those persons suffering from certain abnormalities and/or exposed to certain intervention that cause impairment of the body's immune response are highly susceptible for the progression of TB infection to active TB disease (STC 2004).

The National TB control Program (NTP) of Nepal is committed to reduce the mortality, morbidity, and transmission of TB until it is no longer a Public Health Problem. To achieve this goal, the NTP started Directly Observed Treatment Short-course (DOTS), the internationally recommended strategy for TB control in 1996. Under DOTS strategy, TB suspects (i.e. any patients of 12 years of age or more, who is visiting an outpatient health facility or Medical Officer for the first time for the current complaints, and who had cough for 3 2 weeks or more) are referred for direct microscopy of AFB stained smear. If AFB is found, they receive free treatment with recommended standard drugs under direct supervision of health worker for 8 months. (NTC manual 1997)

HIV-related TB continues to increase even in countries with well organized national TB control programs (NTPs) that are successfully implementing the world health organization's DOTS strategy. This suggests that, where HIV is fuelling the TB epidemic, implementation of DOTS strategy only is insufficient to control TB and control of HIV infection must become an important concern for NTPs. This is because that tuberculosis and HIV prevention and control programs / strategies have common concerns and interests e.g. the prevention of HIV in the first instance must be a priority for TB control and the provision of TB care, treatment and prevention should be a basic ingredient in HIV / AIDS strategies. Thus it has been realized that HIV and TB programs need to work collaboratively (STC, 2003)

Progression of TB infection to disease occur more frequently in certain groups termed as high risk groups, and are once infected have high chance of development of active TB. Among the high risk groups the majority of them are of HIV patients followed by

poverty, malnutrition, overcrowding, armed conflict and increased number of displaced persons (Cheesbrough, 2002). As HIV infection weakens the cellular immunity tubercle bacilli can grow more easily resulting in the active TB disease in both persons recently and acquired latent TB infection. The rate of progression from TB infection to TB disease is 10-30 times higher among persons with HIV and TB infections than among persons with TB infection alone. If HIV status is negative, life time risk of developing TB is 5-10%, but if positive with HIV, then the lifetime TB risk may be up to 60%. TB stands as the most significant killer of the persons with HIV contributing to one third of AIDS death globally and 40% of AIDS mortality with in Asia (STC, 2003).

The interaction between HIV and TB in persons co-infected with them is bidirectional and synergistic. The course of HIV infection is accelerated subsequent to the development of TB. Compared with CD4+ cell count matched HIV infected controls without TB, the relative risk of death and development of other opportunistic infections is higher in HIV-TB co-infected patients. Further, increased HIV replication has been demonstrated locally, at sites of disease affected by TB such as affected lung and pleural fluids in patients with HIV –TB (Sharma *et al*., 2005).

Evidence also suggests that HIV can promote the emergence of multi drug resistance strains of *Mycobacterium tuberculosis*. Several factors such as (i) increased susceptibility to TB (ii) increased opportunity to acquire TB due to over crowding, exposure to patients with MDR –TB due to increased hospital visits and (iii) malabsorption of anti tuberculosis drugs resulting in suboptimal therapeutic blood levels in spite of strict adherence to treatment regimen (Sharma *et.al.,*2005).

The prevalence of extra pulmonary tuberculosis is increased in HIV-infected persons. This is because there is failure to develop characteristic granuloma of immunogenic origin and there is also a suppression of tissue necrotizing reaction and scar formation that would otherwise limit the spread of infection (Grange, 1990). The commonest form of extra-pulmonary TB in HIV infected persons are lymphadenopathy (especially cervical nodes), miliary disease, meningitis and tuberculous effusions in the affected areas, pleurisy, pericarditis and peritonitis. Many HIV infected patients with extra-pulmonary TB also have coexistent pulmonary TB. So, whenever possible

the diagnostic specimen should be as many as possible and should be examined for acid-fast bacilli (AFB) and culture for mycobacteria (WHO, 1998).

The emergence of HIV infection and MDR TB posed a major problem in TB control. In this situation, national and international health related organizations have realized that TB control must go beyond DOTS. As a result new TB control strategy has been developed, the Stop TB Strategy. It is a mechanism for building links between NTPs, health care providers and communities. Until now in Nepal, All the recent stop TB strategy merely embraces the fundamental of TB control originally framed as DOTS. However, due to rise in HIV epidemic and emergence of drug resistance, DOTS is found to be insufficient to control TB in such settings. As a result, there is immediate need to adopt the new TB control strategies that go beyond the DOTS. These include the intensified case detection of active TB through quality assured bacteriology (WHO 2003).

Case detection rate is one of the important indicators used to assess the achievement of millennium development goal. Although active case detection among the general population should not be encouraged because it requires expensive (and inefficient) population survey, it is justified among the high risk population such as HIV positive persons. This process involves the close collaboration with organizations/hospital involving in HIV care and support activities as well as with VCT centers from where HIV case can be identified and tested for tuberculosis. This process is active case finding strategy because community health workers visit the individual HIV persons to collect sputum (irrespective of their TB symptoms), and transport the specimens to the regional mycobacterial laboratory for investigation of TB. If AFB is found in direct microscopy or growth is observed in suitable media, then the patients are referred to the local health center for treatment (WHO 2003). In contrast to this, the usual TB control measures at the local health facilities are relying primarily on the passive case finding i.e. only those individuals experiencing cough of more than two weeks duration are encouraged to submit sputum samples for smear microscopy. Those diagnosed with TB disease initiate directly observed short-course therapy regimens, which are administered at the health center or post closest to their homes. This basic approach in TB control is supposed to be insufficient to control TB in high HIV prevalence region. Furthermore, several studies have already demonstrated that

smear negative tuberculosis constituted the significant proportion among HIV positive individuals. So, inclusion of culture technique along with direct microscopy is the surest way of detecting higher number of TB cases among HIV positive persons and thereby reducing the morbidity and mortality due to tuberculosis (WHO 1994).

CHAPTER – II

2. OBJECTIVES

General

- To explore HIV/TB co-infection pattern in HIV infected persons of Pokhara, Kaski, Nepal

Specific

- To determine the prevalence of pulmonary tuberculosis among HIV infected persons
- To study the characteristics of HIV/TB infected people.
- To identify clinical presentation of HIV/TB infected people.
- To study the socio-demographic characteristics of HIV infected people.

CHAPTER – III

3. LITERATURE REVIEW

3.1 TUBERCULOSIS

Tuberculosis is a chronic granulomatous disease which is recognized as the leading cause of death among the infectious diseases. It is caused by *Mycobacterium tuberculosis* complex which include four closely related organisms – *M. tuberculosis, M. bovis, M. africanum and M.* microti. Despite the availability of effective chemotherapy it is still a major public health problem in most of the countries of the world. Because of the serious public health threat posed by tuberculosis, the WHO declared it a 'global emergency' in 1993 (Cheebrough, 2002).

3.2 HISTORY

In the past tuberculosis has been referred to as the "white plague" and by John Bunyan as "the captain of all these men of death". In Ancient Hindu texts, tuberculosis is referred to as Rajrog and Rajayakshma meaning 'The king of diseases'**.** (Grange *et al.,*1990)Certainly, tuberculosis was well recognized by the time of Hippocrates (377-400 BC), who gave an excellent clinical description of the disease, called "Pthisis", a Greek word which mean "to consume to spit" and "to waste away" (Grange, 1996; Miller, 1982). The Dutch Physician, Franciscus Sylvius (1614-1672) deduced from autopsies that tuberculosis characterized by the formation of nodules, which he named "tubercles" (Lowell *et al.,* 1969).

Robert Koch discovered the *Mycobacterium tuberculosis organism* in 24 March 1882 and succeeded in culturing it on inspissated serum. The transmissible nature of tuberculosis was clearly established by Jean-Antoine-Villemin, a French military doctor in 1868 (Webb *et al.,* 1995).

The word "tuberculosis" means "a small clump" (Dubos *et al.*, 1952). Several names have been used to refer to tuberculosis in the year gone by; acute progressive tuberculosis has been referred to as "galloping consumption". Pulmonary tuberculosis has been referred "tabes pulmonali". The acid fast nature of the organism was

discovered by Ehrlich in 1885 (Burke, 1995) and the present method of acid-fast staining was developed by Ziehl and subsequently modified by Neelsen and hence the named Ziehl Neelsen staining technique

3.3 TUBERCULOSIS AS A MAJOR PUBLIC HEALTH PROBLEM AND ITS CONTROL

Accordingly to world health organization estimates, one-third of the world's human population has been infected by tuberculosis. An estimated 8-10 millions people developed overt tuberculosis annually as a result of primary infection. Despite the fact that TB is preventable, treatable and curable disease, it is still a major public health problem, particularly in South East Asia. The SAARC region bears 27.4 % of the total global new TB burden, India occupying the 1st position in the list of 22 high TB burden nation.(STC 2004). As far as Nepal is concerned almost 45% of Nepalese people are infected with TB of which 60% are in the productive age group (15-45 yrs). According to a recent survey, TB kills 15 Nepalese per day and every year 40,000 people develop active TB disease of which 20,000 are infectious pulmonary disease (NTC 2004).

The proportion of infected persons is similar in developing and developed countries but in the former most infected persons are in productive age (15-45) years whereas in latter most infected persons are in older age group. Thus in Nepal, for example, 60% of the infected persons are in the productive age while in USA and UK, for example, only about 12% of the persons in the age range 15-45 years who are exposed to HIV are infected with TB.

Tuberculosis is the cause of 7% of all deaths and in developing countries it is 1 in 4 (i.e. 25%), even though it is among the most effective of all adult disease to treat (Murray *et al,* 1990). However, MDR-TB has caused some difficulties to cure tuberculosis, resulting more suffering and deaths from this disease.

Fortunately, the introduction of DOTS-plus system for the treatment of MDR-TB has created a ray of hope to reduce the case fatality rate. Thus a ray of hope is brighter to fight TB/MDR-TB through successful implementation of DOTS/DOTS-plus.

3.4 HIV AS ANOTHER MAJOR PUBLIC HEALTH PROBLEM AND ITS CONTROL

The HIV/AIDS epidemic continues to grow worldwide and poses a huge human and economic loss. HIV pandemic presents the global and public health communities with one of the most significant challenges. In one hand there is no widely accessible and effective chemotherapy and in the other hand, the epidemic has mushroomed globally into an unforeseen and unpredicted nightmare so that the morbidity and mortality costs to societies are irrecoverable. HIV infection reveals varying patterns of transmission and evidence suggests that the impact globally has disproportionately affected the more vulnerable and marginalized persons with in the society e.g. injecting drug users, commercial sex workers, migrants, poor and uneducated women and children. The facts are clear with 95% of HIV infected people living in less industrialized, developing countries. As most of the population of sub-Sahara Africa region has already been swept away by the HIV epidemic and the preview of this image has already been reflected to India (our neighboring nation) it can be well anticipated that sooner or latter Nepal may also be along with the list of these high burden nations if immediate action is not taken to fight this disease.

