Original article

DOI https://doi.org/10.70280/njph(2026)v3i1.86

HIV Status among Tuberculosis Patients Registered in a Tertiary Care Hospital of Army, Kathmandu, Nepal

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ABSTRACT

Background: Tuberculosis (TB) is a huge public health issue in Nepal. TB can coexist with Human immunodeficiency virus (HIV) infection. TB-HIV co-infection identification and prompt treatment is necessary in army personnels because of the propensity to spread early as many live together in dormitories and share similar lifestyles.

Methods: A cross-sectional observational study was conducted in DOTS center of Shree Birendra Hospital (SBH) in 46 patients from January-April, 2023 using non-random purposive sampling. Data was collected with proforma containing preformed questionnaires through interview and observation of treatment reports. Data was entered and analysed in Microsoft Excel. Ethics clearance was taken from the institution (Registration No 471, December 2022).

Results: The prevalence of HIV among TB patients was 2.2%. The mean age was 44.0 ±17.98 years and majorities of the participants were married males. Majorities consumed alcohol (35) and smoked tobacco products (29) and 18 patients had close contact with TB cases.

Conclusion: This study showed higher prevalence of HIV among tuberculosis patients than the normal population. Efforts to identify HIV among TB patients and vice versa is key to reducing this lethal combination so screening for HIV in all TB patients of Nepali Army is advised at a policy level.

Keywords: HIV, Nepal, Prevalence, Risk Factors, TB

Received on: 14 July 2026
Accepted on: 18 August 2026

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BACKGROUND

Tuberculosis (TB) is a communicable disease that is a major public health problem and one of the top ten causes of death worldwide as well as in Nepal. Globally, an estimated 10.7 million people fell ill with TB in 2024 and Nepal accounted for 0.5 - 0.6% of global TB cases (1). The HIV epidemic in Nepal is an example of concentrated epidemic with National prevalence of 0.11%. The percentage of notified TB patients who had a documented HIV test result in 2081/82 was 93.9% while the incidence of HIV infection among TB patients in Nepal is 1.4 per 100,000 (1, 2). HIV impairs the cellular immune system causing increased susceptibility to tumors, opportunistic infections and later acquired immunodeficiency syndrome (AIDS) ultimately succumbing the patient to death (3,4). TB and HIV co-epidemic is thus a major public health problem of many developing countries (5). HIV infections mostly affect young, economically active males.(1) It is more common in professionals practicing high risk sexual behavior. A survey in Nepal, conducted among both TB as well as HIV infected, showed results that among TB cases, 1.1 % were HIV positive and among People Living with HIV(PLHIV), 8.5 % had Tuberculosis infection (6). The risk of TB disease is thirty times more in PLHIV. Among various occupational groups, studies have shown that army personnel are also at high risk for getting HIV-

TB co-infection due to the nature of their work in confined environments. Nepali Army personnel are deployed to areas where HIV is highly endemic and they are potential to be exposed and transmit it to local communities. One study conducted in India in serving personnel of the military, admitted with tuberculosis found that sixty (1.06%) of tuberculosis patients were found to be HIV positive (7). Likewise, in another study conducted in Zambia in 2017 among the adult population the HIV infection was found to be 23.8% among TB cases (8). Young age, male sex, malnutrition, use of immunosuppressive agents, diabetes, use of alcohol, tobacco smoke, diabetes mellitus and HIV are the known risk factors for tuberculosis and increase the chance of active tuberculosis in people with tuberculosis infection (9,10). Socioeconomic factors like low socioeconomic status and behavioral factors like smoking, use of alcohol, IV drug use also increases the susceptibility to infection from tuberculosis (10).

The aim of this research is to find the prevalence of HIV in tuberculosis cases and explore the various socio-demographic factors, and risk factors associated with tuberculosis in patients attending a military hospital of Nepal.

METHODOLOGY

A cross-sectional study was conducted among tuberculosis positive Nepali Army personnel or their dependents in the Department of Respiratory Medicine of Shree Birendra Hospital (SBH), Chhauni, Kathmandu. The sample size calculation was done as per the formula,

$$\text{Sample size } (n) = Z^2pq/d^2$$

Where,

Z=confidence level at 95% (standard value=1.96)

p=estimated prevalence of HIV among Serving personnel of Armed forces with tuberculosis=1.06% (7)

q=1-p

d=margin of error (5%)

$$\text{Sample size } (n) = Z^2pq/d^2$$
$$= ((1.96)^2 * 0.024 * 0.976)/ (0.0025)^2$$
$$= 40$$

Considering a 15% non-response, loss to follow up and other losses, the final sample size was calculated to be 46. This 15% rate was decided because a lot of TB patients might choose a DOTS center near their residence. Non-random purposive sampling technique was used. Data was collected from 27th January, 2023 to 28th April, 2023 using interview technique using a semi-structured questionnaire from DOTS center, inpatient department, and chest OPD till the required sample size was completed. Sociodemographic variables like age, sex, marital status, educational level was taken. Behavioral and other risk factors like smoking, smokeless tobacco, alcohol intake, history of close contact with TB patient, migration, previous TB, substance abuse, silicosis, Diabetes mellitus, renal disease, Rheumatoid arthritis, Crohn's disease, low body weight, organ transplant, head and neck cancer, corticosteroid use, and type of tuberculosis were studied.