The good news is that we are not powerless against HIV/AIDS for we do have evidence that prevention and intervention methods do work (e.g. the Thailand 100% condom programme). If someone acquires HIV infection, it can be treated via antiretroviral therapy (ARVT) /high active antiretroviral therapy (HAART) and managed as a chronic disease. Besides these, now there is availability of methodology for the prevention of mother to child transmission of HIV (PMTCT) which affords the birth of healthy (HIV negative) child from HIV positive mother.

3.5 DOUBLE PANDEMIC DEVASTATION OF TB/HIV CO-INFECTION

Tuberculosis is one of the most common opportunistic infection in HIV positive cases and recognized as the leading cause of death of people living with HIV / AIDS (PLWHA) as shown in table 3.1.

Table 3.1 Most Common HIV/AIDS related Condition

Clinical presentation	Global situation (Percentage)	Nepal situation (percentage)
Oral Candidiasis	53	28.42
Pneumocystis Carinni Pneumonia (PCP)	24	NA
Tuberculosis	22	67.76
Esophageal Candidiasis	21	NA
Cytomegalovirus	21	21.86
Kaposis Sarcoma	15	NA
Toxoplasmosis	11	NA
Cryptococcosis	9	NA
weight loss	NA	98.36
Diarrhoea	NA	78.69
Fever	NA	95.63
persistent lymphadenopathy	NA	24.6
Pneumonia	NA	7.1
Vaginal discharge	NA	52.17
Emaciation /Low G.C	NA	21.31
Hepatosplenomegaly	NA	4.37

Source: UNAIDS, 1998 and Dr. B.K Subedi

The co-existence of HIV infection and tuberculosis has been hailed as one of the most serious threats to human health. A person infected by only tubercle bacilli HIV negative cases have about a 10% chance of developing tuberculosis during the remainder of their lives; thus they have a less than 0.5% chance of developing overt disease annually. By contrast, an HIV-positive person already infected by tubercle bacilli has an 8% chance of developing overt disease annually, or up to 50% during the remainder of their relatively short life span (Doli, *et al.,* 1994) as shown in table 3. 2. Thus HIV positive persons infected by tubercle bacilli have a 20-30 fold higher chance of developing tuberculosis than their HIV negative counterparts.

Table 3.2 Lifetime Risk of TB Development

PPD / HIV Status	Percentage Risk of Development of TB
PPD +ve / HIV –ve	10
PPD +ve / HIV +ve	50

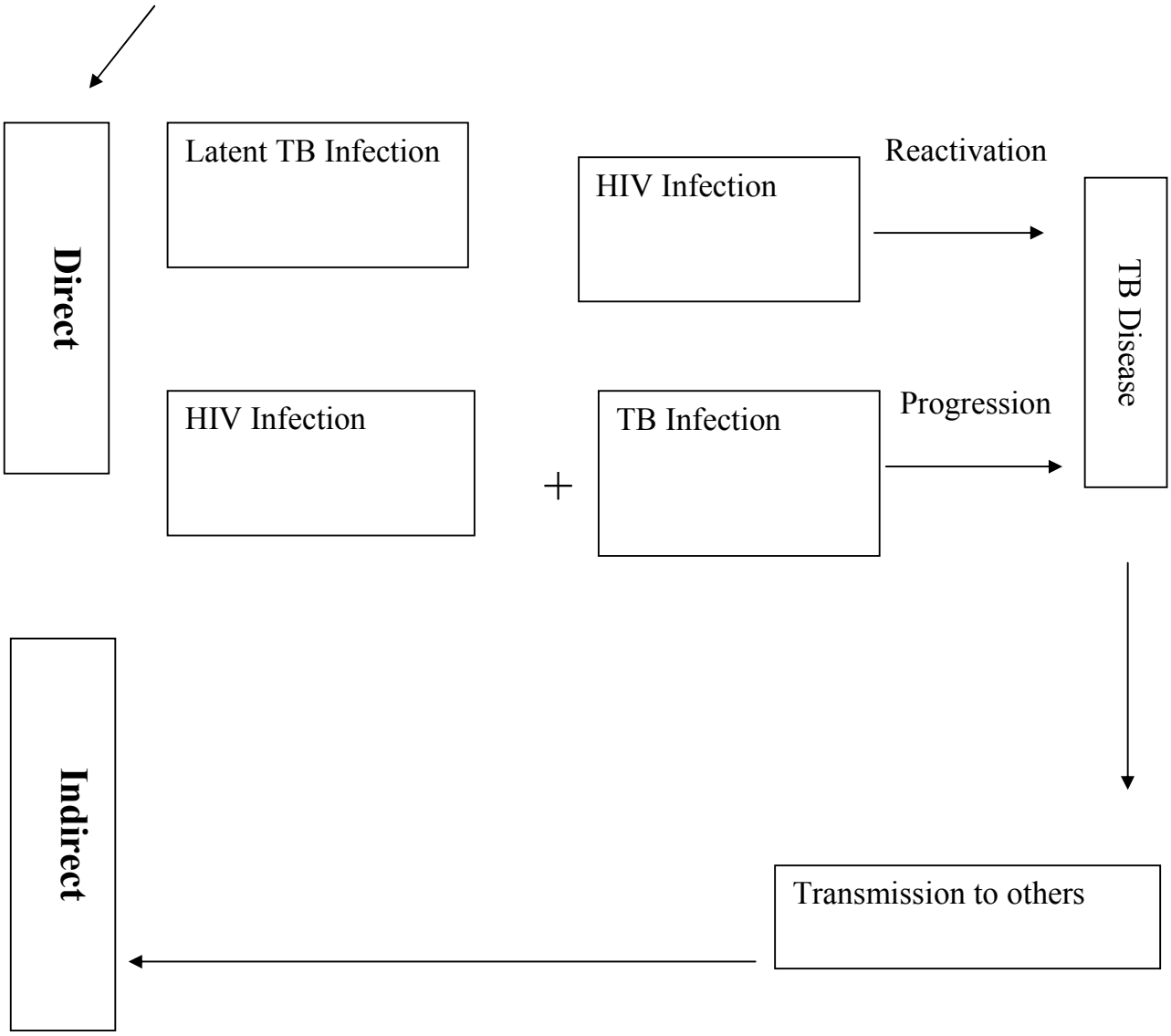
Source: Presentation of 1st SAARC conference on TB, HIV/AIDS and Respiratory diseases 2004.

From the global incidence of tuberculosis, it was estimated that 9% of all new TB cases in adults (aged 15-49 years) were attributable to HIV infection but the proportion was much greater in African region where the incidence of TB attributable to HIV was 31% (STC newsletter, 2003).

In a study in Bangkok, it was observed that HIV positive TB patients were associated with drug resistance including a 12 times higher risk of MDR-TB (Punnotok et al, 2000) and this finding supports the findings observed at New York City that TB patients who had never been treated and who were infected with the human immunodeficiency virus (HIV) or reported injection-drug use were more likely to have resistant isolates of tubercle bacilli (Frieden et al, 1993).

The fueling mechanism of HIV on TB epidemic is shown below:

Fueling Mechanism of HIV on TB epidemics



Flow Chart Showing Fueling Mechanism of HIV on TB Epidemic

Source:Presentation of 1st SAARC conference on TB, HIV/AIDS and Respiratory disease

3.6 TUBERCULOSIS DISEASE

Pulmonary tuberculosis suspect is defined as the persistence of productive cough for more than 3 weeks. Thus TB suspect should be immediately subjected to diagnosis of Tuberculosis. The result may be either Tuberculosis positive or tuberculosis negative (NTP manual, 2005). Tuberculosis infection is defined as the presence of tubercle bacilli, but in dormant/ or sub-clinical stage. Hence, the most people with TB infections can not spread the disease to others but they can be relatively easily identified because they have a positive response to the tuberculin skin test (STC, 2004). The great majority (possibly as many as 90%) of infected persons do not develop active TB during their life time. But if their body defense becomes weak due to any reasons such as HIV infection, they can develop tuberculosis disease earlier than expected. Tuberculosis disease is defined as the condition that results due to the body's attempt to control the multiplying and spreading of the tubercle bacilli (Pace 2000) .10% of the infected people who are not immunocompromised develop TB disease over life time. In about half of these persons (5% of the total), progression to disease occurs during the first few years after exposure. In other 5% there is a long interval, often several decades, between the occurrence of infection and the onset of disease; this sequence defines what is called reactivation of latent infection. Hence, the term tuberculosis in this text (and other articles, publication) means the actual TB disease (STC, 2004).

The main reasons for the increasing global TB burden are of the followings: Poverty in various population, not only in developing countries but also in inner city population in developed countries, changing demographics, with increasing world population, insufficient and inadequate health coverage of the population, especially in poor countries and of vulnerable groups of the population in all countries, negligence and under finding of TB control programme with inadequate cases detection, inadequate case management, poor rates in several countries and the impact of HIV epidemics (WHO, 2003).

Globally TB control is possible through the DOTS strategy, which represents an organizational framework for effective utilization of the existing tools for the diagnosis and treatment. The five component of DOTS strategy are:

- Sustained political commitment.

- Access to quality – assured sputum microscopy.
- Standardized short course chemotherapy for all cases of TB under proper case management conditions, including direct observation of treatment.
- Uninterrupted supply of quality assured drugs.
- Recording and reporting system enabling outcome assessment of all patients and assessment of overall programme performance (WHO, 2003).

3.7 ANATOMICAL SITES OF THE DISEASE

The main categories of TB by anatomical site of disease are pulmonary and extra-pulmonary TB. Generally, recommended treatment regimens are similar, irrespective of site. There are some exceptions such as tuberculous meningitis, for which a prolonged continuation phase is recommended (WHO, 1998).

Pulmonary TB refers to disease affecting the lung parenchyma, tuberculous intrathoracic lymph nodes (mediastinal and hilar) or tuberculous pleural effusion, without radiological abnormalities in the lungs , therefore make up the case definition of extra- pulmonary TB. Symptoms of pulmonary TB are: chest pain, cough, weight loss, night sweat, fever, loss of appetite, tiredness.(WHO, 1998).

Extra- pulmonary TB is much less common than pulmonary TB. Extra-pulmonary TB is most commonly found in the: mediastinal lymph nodes, larynx, cervical lymph, nodes , pleurae, meninges, central nervous system, spine, bones and joints, kidneys, pericardium, intestine, peritoneum and skin. However, TB may affect any organ or tissue of the human body. In miliary TB, acute haematogenous spread of the infection is observed. Extra – pulmonary TB occurs more frequently among persons who are infected with HIV, but pulmonary TB remains the most common type of TB in this group world-wide (WHO, 1998).

3.8 SEVERITY OF DISEASE

Bacillary load as reported by the microscopy examination, the radiological extent of pulmonary disease and the anatomical site of disease determine disease severity. A pulmonary TB case is classified as severe if parenchymal involvement is extensive.

The following forms of extra-pulmonary TB are classified as severe: meningitis, miliary, pericarditis, peritonitis, bilateral or extensive pleurisy, spinal disease with neurological complication, intestinal, and genito –urinary TB.

The following forms of extra –pulmonary TB are classified as less severe: lymph node, unilateral and non-extensive pleurisy, bone (excluding spine), peripheral joint, and skin TB.

3.9 BACTERIOLOGICAL STATUS

"Smear positive" and **"smear negative"** are the most useful bacteriological classification of pulmonary cases. Whenever a case is diagnosed as smear –positive or smear-negative it should be registered in the recording and reporting system.(Smear-positive cases are the only cases for which bacteriological monitoring of cure is available). In places where culture facilities are available, the culture diagnostic results are included in the bacteriological classification. In high-prevalence countries, among all bacteriological positive cases, about 70% of all bacteriologically positive cases are identified with the initial examination of a first set of 3 sputum smears, and up to 50% of the remainder with further repeated sputum- smear examinations. Only 10-15%will be positive by culture but negative by smear (WHO, 1998).

Under programme conditions- when microscopy laboratory services are available and diagnostic criteria properly applied –smear positive cases represent 65-80% of the total pulmonary cases in adults, and 50% or more of all TB cases (WHO, 1998).

3.10 MODE OF TRANSMISSION

Transmission of tuberculosis is almost exclusively through respiratory routes. When droplet nuclei are created through coughing / sneezing / laughing /talking by untreated persons suffering from pulmonary tuberculosis (the most common form) in a confined environment, they may be inhaled by susceptible persons, who are in close contact and become infected. This type of the transmission of infectious diseases is known as

air borne transmission. It is well established that, sputum smear positive cases of pulmonary TB are the main sources of transmission of infection. They are responsible for almost 95% of the transmission of infection in the community. They also suffer from extensive disease and thus are at higher risk of dying. If not treated properly they become the sources of drug resistance bacilli (STC, 2004). Some documented facts about transmission are:

- The droplet nuclei produced by sneezing can carry viable tubercle bacilli up to 3 m.
- The droplet nuclei produced by coughing can carry viable tubercle bacilli up to 1.5m.
- One cough can produce 3,000 -5,000 droplet nuclei (Rijal *et. al., 2004*)
- One cough is equivalent to about 5 minutes of loud talking in terms of resulting number of droplet nuclei (Rijal *et.al.,*2004).
- One air borne particle (1-3μm) contains 1-10 bacilli.
- Persons who excrete 10,000 or more tubercle bacilli per ml of sputum are the main source of infection to others.
- Lesser the size of droplet nuclei higher is the chance of transmission because they are not trapped in the nose but may reach the alveoli of lungs.

3.11 MYCOBACTERIA

3.11.1 Morphology and General Characteristics

Mycobacteria are cylindrical bacteria of size 1-4μm in length by 0.3-0.6 in length , which frequently forms small clumps (Smith and Easmon, 1990).They are weakly Gram positive non motile , non sporulating, non capsulated and exhibit acid and alcohol fastness i.e., they are not readily decolorized by 3% acid and alcohol once stained with Carbol fuschsin. The acid and alcohol fastness is due to the presence of thick, complex , lipid rich , waxy cell wall component called mycolic acid . The degree of acid fastness is different for different species due to variation of lipid percent (40%-60%) in the species. In addition to mycolic acid (principle constituent) layer, mycobacteria possess peptidoglycan (innermost) layer, arabinogalactan

(external to peptidoglycan) layer and mycosides layer (forming species or strain specific surface lipid).

3.11.2 Cultural Characteristics

Mycobacteria are obligate aerobes and slow growers (average generation time 18 hours). Even the most rapid growers require 3-4 days to grow on simple media and most disease associated mycobacteria require up to 8 weeks on complex media enriched with eggs . Mycobacteria are usually cultivated in Lowenstein –Jensen(LJ) media which consist of fresh egg, glycerol, asparagines several mineral salts and malachite green (to inhibit contaminants). In recent years several modifications of L.J. medium have been developed, e.g. Ogawa Medium which is cheaper than LJ medium due to the exclusion of asparagines and some mineral salts.

Typical colonies of *M. tuberculosis* are rough, tough and buff coloured and slow growers i.e. only appearing after 3 weeks of incubation.

For preliminary identification of tubercle bacilli the following characteristics are applied (WHO, 1998).

- Tubercle bacilli do not grow in less than one week and usually take three to four weeks to give visible growth.
- The colonies are buff colored and rough having the appearance of bread crumbs or cauliflower.
- They do not emulsify in the saline for making smears but give a grander suspension.
- Microscopically they are frequently arranged in serpentine cords of varying length or show distinct linear clumping.

3.11.3 Mycobacteria other than tuberculosis (MOTT)

These are a large number of mycobacterial species frequently found in environment habitats that may colonize and occasionally cause infection in humans and animals.

They are becoming more prevalent with the increasing prevalence of immunocompromised hosts, particularly in relation to the HIV/AIDS pandemic.

The most commonly encountered MOTT in the HIV patients are:

- *Mycobacterium avium* complex also known as *Mycobacterium avium intracellular* (MAI) complex, and
- *M.* k*ansasii*.

Most MOTT are acid fast and indistinguishable from *M. tuberculosis* except by a negative niacin test: other distinguishing characters are growth rate and pigmentation. Runyon classified the NTM (Non-tuberculosis mycobacteria) into the following 4 groups by the growth rate and pigmentation (Brooks *et al, 2002*):

Group I Photochromogen - Pigmentation only when exposed to light e.g. *M. kansasii, M. marinum & M. simie*

Group II Scotochromogen - Produce deep yellow to orange yellow pigment in dark.

Group III Non chromogen - Do not produce pigment at all. e.g. MAC

Group IV Rapid growers - Produce colonies within 3-4 days of incubation e.g. *M. fortuitum, M. chelonae.*

3.12 EPIDEMIOLOGY OF TB

3.12.1 Global aspect of TB burden

There were an estimated 8.8 million new cases of TB in 2005, (136 per 100 000 population) including 3.9 million (60 per 100 000 population) new smear positive cases, 7.4 million in Asia and sub Saharan Africa. A total of 1.6 million of people (24/100 000) died of TB, including 195 000 patients infected with HIV.

3.12. 2 TB burden in Asia

Asia has the highest burden of TB in the world. Out of the 22 high burden countries reported by WHO, 11 are in Asia : 1 st india, 2nd China, 3rd Indonesia, 5 th

Bangladesh, 6 th Pakistan, 9 th Philippines, 13 th Vietnam, 17 th Thailand 19 th Myanmar 21st Combodia and 22 nd Afganistan. In Asia, 4.5 million people develop TB every year.

3.12. 3 Situation of TB in South East Asia

South East Asia Region (SEAR) has the highest burden of TB in cases among the all the WHO region with 4.8 million cases; this is almost one- third of the global TB burden. Every year 1.34 million new cases of active TB appear and over 500 000 deaths occur due to this disease.

3.12.4 Tuberculosis Burden within SAARC Countries

Tuberculosis is one of the major public health problem in the SAARC region with immense socioeconomic impacts as this region bears 27.4 % of the total global new TB burden. Almost 50% of the adult population of this region has already been infected with tubercle bacilli and is at risk of developing TB disease (STC 2004).

3.12.5 Tuberculosis Burden in Nepal

About 45% population is infected with TB, of which 60 % are adult. Every year 40,000 people develop active TB, of whom 20,000 have infectious pulmonary TB. Expansion of DOTS has proved its efficacy in Nepal. The global target of 85% treatment success has already been achieved (NTC 2004).

3.13 EPIDEMIOLOGY OF TB/HIV CO-INFECTION IN NEPAL

In a study conducted in United Mission Hospital, Tansen (Western Region) during 2001-2002, it was observed that out of 260 suspected patients analyzed for the presence of both TB and HIV, 28 (10.76%) were found to be positive for both the diseases (Ghimire et al.,2004). Another study in the same hospital during 2004 showed 39.4 % TB prevalence in HIV/AIDS patients (Luitel et al., 2005). Studies conducted in Kathmandu (Central Region) showed that the Prevalence of TB in HIV infected persons was 23% in 2005 (Dhungana et al, 2007). Moreover, prevalence was found to be significantly higher in late stage of AIDS and another important factor for

this high prevalence of tuberculosis with HIV in these studies could be attributed to the fact that theses were all hospital based studies and symptomatic patients visiting the hospital were taken as the subjects. Official analysis of NCASC report showed that till 1992, all 14 AIDS cases were co-infected with TB and till 2001 out of 312 reported AIDS cases 99 were suffering from tuberculosis to give a prevalence of 31.73% as shown in table 3.4 (Subedi, 2003)

Table 3.4: Number of tuberculosis cases among HIV/AIDS cases in Nepal

Year	Total reported AIDS cases	Total reported TB cases	Total co-infection in the given period
1988	2	2	
1989	0	0	
1990	2	2	14
1991	5	5	
1992	5	5	
1993	10	4	
1994	11	3	
1995	15	12	99
1996	32	10	
1997	100	69	
1998	54	41	
1999	54	37	
2000	165	92	
2001	85	67	312
2002	84	46	
2003(June)	31	26	

Source: Dr. B.K Subedi

"A surveillance of HIV infection in patients with TB in Nepal" a study carried out in 2002 in five different testing sites in various parts of Nepal such as NTC Kathmandu, INF Nepalgunj, Tansen Palpa, NATA Biratnagar and RTC Pokhara showed that HIV prevalence among TB patients continued to rise and had increased four fold in the past eight years as shown in table 3.5.