Patients were included if they consented to the study, were above 18 years, were diagnosed as being tuberculosis positive (of any type) and would continue treatment in SBH. Exclusion was done if they had language barrier (unable to speak either Nepali or English), had active psychiatric disorders, had impairment in cognition, or severely ill and unable to participate.

For participants who were already diagnosed with HIV, their HIV status was recorded. For newly registered tuberculosis cases, HIV tests were done after enrollment in study, after taking consent and counselling to check the status of HIV.

The enzyme-linked immunosorbent assay (ELISA), a screening tool for HIV, was conducted which detects HIV antibodies and antigens in the blood. A blood specimen was collected for testing typically by the use of indirect ELISA-based tests. In this technique, the microtiter wells are coated with an antigen. It is then reacted with antibody first (specimen) and then secondary antibody (anti-human globulins) is added, which is already tagged with enzyme and leads to the color product after addition of specific substrate. After a few minutes a stop solution is added and it is then measured by the ELISA reader. The intensity of the color is directly proportional to the concentration of antibodies present in the specimen (11,12,13).

All collected data was entered in the Microsoft Excel 2007 and analyzed. Prior to commencing the research, the proposal was cleared by the Institutional Review Committee (IRC) of Nepalese Army Institute of Health Sciences (Registration No 471, December 2022). Written informed consent was taken from the study participants. The participation was voluntary and confidentiality of the participants was maintained.

RESULTS

A total of 47 participants were enrolled in the study. One participant gave a history of HIV status being positive one and half years before the diagnosis of tuberculosis, which was disclosed after enrollment on counselling for HIV test and opted out of the study. Out of the remaining 46 participants, one tested positive on ELISA. Thus, the prevalence of HIV reactivity among study participants was 2.2%.

The mean age of participants was 44.0 ±17.98 with a range of 18-89 years. There were 37(80.4%) males in the study and 39(84.8%) were married and the majority of participants had a secondary level of education (50.0%). Regarding tuberculosis, 43(93.5%) were new cases and 29(63.1%) had Extra pulmonary Tuberculosis (Table 1).

Table 1. Socio-demographic characteristics and type of Tuberculosis (n=46)

Particulars	Frequency	Percent
Sex		
Male	37	80.4
Female	9	19.6
Marital Status		
Married	39	84.8
Unmarried	7	15.2
Education		
Illiterate	8	17.4
Literate	2	4.3
Primary	6	13.0
Secondary	23	50.0
Higher Secondary	4	8.7
Occupation		
Army	33	71.7
Family members	13	28.3
Tuberculosis Type		
Pulmonary	17	36.9
Extrapulmonary	29	63.1
Extrapulmonary TB type		
Pleural	21	45.6
Cervical Lymphadenopathy	2	4.3
Renal	2	4.3
Skeletal (Pott's Disease)	1	2.2
Abdominal	1	2.2
Disseminated	2	4.3
Registration		
New	43	93.5
Relapse	3	6.5

Analysis of risk factors for tuberculosis showed that 28 (60.9%) of TB patients in SBH smoked some form of tobacco, 9 (19.6%) consumed smokeless tobacco "Khaini", and 34 (73.9%) consumed alcohol. Eighteen (39.1%) had close contact with tuberculosis cases as shown in Table 2. Other risk factors like substance abuse, silicosis, renal disease, Rheumatoid arthritis, Crohn's disease, low body weight, organ transplant, head and neck cancer was not found in any of the participants.

Table 2. Risk factors of Tuberculosis (n=46)

Particulars	Frequency	Percentage
Smoking	28	60.9
Smokeless tobacco	9	19.6
Alcohol Intake	34	73.9
Close Contact	18	39.1
Migration	2	4.3
Previous TB	3	6.5
Corticosteroid Use	1	2.2
HIV Test (reactive)	1	2.2

Abnormalities in Chest X-RAY suggestive of TB was present in 40 patients and the remaining had no detectable abnormalities in chest Xray. All patients undergoing biopsy (3) and FNAC (25) for features suggestive of tuberculosis had positive results whereas only one of the seven BAL samples was positive for TB. Mantoux test was positive in 24 of 32 patients who underwent the procedure whereas Gene expert was positive in 14 of 35 patients who underwent the test as shown in (Table 3).