Table 3. 5 HIV in TB Patients Sentinel Surveys1993-2002.

Surveillance	% of HIV in TB
1993-1994	0
1995-1996	0.6
1998-1999	1.88
1999-2000	1.4
2001-2002	2.4

Source : NTC,Thimi, Bhaktapur

3.15 LABORATORY DIAGNOSIS OF TUBERCULOSIS

The definitive diagnosis of TB is based on the detection of acid fast bacilli in clinical specimens by microscopy, cultural techniques or by polymerase chain reaction (PCR). Numerous attempts have been made to develop serological tests for the diagnosis with little success (Greenwood, 2000).

3.15.1 Laboratory Methods for the Diagnosis of Tuberculosis in HIV Infected Persons

Laboratory methods of diagnosis of Tuberculosis (TB) in HIV positive people require specialized equipments and a well equipped laboratory because

patients with smear negative TB constitute a significant proportion of HIV infected adults with respiratory disease. It is found that 24% of people who were smear negative in multiple sputum examination had TB on bronchoscopy. Similarly, tuberculin skin test may be less useful in people with HIV because immune response might be too weak in such persons. With minimal or no finding in chest x-ray, sputum negative for AFB and sputum culture being often unhelpful, additional tests are needed to arrive at the correct diagnosis. Such additional diagnosis methods for determination of mycobacteria infection in HIV infected people include the following:

- Mycobacterial culture of bronchoalveolar lavage (BAL)
- Bronchoscopy leading to lung biopsy.
- Polymerase Chain Reaction (PCR) using BAL fluid.
- Blood culture on Bactec 460 (i.e. Radiometric method based on principle of monitoring 14 CO_2 produced during growth of mycobacteria).
- Blood culture on middle brook 7H4 agar.
- Rapid mycobacterial detection by mycobacterial growth indicator tube (MGIT).
- High performance liquid chromatography (HPLC)
- Serological surveys

However, developing countries (where routine use of such sophisticated technique is troublesome) must rely on following conventional methods for diagnosis of TB in HIV/AIDS patients

i) Sputum microscopy.

ii) Fluorescence microscopy

iii) Sputum Culture.

iv) CSF investigation

v) Examination of lymph node aspirates.

vi) Biopsy

i) Sputum microscopy.

In high prevalence countries, TB case detection is largely based on microscopic examination of sputum for acid-fast bacilli (AFB). It represents one of the five pillars of DOTS strategy. The technical guidelines of WHO and International Union Against Tuberculosis and Lung Diseases (IUATLD) specify that this should be done by examination of three samples- the first spot, early morning and the second spot. It has been recommended that a minimum of 300 microscopic fields should be examined for maximum yield A minimum of 10 AFB/100 fields is taken as the threshold for considering a result as positive. A definite case should have at least one such result confirmed by a second smear examination, a suggestive chest radiograph, or alternatively there should be one positive mycobacterial culture result.

The simplest method for the detection of AFB is by Ziehl-Neelsen (ZN) staining technique. In Z-N staining, use is made of the acid fast property of mycobacteria i,e once stained with Carbol Fuschsin (a mixture of basic fuschsin and phenol red) they are not easily decolorized by dilute mineral acids (3% HCl). This is because of the presence of mycolic acid in the Cell wall which tightly binds to the dye. The decolorizing agent remove the red dye, from the back ground cells, tissue fibres and any organisms except mycobacteria and hence, they are referred to as acid fast bacilli (AFB).

ii) Sputum Culture.

Bacterial culture provides the definitive diagnosis of tuberculosis. Depending on the decontamination method and the type of culture medium used, as few as ten viable tubercle bacilli can be detected. Culture increases the number of tuberculosis cases often by 30-50%, detect cases earlier, often before they become infectious. Since the culture technique can detect few bacilli, the efficiency of diagnosing failure at the end of the treatment can be improved considerably. Culture

also provides the necessary materials for drug susceptibility testing. The turn around time of 6-8 weeks is one disadvantage of the culture.

Media of Choice

1. Solid Media

(a) Egg based

(i) Lowenstein Jensen (LJ) Media

(ii) Ogawa Media

(iii) Dorset egg media

(b) Agar Based Media

(i) Middle brook 7H10 and Middle brook 7H10Se

(ii) Middle brook 7H11 and Middle brook 7H11Se

2. Liquid Media

(i) BACTEC 12B broth

(ii) Middle brook 7H9 broth

Among these media, the routinely used are LJ and Ogawa. Liquid media are used for sensitivity test biochemical test and preparation of antigens and vaccines. To prevent overgrowth by contaminants, a cocktail of antibiotics such as PANTA (Polymixin, Amphotericin, Nalidixic acid Trimethoprim and Azlocillin) are added to the liquid media.

As the sputum specimen submitted to the TB laboratory are contaminated to varying degrees by more rapidly growing normal flora organisms, the specimen should be subjected to digestion and decontamination. This technique not only liquefies the organic debris, but also eliminates the unwanted normal flora. All currently available digesting/decontaminating agents are toxic to tubercle bacilli. Therefore, to ensure the survival of

the maximum number of bacilli in the specimen, the digestion/ decontamination procedure must be precisely followed.

The most widely used decontamination technique is modified petroff;s method which utilizes 4% NaOH as a digesting decontaminating agent. In this technique sputum is treated with double volume of the NaOH, allowed stand for 15 min (with occasional shaking) and then centrifuged. Then the deposit thus obtained should be washed with normal saline, centrifuged to concentrate the bacilli and then inoculated into media.

CHAPTER - IV

4. METHODOLOGY

This work was carried out at the Regionl TB centre (RTC), Pokhara during December 2006 to December 2007. Altogether 184 HIV positive persons were included in the study. HIV positive persons were selected from Friends of Hope (FOH), Ranipauwa, Community Support Group (CSG), Damside, Nauloghumti (New Road) and Paluwa (Srijana Chowk). HIV positive person's selection was done by random sampling method using the lists available in the respective sites. 50% of 368 HIV positive persons registered over one year in the above organizations working for HIV/AIDS were randomly selected to get a sample size of 184. The interviewers went to these organizations to take the interview and to collect the sputum samples of the identified HIV positive subjects.

Exclusion Criteria

Following are the exclusion criteria adopted:

1. Those HIV positive persons who could not produce the sputum readily (Many children were excluded by this criterion)
2. Those HIV positive persons who visited VCT only for one day and unable to submit the sputa next day.
3. Those HIV positive persons who had already taken anti tuberculosis therapy or are under treatment for tuberculosis.

After taking informed consent, they were interviewed to fill up the prestructured questionnaire. Then, specimens were collected for investigation of TB. The sputum specimen was collected for 3 times (The first Spot specimen, early morning specimen, and second spot specimen). All the specimens were transported to the Mycobacteriology Research Laboratory, RTC and specimen processing was done as per standard Microbiological operating procedure. Tuberculosis was investigated by direct microscopy of AFB stained smear and by cultural technique using Ogawa media as per WHO protocol.

4.2.1 Specimen Collection

As soon as HIV infected persons were identified, the investigator was reached to them with required number of wide mouthed, screw capped, leak proof, sterile sputum container. After taking informed consent the patients were instructed to collect the sputum in the following way.

- Deep coughed – obtained from the lower respiratory tract.
- Large amount of mucopurulent part – not saliva
- Adequate amount –Approximately 2 ml

If it was difficult to get sputum it may be induced by the inhalation of heated hypertonic saline aerosol for several minutes. Sputum collection of each patient was done with in 3 consecutive days in the following order. The first specimen was collected on the spot when a patient is identified as HIV infected. Two containers were given to the patient to collect the 2^{nd} and third specimen early in the second and third days.

4.2.2 Acceptance or rejection of Sputum Sample

To eliminate the wrong evaluation, quality control of the sputum was done for possible cases .Thus observation was done for the presence or absence of muco-purulent portion of the sputum. If specimen was without mucopurulent part it was rejected and asked for another sample.

4.2.3 Microscopic Examination of Sputum

4.2.3.1 Smear Preparation and heat Fixation

A small portion of the mucopurulent material is selected separated from the remainder, with a wooden stick and transferred to the slide. The material was spread evenly to a size of approximately 2×3 cm and dried at room temperature completely inside the safety cabinet and heat fixed by passing through the flame 3-4 times.

4.2.3.2 Staining of Fixed Smears by Ziehl-Neelsen (ZN) Method

Procedure

i. Heat fixed smears were placed on a staining rack.

ii. The smear was flooded with Carbol Fuschsin stain and heated from below with spirit cotton until the vapour just begins to rise, not to boil

iii. Heated stain was allowed to remain on the slide for 5 minutes.

iv. Stain was washed off with tap water and the excess of water was drained out.

v. The smear was covered with 3% acid alcohol for 5 minutes or until the smear was sufficiently decolorized i.e. pale pink.

vi. Smear was washed off with tap water and excess of water was drained out.

vii. The smear was covered with malachite green (0.5%) for 3 minutes.

viii. The smear was washed off by tap water.

ix. Backside of the slide was wiped out by cotton and placed at the draining rack (Cheesbrough , 2002).

4.2.3.3 Observation of stained smear

The dried ZN stained slide was examined microscopically using oil immersion objective:

The reporting of AFB stain was done according to WHO/IUATLD standard

4.2.4 Sputum Culture

4.2.4.1 Digestion and Decontamination by Modified Petroff"s method

a) Sputum sample (approximately 2ml) was aseptically transferred to the centrifuge tube.

b) Twice volume of 4% NaOH was added to the sputum.

c) The solution was left for 15 minutes at room temperature with occasionally shaking.

d) Then the solution was centrifuged at 3000 x g for 15 minutes.

e) The supernatant was discarded.

f) About 15 ml of sterile normal saline was added to it and sediment was suspended.

g) The solution was centrifuged at 3000 x g for 15 minutes. The supernatant was discarded and sediment was used for inoculation (WHO, 1998)

4.2.4.2 Inoculating the Primary Culture

0.1 ml of decontaminated and concentrated sputum sample was sucked through a pipette and inoculated into the 3% Ogawa media. Tube was slightly rotated out to allow the dispersion of sample through out the media. The tube was placed in horizontal position at 20°angle for 1 day, for complete absorption of sample into the media and then kept in upright position.

4.2.4.3 Incubation

The inoculated tube was incubated at 37°C for 8 weeks.

4.2.4.4 Observation

After incubation weekly observation was done to note growth rate, colony characteristics, pigmentation and contamination. Once growths were confirmed in the culture tube, smear was taken and stained by ZN technique to confirm the presence of AFB by microscopy.

5. Data processing and Analysis

Data processing and analysis was done by using SPSS 11.5 (Statistical Package for Social Science version 11.5) spreadsheet in the following way:

1. Variables were identified, scrutinized, classified and entered into sheet 1 (variable view part) of the datasheet.
2. They were properly labeled and coded as required.
3. Once the variable view was filled, data were entered into the data view.

4. Verification of the data entry was done by randomly selecting the 10 % of the questionnaire and comparing its information with data view through trial analysis.
5. On the basis of trial analysis, it was ensured that no data were missing in the data sheet.
6. After filling the both sheet of the SPSS spreadsheet, data analysis was done using the same program. Cross tabulation, frequency distribution, mean, median value calculation were done.

CHAPTER - V

5. RESULTS

Altogether 184 HIV infected people, were included in the study to investigate TB in them. After taking informed consent, they were interviewed and then specimen collected. The data obtained through Laboratory investigation and questionnaire were merged by entering into SPSS11.5, and analyzed to get the results.

5.1. DISTRIBUTION OF STUDIED CASES BY AGE AND GENDER

Among 184 studied subjects 110 (59.7%) were males and (40.3 %) were females. Over 43% of the cases were in the age group 31- 40 years as shown in table 5.1.

Table 5.1 Distribution of studied subjects by Age and Gender

Age group of subjects	Gender of the subjects		
	Male	Female	Total
1-10	1	0	1
	.9%	.0%	
11-20	4	1	5
	3.6%	1.4%	2.7%
21-30	36	44	80
	32.7%	59.5%	43.5%
31-40	50	21	71
	45.5%	28.4%	38.6%
41-50	18	7	25
	16.4%	9.5%	13.6%
51-60	1	1	2
	.9%	1.4%	1.1%
Total	110	74	184
	100.0%	100.0%	100.0%

5.2 DISTRIBUTION OF STUDIED SUBJECTS BY EDUCATIONAL STATUS AND GENDER

Over 38 percent of the studied cases had attained primary education followed by secondary education (30.6%). Literacy rate of males was found to be greater than females as shown in table 5.2

Table 5.2 Distribution of studied subjects by Educational Status and Gender

Education Status of the subjects	Gender of the subjects		Total
	Male	Female	
Illiterate	13	38	51
	11.8%	52.1%	27.7%
Primary education	46	25	71
	41.8%	34.2%	38.8%
Secondary education	45	11	56
	40.9%	15.1%	30.6%
Higher secondary education	6	0	6
	5.5%	.0%	3.3%
Total	110	73	184
	100.0%	100.0%	100.0%

5.3 DISTRIBUTION OF STUDIED SUBJECTS BY MARITAL STATUS AND GENDER

Over 77 percent of the studied cases were married followed by unmarried males (18.2%), unmarried females (12.5%) and widow females (6.5%) as shown in table 5.3.

Table 5.3 Distribution of studied subjects by Marital Status and Gender

Marital status of the subjects	Gender of the subjects		Total
	Male	Female	
Married	85	57	142
	77.3%	77.0%	77.2%
Unmarried	20	3	23
	18.2%	4.1%	12.5%
Divorced	5	2	7
	4.5%	2.7%	3.8%
Widowed	0	12	12
	.0%	16.2%	6.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.4 STRIBUTION OF STUDIED SUBJECTS BY OCCUPATIONAL STATUS AND GENDER

Over 39 % of the studied cases were unemployed followed by farmer (19.0%). Majority of the females were farmers (27.5%) and housewives (14.9%) while majority of the males were mainly businessman (15.5%) and volunteer (10.9) as shown in table 5.4.

Table 5.4 Distribution of studied subjects by occupational status and Gender

Occupational status	Gender of the subjects		Total
	Male	Female	
Unemployed	45	27	72
	40.9%	36.5%	39.1%
Farmer	15	20	35
	13.6%	27.05	19.0%
Labor	2	3	5
	1.8%	4.1%	2.7%
Business	17	6	23
	15.5%	8.1%	12.5%
Student	2	1	3
	1.8%	1.4%	1.6%
Housewife	0	11	11
	.0%	14.9%	6.0%
Volunteer/Social worker	12	4	16
	10.9%	5.4%	8.7%
Driver	6	0	6
	5.5%	.0%	3.3%
service	6	2	8
	5.5%	2.7%	4.3%
NGO/INGO	3	0	3
	2.7%	.0%	1.6%
Other	2	0	2
	1.8%	.0%	1.0%

5.5 DISTRIBUTION OF STUDIED SUBJECTS BY FAMILIARITY WITH THE WORD TB AND GENDER

Over 77 % of the studied subjects were had heard the word TB and males were found to be more familiar than females as shown in table 5.5.

Table 5.5 Dstribution of studied subjects by their familiarity with TB and Gender

Familiarity with TB	Gender of the subjects		Total
	Male	Female	
Yes	90	53	143
	81.8%	71.6%	77.7%
no	11	7	18
	10.0%	9.5%	9.8%
dont know	9	14	23
	8.2%	18.9%	12.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.6 DISTRIBUTION OF STUDIED SUBJECTS REGARDING KNOWLEDGE OF THE CAUSATIVE AGENT OF TB AND GENDER

Over 28 % of the studied subjects had knowledge regarding the causative agent of tuberculosis and males were found to have comparatively more knowledge regarding this matter than females as shown in table 5.6.

Table 5.6 Distribution of studied subjects by their familiarity with TB and gender

Knowledge regarding the causative agent of TB	Gender of the subjects		Total
	Male	Female	
Yes	44	9	53
	40.0%	12.2%	28.8%
no	32	33	65
	29.1%	44.6%	35.3%
Don't know	34	32	66
	30.9%	43.2%	35.9%
Total	110	74	184
	100.0%	100.0%	100.0%

5.7DISTRIBUTION OF STUDIED SUBJECTS REGARDING KNOWLEDGE OF THE CAUSATIVE AGENT OF TB AND GENDER

Over 46 % of the studied subjects had knowledge regarding the mode of transmission of tuberculosis and more were found to have comparatively more knowledge regarding this matter than females as shown in table 5.7.

Table 5.7 distribution of studied subjects by their familiarity with TB and gender

Knowledge regarding the mode of transmission of TB	Gender of the subjects		Total
	Male	Female	
Yes	63	23	86
	57.3%	31.1%	46.7%
no	19	21	40
	17.3%	28.4%	21.7%
Don't know	28	30	58
	25.5%	40.5%	31.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.8 DISTRIBUTION OF STUDIED SUBJECTS BY FAMILIARITY WITH HIV/AIDS AND GENDER

Over 93 % of the studied subjects were had heard the word HIV/AIDS and both the males and females showed similarly distributed in this matter. as shown in table 5.8.

Table 5.8 Distribution of studied subjects by their familiarity with HIV/AIDS and Gender

Familiarity with HIV/AIDS	Gender of the subjects		Total
	Male	Female	
Yes	103	69	172
	93.6%	93.2%	93.5%
No	3	3	6
	2.7%	4.1%	3.3%
Don't know	4	2	6
	3.6%	2.7%	3.3%
Total	110	74	184
	100.0%	100.0%	100.0%

5.9 DISTRIBUTION OF STUDIED SUBJECTS REGARDING KNOWLEDGE ABOUT THE MODE OF TRANSMISSION OF HIV/AIDS AND GENDER

Over 51 % of the studied subjects had knowledge regarding all the 4 methods of transmission of HIV/AIDS and males were found to have comparatively more knowledge regarding this matter than females as shown in table 5.9.

Table 5.9 Distribution of studied subjects regarding the knowledge about the mode of transmission of HIV/AIDS and Gender

Knowledge regarding the mode of transmission of HIV	Gender of the subjects		Total
	Male	Female	
Sexual, through Blood, Sharing injection and mother to child	62	33	95
	56.4%	44.6%	51.6%
Sexual, blood, sharing injection	15	6	21
	13.6%	8.1%	11.4%
Sexual and blood	9	10	19
	8.2%	13.5%	10.3%
sexual	5	3	8
	4.5%	4.1%	4.3%
I don't know	8	6	14
	7.3%	8.1%	7.6%
Not specified	1	0	1
	.9%	.0%	.5%
Sexual and injection	9	13	22
	8.2%	17.6%	12.0%
Injection and blood	0	1	1
	.0%	**1.4%**	**.5%**
injection	0	1	1
	.0%	1.4%	.5%
syringe, sex and mother to child	1	1	2
	.9%	1.4%	1.1%
Total	110	74	184
	100.0%	100.0%	100.0%

5.10 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE KNOWLEDGE ABOUT THE DIFFERENCES BETWEEN HIV AND AIDS AND GENDER

Over 64 % of the studied subjects had knowledge regarding the difference between HIV and AIDS and males were found to have comparatively more knowledge regarding this matter than females as shown in table 5.10.

Table 5.10 Distribution of studied subjects regarding the knowledge about the differences between HIV and AIDS and Gender

Knowledge regarding the differences between HIV and AIDS	Gender of the subjects		Total
	Male	Female	
Yes	78	41	119
	70.9%	55.4%	64.7%
No	13	14	27
	11.8%	18.9%	14.7%
Don't know	19	19	38
	17.3%	25.7%	20.7%
Total	110	74	184
	100.0%	100.0%	100.0%

5.11 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE MEANING OF SEXUALLY TRANSMITTED DISEASE (STD)

Over 80 % of the studied subjects had known the meaning of STD and males were found to have comparatively more knowledge regarding this matter than females as shown in table 5.11.

Table 5.11 Distribution of studied subjects regarding the meaning of sexually transmitted disease (STD)

Knowledge regarding the meaning of STD	Gender of the subjects		Total
	Male	Female	
Yes	93	55	148
	84.5%	74.3%	80.4%
No	9	13	22
	8.2%	17.6%	12.0%
Don't know	8	6	14
	7.3%	8.1%	7.6%
Total	110	74	184
	100.0%	100.0%	100.0%

5.12 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE TRANSMISSION OF HIV BY SHAKING HANDS

Over 91 % of the studied subjects had reported that no transmission of HIV occur by shaking hands and male were found to have comparatively more knowledge regarding this matter than females as shown in table 5.12.