Table 3. Diagnostic modalities in Tuberculosis (n=46)

Test	Positive	Negative	Not Done
Gene Expert	14	21	12
Mantoux test	24	8	14
Biopsy	3	0	43
Fine Needle Aspiration Cytology (FNAC)	25	0	21
Broncho-Alveolar Lavage	1	6	39

DISCUSSION

The relationship between HIV and tuberculosis (TB) remains a significant concern due to their synergistic impact on public health. HIV weakens the immune system, making individuals more susceptible to TB infection and progression to active disease (14). After the HIV epidemic began, almost 38 million people became infected with HIV and more than 36 million have succumbed to death due to HIV (15).

Our study helped to find the HIV status of Tuberculosis patients and their associated risk factors in the military and associated population in Nepal. Our study showed the prevalence of HIV infection in TB patients as 2.2% which was higher than the national level of 0.7% (2). These findings are in line with a systematic review and metaanalysis which shows higher prevalence in the military specially in lower income countries and with

longer serving years, which matches our population (16). A similar study conducted in Zambia among adults with pulmonary TB showed that out of 151 TB survey cases 36 were HIV-seropositive (23.84%, 95% CI 17.2-31.4) (17). Likewise, a study conducted in eastern India reported HIV prevalence in TB patients as 12.3% (18). Another record based study conducted in Ethiopia reports the prevalence as 11.4% (19). In 2005, the prevalence in the United States of America was 9% (20). Our value is much lower than these studies and the difference could be because of the difference in study participants. Pre deployment screening conducted in the military population prior to enrollment and the fact that we have a concentrated epidemic in Nepal whereas these studies are conducted in countries which have higher HIV burden could also be a reason for it. Additionally, the repeated comprehensive health education and prevention programs, including information about HIV transmission, safe sex practices, and the use of protective measures to troops in various spheres of life like during various training and courses especially in United Nations related training could also contribute to the lower prevalence in our population. These programs aim to promote awareness and reduce risky behaviors that can lead to HIV. Moreover, military personnel usually have access to regular healthcare services. They may receive routine screenings, access to condoms, and education on risk reduction strategies. Prompt access to healthcare can contribute to early detection and treatment of HIV, reducing its spread within the military population.

In our study, the mean age of participants was 44.0 (Age range 18-89) which is different from global data which reports the age group, 25-34, to have the highest prevalence (1). Another study conducted in Zambia showed the mean age of participants as 37.6 years with an age ranging from 24-70 years which was lower than our study (17). Our values are also different from the national values which report higher TB in ages more than 65 years (2). The lower value in our study than national values could be due to the fact that most of the age above 65 years are retired from the army hence our study might not have captured that age group.

The majority of the participants in our study were males 37 (80.4%) which might be due to the type of occupation (military occupation) and Tuberculosis being more common in male in Nepal (2). At global level, 54% people who have TB are men, 35% are women and 11% are children (1).

Regarding the tuberculosis type, in our study pulmonary TB was more common than extra pulmonary TB (36.9% vs 63.1%) which is different from national data (Pulmonary 72.4%) and global data which reports higher prevalence of pulmonary TB (1,2). The difference could be because data in this study was taken from a tertiary level hospital of the military which gets more complex, referred cases of military population throughout the country. Additionally, a lot of the extrapulmonary cases in this study were pleural, which could have been diagnosed at an early stage at the tertiary level hospital during regular screening like annual health examination and UN mission. These cases might be diagnosed late in other centres when it would eventually present as pulmonary TB.

In our study, all TB patients were screened for HIV reactivity. At national level, 93.9% of TB cases had known HIV status so our screening was higher than national level. The World Health Organization (WHO) recommends HIV screening for all presumptive and diagnosed cases of TB patients (2, 21). Our article recommends that Nepali Army should have a policy that after the diagnosis of TB, all tuberculosis patients should be screened for HIV, unless the patient declines (i.e., opt-out screening) as TB- HIV is a lethal combination.

There could be recall bias for various risk factors. There are some limitations of the study, the dose response relationship of various risk factors like smoking, alcohol has not been studied in this research. Factor-like socioeconomic status, occupational status, and nutritional status was not studied. The study can only be generalized to similar military based populations in south asian countries. This study is a pilot study with a limited number of samples and similar larger studies can be planned in future.

CONCLUSION

This study showed higher prevalence of HIV among tuberculosis patients than the normal population. Efforts to identify HIV among TB patients and vice versa is key to reducing this lethal combination so screening for HIV in all TB patients of Nepali Army is advised at a policy level.

Acknowledgement:

Sincere gratitude Dr Ussab Rana Mohsin, the Head of Department (2022/2023), Department of Respiratory, for granting permission to conduct this research in the department and to all participants for giving their valuable time.

Funding

This study was conducted as a part of NAIHS grant 2022. However, those providing the grant providers had no role in study design, collection and analysis of data, writing of manuscript or submission to the journal.

Conflict of Interest

The authors declare no conflict of interest.

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