Table 5.12 Distribution of studied subjects regarding the transmission of HIV by shaking hands

Can HIV be transmitted through hand shaking ?	Gender of the subjects		Total
	Male	Female	
Yes	0	1	1
	.0%	1.4%	.5%
No	105	64	169
	95.5%	86.5%	91.8%
Don't know	5	9	14
	4.5%	12.2%	7.6%
Total	110	74	184
	100.0%	100.0%	100.0%

5.13 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE TRANSMISSION OF HIV BY SHARING INJECTIONS

Over 87 % of the studied subjects had reported that transmission of HIV occur by sharing injections and male were found to have comparatively more knowledge regarding this matter than females as shown in table 5.13.

Table 5.13 Distribution of studied subjects regarding the transmission of HIV by sharing injections

Can HIV be transmitted sharing injection?	Gender of the subjects		Total
	Male	Female	
Yes	102	59	161
	92.7%	79.7%	87.5%
no	2	1	3
	1.8%	1.4%	1.6%
Don't know	6	14	20
	5.5%	18.9%	10.9%
Total	110	74	184
	100.0%	100.0%	100.0%

5.14 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE KNOWLEDGE OF TRANSMISSION OF STD BY SEXUAL INTERCOURSE

Over 84 % of the studied subjects had reported that transmission of STD occur by sexual intercourse and male were found to have comparatively more knowledge regarding this matter than females as shown in table 5.14.

Table 5.14 Distribution of studied subjects regarding the transmission of STD sexual intercourse

Can STD be transmitted through sexual intercourse?	Gender of the subjects		Total
	Male	Female	
Yes	98	57	155
	89.1%	77.0%	84.2%
No	4	7	11
	3.6%	9.5%	6.0%
Don't know	8	10	18
	7.3%	13.5%	9.8%
Total	110	74	184
	100.0%	100.0%	100.0%

5.15 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE KNOWLEDGE OF TB TREATMENT

Over 84 % of the studied subjects had reported that the TB is treatable/curable and males have slightly higher knowledge regarding this issue than the females as shown in table 5.15.

Table 5.15 Distribution of studied subjects regarding the knowledge of TB treatment

Is TB treatable/ curable?	Gender of the subjects		Total
	Male	Female	
Yes	94	62	156
	85.5%	83.8%	84.8%
dont know	16	12	28
	14.5%	16.2%	15.2%
Total	110	74	184
	100.0%	100.0%	100.0%

5.16 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THE KNOWLEDGE OF HIV CURABILITY

Over 87 % of the studied subjects had reported that the HIV could not be cured and males have found to be higher knowledge regarding this issue than the females as shown in table 5.16.

Table 5.16 Distribution of studied subjects regarding the knowledge of HIV curability

Is HIV/AIDS curable?	Gender of the subjects		Total
	Male	Female	
Yes	1	2	3
	.9%	2.7%	1.6%
No	99	61	160
	90.0%	82.4%	87.0%
dont know	10	11	21
	9.1%	14.9%	11.4%
Total	110	74	184
	100.0%	100.0%	100.0%

DISTRIBUTION OF STUDIED SUBJECTS REGARDING THEIR FAMILIARITY WITH DOTS

Only 29.9% of the studied subjects had reported that they had heard about DOTS and males were found to have greater familiarity than females regarding this issue as shown in table 5.17.

Table 5.17 Distribution of studied subjects regarding their familiarity with DOTS

Have you ever heard about DOTS?	Gender of the subjects		Total
	Male	Female	
Yes	38	17	55
	34.5%	23.0%	29.9%
No	31	29	60
	28.2%	39.2%	32.6%
Don't know	41	28	69
	37.3%	37.8%	37.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.18 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THEIR KNOWLEDGE ABOUT RISKY BEHAVIOUR TO BE INFECTED WITH HIV

Over 86%% of the studied subjects had reported that they had known the risky behaviors to be infected with HIV and males were found to have greater knowledge than females regarding this issue as shown in table 5.18.

Table 5.18 Distribution of studied subjects regarding their knowledge about risky behavior to be infected with HIV

Do you know the risky behavior to be infected with HIV?	Gender of the subjects		Total
	Male	Female	
Yes	98	61	159
	89.1%	82.4%	86.4%
No	2	1	3
	1.8%	1.4%	1.6%
Don't know	10	12	22
	9.1%	16.2%	12.0%
Total	110	74	184
	100.0%	100.0%	100.0%

5.19 DISTRIBUTION OF STUDIED SUBJECTS REGARDING THEIR KNOWLEDGE ABOUT USING CONDOM PROPORLY

Seventy five percent of the studied subjects reported that the they had known how to use the condom properly and males were found to have greater knowledge than females regarding this issue as shown in table 5.19.

Table 5.19 Distribution of studied subjects regarding their knowledge about using condom properly

Do you know how to use condom properly?	Gender of the subjects		Total
	Male	Female	
Yes	94	44	138
Yes	59.5%		75.0%
no	7	15	22
	6.4%	20.3%	12.0%
Don't know	9	15	24
	8.2%	20.3%	13.0%
Total	110	74	184
	100.0%	100.0%	100.0%

5.20 DISTRIBUTION OF STUDIED SUBJECTS BY CURRENT PRACTICE TO REDUCE THE RISK OF HIV TRANSMISSION

Over 76 % of the patients had reported that they were using condom to reduce the risk of HIV transmission and males were found to have greater practice of using condom than females as shown in table 5.20.

Table 5.20 Distribution of studied subjects by current practice to reduce the risk of HIV transmission

Current practice to be safe from Current HIV/AIDS	Gender of the subjects		Total
	Male	Female	
using condom	90	51	141
	81.8%	68.9%	76.6%
Practicing safer sex	0	1	1
	.0%	1.4%	.5%
Nothing	16	18	34
	14.5%	24.3%	18.5%
not specified	4	4	8
	3.6%	5.4%	4.3%
Total	110	74	184
	100.0%	100.0%	100.0%

5.21 DISTRIBUTION OF STUDIED SUBJECTS BY THEIR FAMILIARITY WITH VCT SERVICE

Over 81% of the patients had reported that they were familiar with VCT service and males were found to have greater familiar with this service as shown in table 5.21.

Table 5.21 Distribution of studied subjects by their familiarity with VCT service

Do you know about VCT?	Gender of the subjects		Total
	Male	Female	
Yes	90	59	149
	81.8%	79.7%	81.0%
No	6	3	9
	5.5%	4.1%	4.9%
Don't know	14	12	26
	12.7%	16.2%	14.1%
Total	Count	74	184
		100.0%	100.0%

5.22 DISTRIBUTION OF STUDIED SUBJECTS BY THEIR CURRENT PRACTICE OF USING VCT SERVICE

Over 78% of the patients had reported that they were using the VCT service regularly and females were found to have visiting VCT service more frequently than males as shown in table 5.22.

Table 5.22 Distribution of studied subjects by their current practice of using VCT service

Are you currently using VCT service?	Gender of the subjects		Total
	Male	Female	
yes	86	59	145
	78.2%	79.7%	78.8%
No	22	13	35
	20.0%	17.6%	19.0%
not mentioned	2	2	4
	1.8%	2.7%	2.2%
Total	110	74	184
	100.0%	100.0%	100.0%

5.23 DISTRIBUTION OF STUDIED SUBJECTS BY THE AVAILABILITY OF VCT SERVICE IN THEIR COMMUNITY

Over 70% of the patients had reported that VCT services were available in their community as shown in table 5.23.

Table 5.23 Distribution of studied subjects by their current practice of using VCT service

Is there VCT service in your community?	Gender of the subjects		Total
	Male	Female	
Yes	81	49	130
	73.6%	66.2%	70.7%
No	10	15	25
	9.1%	20.3%	13.6%
Don't know	19	10	29
	17.3%	13.5%	15.8%
Total	110	74	184
	100.0%	100.0%	100.0%

5.24 DISTRIBUTION OF STUDIED SUBJECTS BY THEIR PREVIOUS HISTORY OF TUBERCULOSIS

Over 19% of the patients had reported that they had previous history of TB and more males reported the previous history of TB in comparison to females as shown in table 5.24.

Table 5.24 Distribution of studied subjects by their previous history of TB

Have you ever had TB?	Gender of the subjects		Total
	Male	Female	
Yes	25	11	36
	22.7%	14.9%	19.6%
no	85	63	148
	77.3%	85.1%	80.4%
Total	110	74	184
	100.0%	100.0%	100.0%

5.25 DISTRIBUTION OF STUDIED SUBJECTS BY THEIR FAMILY HISTORY OF TUBERCULOSIS

Over 17% of the patients had reported that they had family history of TB and more females reported the family history of TB in comparison to males as shown in table 5.25

Table 5.25 Distribution of studied subjects by their family history of TB

Did your family member suffer from TB or had treatment for TB?	Gender of the subjects		Total
	Male	Female	
Yes	16	16	32
	14.5%	21.6%	17.4%
no	94	58	152
	85.5%	78.4%	82.6%
Total	110	74	184
	100.0%	100.0%	100.0%

5.26 DISTRIBUTION OF STUDIED SUBJECTS BY THEIR DURATION OF HIV DIAGNOSIS

Over 57 % of the patients had reported that they had acquired the HIV infection recently (with in a year) followed by two years back (9.8%) as shown in table 5.26.

Table 5.26 distribution of studied subjects by their duration of HIV diagnosis

How many years ago diagnosed as HIV positive?	Gender of the subjects		Total
	Male	Female	
Recently	55	51	106
	50.0%	68.9%	57.6%
2 yrs back	8	10	18
	7.3%	13.5%	9.8%
3 yrs back	3	4	7
	2.7%	5.4%	3.8%
4 yrs back	8	3	11
	7.3%	4.1%	6.0%
5 yrs back	11	3	14
	10.0%	4.1%	7.6%
6 yrs back	7	1	8
	6.4%	1.4%	4.3%
7 yrs back	5	0	5
	4.5%	.0%	2.7%
8 yrs back	2	1	3
	1.8%	1.4%	1.6%
9 yrs back	5	1	6
	4.5%	1.4%	3.3%
10 yrs back	3	0	3
	2.7%	.0%	1.6%
12 yrs back	2	0	2
	1.8%	.0%	1.1%
More than 12 yrs	1	0	1
	.9%	.0%	.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.27 DISTRIBUTION OF STUDIED SUBJECTS BY THE MODE OF HIV INFECTION

Over 66% of the patients had reported that they had acquired the HIV infection through sex. This mode of acquiring HIV infection is more common in females. However, significant proportion of males had acquired HIV infection through sharing unsafe injection as shown in table 5.27.

Table 5.27 Distribution of studied subjects by their mode of HIV infection

Mode of HIV infection	Gender of the subjects		Total
	Male	Female	
Sexual	52	70	122
	47.3%	94.6%	66.3%
IDU	54	4	58
	49.1%	5.4%	31.5%
Blood transfusion	2	0	2
	1.8%	.0%	1.1%
From mother	2	0	2
	1.8%	.0%	1.1%
Total	110	74	184
	100.0%	100.0%	100.0%

5.28 DISTRIBUTION OF STUDIED SUBJECTS BY THE MODE OF DRUG ABUSE

Over 62% of the drug abused cases reported that they had taken the drug through IV route. While 31.1% used both the IV and oral routes as shown in table 5.28

Table 5.28 Distribution of studied subjects by their mode of drug abuse

Mode of drug use	Gender of the subjects		Total
	Male	Female	
IV	35	3	38
	60.3%	100.0%	62.3%
Oral	4	0	4
	6.9%	.0%	6.6%
Both	19	0	19
	32.8%	.0%	31.1%
Total	58	3	61
	100.0%	100.0%	100.0%

5.29DISTRIBUTION OF STUDIED SUBJECTS BY THEIR ARV STATUS
Over 29% of the studied subjects had taken ART and more percentage of the males had taken this therapy in comparison to females as shown in table 5.29

Table 5.29 distribution of studied subjects by their ARV status

Are you currently taking ARV?	Gender of the subjects		Total
	Male	Female	
Yes	36	18	54
	32.7%	24.3%	29.3%
No	74	56	130
	67.3%	75.7%	70.7%
Total	110	74	184
	100.0%	100.0%	100.0%

5.30 DISTRIBUTION OF THE STUDIED SUBJECTS REGARDING THEIR VIEW ON PRIMARY SOURCE OF TB/HIV KNOWLEDGE

As high as 81% of the studied subjects reported that radio/TV/FM were the primary source of TB/HIV knowledge as shown in table 5.30

Table 5.30 Distribution of the studied subjects regarding their view on primary source of TB/HIV knowledge

What is the primary source of TB/HIV knowledge?	Gender of the subjects		Total
	Male	Female	
Radio/TV/FM	87	62	149
	79.1%	83.8%	81.0%
newspaper/ magazine	3	1	4
	2.7%	1.4%	2.2%
CHW/health worker	6	2	8
	5.5%	2.7%	4.3%
Friends/relatives	12	4	16
	10.9%	5.4%	8.7%%
Governmental initiation	0	1	1
	.0%	1.4%	.5%
Victim themselves	1	0	1
	.9%	.0%	.5%
counseling	1	0	1
	.9%	.0%	.5%
I don't know	0	3	3
	.0%	4.1%	1.6%
INGO/NGO	0	1	1
	.0%	1.4%	.5%
Total	110	74	184
	100.0%	100.0%	100.0%

5.31 DISTRIBUTION OF THE STUDIED SUBJECTS BY CD 4 GROUPING AND SEX

Among 184 patients, only 92 had done the CD4 count. Over 83% of them had the CD4 count less than 500 as sown in table 5.31.

Table 5.31 distribution of the studied subjects by CD 4 grouping and sex

CD 4 group	Gender of the subjects		Total
	Male	Female	
1-199	26	12	38
	44.8%	35.3%	41.3%
200-499	24	15	39
	41.4%	44.1%	42.4%
500-1300	8	7	15
	13.8%	20.6%	16.3%
Total	58	34	92
	100.0%	100.0%	100.0%

5.32 DISTRIBUTION OF THE STUDIED SUBJECTS BY TB STATUS AND GENDER

Overall prevalence of TB was found to be 6%. Prevalence of tuberculosis is higher in males in comparison to females as shown in table 5.32

Table 5.32 distribution of the studied subjects by TB status and gender

TB status of patients	Gender of the subjects		Total
	Male	Female	
Yes	9	2	11
	8.2%	2.7%	6.0%
No	101	72	173
	91.8%	97.3%	94.0%
Total	110	74	184
	100.0%	100.0%	100.0%

5.33 DISTRIBUTION OF THE STUDIED SUBJECTS BY TB STATUS AND AGE

All the TB/HIV co-infected patients were in the productive age group i.e., 21-40 years as shown in table 5.33

Table 5.33 distribution of the studied subjects by TB status and age

		TB status of subjects		Total
		yes	no	
Age group of patients	1-10	0	1	1
		.0%	.6%	.5%
	11-20	0	5	5
		.0%	2.9%	2.7%
	21-30	6	74	80
		54.5%	42.8%	43.5%
	31-40	5	66	71
		45.5%	38.2%	38.6%
	41-50	0	25	25
		.0%	14.5%	13.6%
	51-60	0	2	2
		.0%	1.2%	1.1%
Total		11	173	184
		100.0%	100.0%	100.0%

5.34 DISTRIBUTION OF THE STUDIED SUBJECTS BY TB STATUS AND EDUCATIONAL LEVEL

The prevalence of TB was found to be highest in those patients with primary level of education (8.5%) followed by illiterate (5.9%) as shown in table 5.34.

Table 5.34 Distribution of the studied subjects by TB status and educational level

Education Status of the subjects	TB status of subjects		Total
	yes	no	
Illiterate	3	48	51
	5.9%	94.1%	100.0%
Primary education	6	65	71
	8.5%	91.5%	100.0%
Secondary education	2	54	56
	3.6%	96.4%	100.0%
Higher secondary education	0	6	6
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.35 DISTRIBUTION OF THE STUDIED SUBJECTS BY TB STATUS AND THE NUMBER OF FAMILY MEMBER LIVING PER ROOM

Table 5.35 shows that chance of getting TB increase with the increase in number of family members residing per room.

Table 5.35 Distribution by TB status and the number of family member living per room

Number of family members (per room)	TB status of subjects		Total
	yes	no	
1.00	0	1	1
	.0%	100.0%	100.0%
2.00	0	9	9
	.0%	100.0%	100.0%
3.00	3	27	30
	10.0%	90.0%	100.0%
4.00	2	47	49
	4.1%	95.9%	100.0%
5.00	4	40	44
	9.1%	90.9%	100.0%
6.00	0	14	14
	.0%	100.0%	100.0%
7.00	0	7	7
	.0%	100.0%	100.0%
8.00	1	8	9
	11.1%	88.9%	100.0%
9.00	0	5	5
	.0%	100.0%	100.0%
10.00	0	6	6
	.0%	100.0%	100.0%
15.00	0	1	1
	.0%	100.0%	100.0%
17.00	0	1	1
	.0%	100.0%	100.0%
not mentioned	1	7	8
	12.5%	87.5%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.36 DISTRIBUTION OF THE STUDIED SUBJECTS BY TB STATUS AND OCCUPATION

Table 5.36 shows that labours have high chance of getting TB disease.

Table 5.36 Distribution of the studied subjects by TB status and occupation

Occupational status of the subjects	TB status of patients		Total
	yes	no	
Unemployed	2	70	72
	2.8%	97.2%	100.0%
Volunteer/Social worker	0	16	16
	.0%	100.0%	100.0%
Labour	3	2	5
	60.0%	40.0%	100.0%
Business	2	21	23
	8.7%	91.3%	100.0%
Student	0	3	3
	.0%	100.0%	100.0%
Housewife	0	11	11
	.0%	100.0%	100.0%
Farmer	1	34	35
	2.9%	97.1%	100.0%
Driver	0	6	6
	.0%	100.0%	100.0%
service	2	6	8
	25.0%	75.0%	100.0%
NGO/INGO	1	2	3
	33.3%	66.7%	100.0%
Army	0	1	1
	.0%	100.0%	100.0%
plumber	0	1	1
	.0%	100.0%	100.0%
Total	11(6%)	173(94%)	184(100)

5.37 DISTRIBUTION OF TB IN STUDIED SUBJECTS BY SMOKING HABIT

Among 86 smokers 9.3% had TB, but among 98 non smokers only 3.1% had TB as shown in table 5.37.

Table 5.37 Distribution of TB in studied subjects by smoking habit

Smoking habit	TB status of subjects		Total
	yes	no	
Yes	8	78	86
	9.3%	90.7%	100.0%
No	3	95	98
	3.1%	96.9%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.38 DISTRIBUTION OF TB IN STUDIED SUBJECTS BY ALCOHOLIC HABIT

Among 58 alcoholics, 12.1% had TB, but among 126 non alcoholics only 3.2% had TB as shown in table 5.38.

Table 5.38 Distribution of TB in studied subjects by alcoholic habit

Alcoholic habit of the subjects	TB status of subjects		Total
	Yes	No	
Yes	7	51	58
	12.1%	87.9%	100.0%
No	4	122	126
	3.2%	96.8%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.39 DISTRIBUTION OF TB IN STUDIED SUBJECTS BY HABIT OF DRUG ADDICTION

Among 62 drug addicts, 4.8% had TB and among 122 non drug users6.6 % had TB as shown in table 5.39.

Table 5.39 Distribution of TB in studied subjects by habit of drug addiction

Drug addiction	TB status of subjects		Total
	yes	no	
yes	3	59	62
	4.8%	95.2%	100.0%
No	8	114	122
	6.6%	93.4%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.40 CORRELATION OF TB STATUS AND CHEST PAIN IN STUDIED SUBJECTS

Among 72 subjects with complaints of chest pain, 6.9% had TB, and among 111 patients with out complaints of chest pain, 4.5 % had TB as shown in table 5.40

Table 5.40 correlation of TB status and chest pain in studied subjects

Chest pain	TB status of subjects		Total
	yes	no	
yes	5	67	72
	6.9%	93.1%	100.0%
no	5	106	111
	4.5%	95.5%	100.0%
11.00	1	0	1
	100.0%	.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.41 CORRELATION OF TB STATUS AND NIGHT SWEATS IN STUDIED SUBJECTS

Among 48 subjects with complaints of night sweats, 10.4% had TB, and among 136 subjects without complaints of night sweat, 4.4% had TB as shown in table 5.41

Table 5.41 correlation of TB status and night sweats in studied subjects

Night sweats	TB status of subjects		Total
	yes	no	
Yes	5	43	48
	10.4%	89.6%	100.0%
No	6	130	136
	4.4%	95.6%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.42 CORRELATION OF TB STATUS AND WEIGHT LOSS IN STUDIED SUBJECTS

Among 79 subjects with complaints of weight loss, 7.6% had TB, and among 105 subjects without complaints of weight loss, 4.8% had TB as shown in table 5.42

Table 5.42 correlation of TB status and weight loss in studied subjects

Weight loss	TB status of subjects		Total
	yes	no	
Yes	6	73	79
	7.6%	92.4%	100.0%
No	5	100	105
	4.8%	95.2%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.43 CORRELATION OF TB STATUS AND LOSS OF APPETITE IN STUDIED SUBJECTS

Among 64 subjects with complaints of loss of appetite 7.8% had TB, and among 120 subjects with out complaints of night sweat, 5% had TB as shown in table 5.43

Table 5.43 correlation of TB status and loss of appetite in studied subjects

Loss of appetite	TB status of subjects		Total
	yes	no	
Yes	5	59	64
	7.8%	92.2%	100.0%
No	6	114	120
	5.0%	95.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.44 CORRELATION OF TB STATUS AND FEVER IN STUDIED SUBJECTS

Among 64 subjects with complaints of fever, 9.4% had TB, and among 120 subjects without complaints of fever, 4.2% had TB as shown in table 5.44

Table 5.44 correlation of TB status and fever in studied subjects

Fever	TB status of subjects		Total
	yes	no	
Yes	6	58	64
	9.4%	90.6%	100.0%
No	5	115	120
	4.2%	95.8%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.45 CORRELATION OF TB STATUS AND DIARRHOEA IN STUDIED SUBJECTS

Among 40 subjects with complaints of diarrhoea, 7.5% had TB, and among 144 subjects with out complaints of diarrhoea, 5.6% had TB as shown in table 5.45

Table 5.45 correlation of TB status and diarrhoea in studied subjects

Diarrhoea	TB status of subjects		Total
	yes	no	
yes	3	37	40
	7.5%	92.5%	100.0%
no	8	136	144
	5.6%	94.4%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.46 CORRELATION OF TB STATUS AND TYPE OF HOUSING IN STUDIED SUBJECTS

Among 60 subjects living in pukka house 9.1% had TB, and among 113 subjects living in katcha house 4.2% had TB as shown in table 5.46

Table 5.46 Correlation of TB status and type of housing

Type of housing	TB status of subjects		Total
	yes	no	
Pukka	6	60	66
	9.1%	90.9%	100.0%
Katcha	5	113	118
	4.2%	95.8%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.47 CORRELATION OF TB STATUS AND VENTILATION

Among 169 subjects living in ventilated room, 5.9% had TB and among 13 subjects living in a non ventilated room 7.7% had TB as shown in table 5.47.

Table 5.47 correlation of TB status and ventilation

Ventilation	TB status of subjects		Total
	yes	no	
yes	10	159	169
	5.9%	94.1%	100.0%
no	1	12	13
	7.7%	92.3%	100.0%
not mentioned	0	2	2
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.48 CORRELATION OF TB STATUS AND COOKING FUELS

Table 5.48 shows that those using LPG and firewood as cooking fuels have high chance of TB development.

Table 5.48 correlation of TB status and cooking fuels

Cooking fuels	TB status of subjects		Total
	yes	no	
LPG	6	65	71
	8.5%	91.5%	100.0%
biogas	0	3	3
	.0%	100.0%	100.0%
Firewood	5	88	93
	5.4%	94.6%	100.0%
Kerosene	0	13	13
	.0%	100.0%	100.0%
heater	0	1	1
	.0%	100.0%	100.0%
not specified	0	3	3
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.49 CORRELATION OF TB STATUS AND KITCHEN TYPE

Table 5.49 shows that those having attached kitchen have high chance of TB development in comparison to those having separated kitchen.

Table 5.49 correlation of TB status and Kitchen type

Kitchen type	TB status of subjects		Total
	yes	no	
Separated	7	113	120
	5.8%	94.2%	100.0%
Attached	4	58	62
	6.5%	93.5%	100.0%
not mentioned	0	2	2
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.50 CORRELATION OF TB STATUS AND SMOKE VENTILATION

Table 5.50 shows that those lacking smoke ventilation has high chance of TB development.

Table 5.50 Correlation of TB status and Smoke ventilation

Smoke Ventilation	TB status of subjects		Total
	yes	no	
yes	8	154	162
	4.9%	95.1%	100.0%
no	3	18	21
	14.3%	85.7%	100.0%
not mentioned	0	1	1
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.51 CORRELATION OF TB STATUS AND AVERAGE FOOD ITEM CONSUMED

Table 5.51 shows that those taking only rice and curry without dal, meat, fruits etc have high chance of TB development.

Table 5.51 correlation of TB status average food item consumed.

Average food items consumed	TB status of subjects		Total
	yes	no	
Dal, Rice . Curry daily with meat twise in a week	6	145	151
	4.0%	96.0%	100.0%
Dal, Rice curry daily with meat thrice a week	0	1	1
	.0%	100.0%	100.0%
Only Dal, rice and curry	2	8	10
	20.0%	80.0%	100.0%
Dal rice and curry with fruits regularly	2	18	20
	10.0%	90.0%	100.0%
rice and curry only	1	0	1
	100.0%	.0%	100.0%
rice curry and fruits sometime	0	1	1
	.0%	100.0%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.52 CORRELATION OF TB WITH CD4 GROUPING.

Table 5.52 shows that there is high chance of TB development as soon as the CD4 count falls below 500.

Table 5.52 Correlation of TB with CD4 grouping

CD4 group	TB status of subjects		Total
	yes	no	
1-199	3	35	38
	7.9%	92.1%	100.0%
200-499	4	35	39
	10.3%	89.7%	100.0%
500-1300	0	15	15
	.0%	100.0%	100.0%
Total	7	85	92
	7.6%	92.4%	100.0%

5.53 CORRELATION OF TB WITH ARV THERAPY

Table 5.53 shows that there is high chance of TB development in non ART subjects in comparison to ART taking subjects.

Table 5.53 Correlation of TB with ARV therapy

Are you currently taking ARV therapy?	TB status of subjects		Total
	yes	no	
Yes	3	51	54
	5.6%	94.4%	100.0%
no	8	122	130
	6.2%	93.8%	100.0%
Total	11	173	184
	6.0%	94.0%	100.0%

5.54 CORRELATION OF AFB CULTURE AND AFB STAINING

Table 5.54 shows that AFB culture is more effective in case detection of TB in HIV positive patients (by which all 11 cases were detected by culture in comparison to only 3 by AFB staining).

Table 5.54 correlation of AFB culture and AFB staining

	Culture		
Microscopy result	yes	no	Total
AFB not found	8	173	181
AFB found	3	0	3
Total	11	173	184

CHAPTER - VI

6. DISCUSSION

Although HIV is the initial causative agents in AIDS, the high rate of mortality and morbidity in immunocompromised patients results from TB. In this study majority of the HIV as well as HIV/OI co-infected patients were in the productive age group, i.e., 21-40 years suggesting that youths are more vulnerable to HIV infections. The socio- economic profile of the patients suggests that illiteracy and lack of skills (unemployment) are other risk factors associated with HIV infection. Unsafe sexual practice was found to be the major cause of HIV transmission accounting over 66.3%% (in both males and females) followed by unsafe drug abuse through IV route accounting over 31.5 % (mainly in males). All these findings are consistent with those of other socio-demographic studies conducted in different parts of the nation (Dhungana *et al* .,2007, Ghimire *et al*.,2004). Data of National centre for AIDS and STD control (NCASC, as of 13th May 2008) shows that >77% HIV positive people are in the age group 20-40 and as high as 80 % of these patients acquired HIV infection through sexual means.

This study documents the 6% prevalence of pulmonary tuberculosis among HIV infected persons of Pokhara. Few previous TB/HIV studies conducted in different settings in Nepal documented 10-23% prevalence of TB (Dhungana et al.2007, Ghimire *et al.*2004). These variations in prevalence rate of TB among the HIV patients are presumed to result from different geographic, climatic and socioeconomic condition. Moreover, prevalence was found to be significantly higher in late stage of AIDS and another important factor for this high prevalence of tuberculosis with HIV in these studies could be attributed to the fact that theses were all hospital based studies and symptomatic patients visiting the hospital were taken as the subjects.

This study documents higher percentage of TB (8.2%) in males than females (2.7%). This may be due to the fact that the males have higher exposure to the outside environment during life activities. Dhungana *et al* also documented that TB-HIV co-infection was higher in males than females.

Studies done in sub-Saharan African countries have revealed a higher prevalence of pulmonary tuberculosis confirmed by smear microscopy/cultures among the HIV infected persons (Bruchfeld et al, 2002) where as studies done in Cambodia showed a prevalence of 9% (Kimerling et al, 2002) and 5.8% (Chheng et al, 2008).

Another important finding of the study is the evaluation of different risk factors contributing to the TB development. This study clearly shows that smoking habit, alcohol addiction, lack of smoke ventilation, attached kitchen, malnutrition are the risk factors of TB development. Similarly, this study explores behaviour characteristic and knowledge regarding TB and HIV in HIV positive persons. On the basis of the study it can be said that studied subjects had lesser knowledge of TB in comparison to HIV/AIDS and in general, males had more knowledge in comparison to females.

This study has also clearly correlated the clinical aspects with TB development. In general it was observed that various clinical manifestations such as cough, chest pain, weight loss, loss of appetite etc are more common in TB co-infected HIV patients than non co-infected counterparts. Similarly, higher percentage of TB cases were seen in non-ART patients with low CD4 count (<500).

Microbiologically, the most important findings of this study is the exploration of the fact that TB case detection by culture technique was found to be the most effective (which detected all 11 cases of TB) than direct observation of AFB stained smear (which detected only 3 cases of TB).

CHAPTER - VII

7. RECOMMENDATIONS

On the basis of this study it can be recommended that:

1. Even in the community 6% TB prevalence was documented in HIV infected people. So, Specific guidelines regarding their investigation and treatment should be formulated and put into effort as a part of HIV care and support service.

2. Cough, chest pain, fever, weight loss along with diarrhea were identified as the main clinical features in HIV/AIDS patients which can be used for TB/HIV/AIDS surveillance purpose

3. TB culture was found to be the most efficient way for detecting significantly higher number of TB cases among the HIV positive persons. So adoption of TB culture for diagnosing pulmonary tuberculosis by the NTP for the HIV infected persons is recommended.

4. Socioeconomic profile of the subjects suggested that productive age groups with low socioeconomic status were more vulnerable to HIV/AIDS. So, special program targeted on this marginalized communities should be launched to create public awareness through behaviour change, information education and communication.

5. HIV positive persons showing sign and symptoms of TB should immediately be subjected to the diagnosis of TB and vice versa.

6. More extensive study is recommended to get the more representative data of the TB/ HIV co-infection to develop national policy regarding this burning issue.

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