

Intensified Case Finding of Active Pulmonary Tuberculosis (TB) Among HIV Positive Persons in Kathmandu

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Abstract

Introduction Despite the fact that global TB epidemic is on threshold of decline, its burden is particularly higher in high HIV prevalence region such as South East Asian Region and sub Saharan Africa, where it causes 40 percent AIDS death. Control of HIV related TB means going beyond the DOTS strategy. This includes close coordination between HIV and TB control programmes. Intensified case finding of TB among HIV positive individuals is one of the basic component of TB/HIV collaborative programmes.

Objectives This study was designed to detect active pulmonary TB (PTB) cases in HIV positive individuals by intensified case finding approach and to compare the case detection rate by direct microscopy of acid fast stained smear and cultural technique along with appropriate case management.

Methods Altogether 100 HIV infected persons were included in this cross-sectional study, conducted during January 2004 to August 2005. After taking informed consent, questionnaires were filled and three sputum specimen from each person were collected to investigate tuberculosis by conventional methods viz. AFB staining and culture in the Mycobacteriology laboratory of Tribhuvan University, Teaching hospital (TUTH). Data thus generated were entered into SPSS (11.5 version) and analyzed.

Results As high as 23 active pulmonary TB cases were detected in 100 HIV positive individuals. Sputum culture by modified Petroff's method was found to be more than four times efficient in comparison to direct microscopy of acid fast stained smear. Majority (91.3%) of the TB/HIV co-infected individuals were in the productive age group (21-40 years). Among the 23 co-infected persons, majority of them were males (male:female = 17:6). Significant relationship was established between smoking and/ or alcoholic habit and the subsequent development of active pulmonary TB (χ^2 for smoking = 7.24, $P < 0.05$; χ^2 for alcoholic = 4.39, $P < 0.05$). Higher number of TB cases were detected in 1st and 5th year of HIV infection.

Conclusion Higher number of TB cases were detected by cultural technique as compared to direct microscopy. Young adults of productive age group were predominantly co-infected in the 1st and the 5th year of HIV diagnosis. Smoking and alcoholic habit were found to be the risk factors of active TB development.

Key words Tuberculosis, HIV/AIDS and Case finding.

Introduction

Tuberculosis and HIV/AIDS are serious public health problem in most part of the world including Nepal. The causative agents of these diseases i.e. *Mycobacterium tuberculosis* and the HIV virus are a deadly partner each speeding of the progression of other. When someone is infected with HIV, there

will be continuous deterioration of body's cellular immune system, leading to increased susceptibility to develop TB in both persons with primary TB as well as with latent TB infection. It has been found that up to 60 percent HIV positive patients who are tuberculin skin test positive develop active TB during

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their life time compared to about 10 percent of tuberculin positive HIV negative individual¹. As TB kills more people than any other curable type of infectious disease, its control is one of the priority action area of all national and international health related organization.

With the several decades of experience on TB epidemic and its control, WHO has been adopting different TB control strategy with some modification in regular interval. The National TB control programmes (NTPs) around the world have strived to meet the 2005 targets – the 70 percent case detection rate and 85 percent cure rate set by WHO. WHO's new stop TB strategy, *The global plan to stop TB, 2006-2015* was launched in Jan 2006 in order to achieve the United Nation's millennium development goals for TB by 2015². Until now in Nepal, all the recent stop TB strategy merely embraces the fundamental of TB control originally framed as directly observed treatment short- course (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 an 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 bacteriology³.

Case detection rate is one of the important indicators used to assess the achievement of million development goal. Although active case detection among the general population should not be encouraged because it is expensive, 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. In contrast to this, the usual TB control programmes 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 region⁴. Furthermore, several studies have already demonstrated that smear negative tuberculosis constituted the significant proportion among HIV positive individuals⁵. So, inclusion of cultural technique along with direct microscopy is the best way of detecting higher number of TB cases.

Approximately one- third of the 40 million PLWHA globally were co-infected with tuberculosis, with 22 percent of these co-infected persons living within South- East Asia. Thus, South- East Asia bears major portion of TB/HIV burden. According to late 1990s prediction, the worldwide incidence of HIV-attributable TB cases was estimated to increase from 3,15,000 (4% of the total TB cases) in 1990 to 1.4 million (14% of the total TB cases) in 2000. In SEA, total TB cases was increased by 27 percent during that 10 years period in contrast to global increase of about 36 percent. On the other hand, SEA showed more than 765 percent increase in HIV attributable cases during the same period in contrast to global increase of less than 350 percent. So, according to this estimate the challenge of TB/HIV co-epidemic is more in SEA in comparison to over all global context⁶. In context to Nepal, the estimated prevalence and incidence of all forms of TB during 2005 were 66,158 and 48,842 respectively². There is limited information regarding the prevalence of TB among the HIV positive individuals. It has been observed that 10.8 percent of HIV infected persons were co-infected with TB in United Mission Hospital, Tansen during 2002⁷.

Until now in Nepal, there is no any policies in NTP regarding the sputum culture of known HIV Positive individuals in their first visit to TB centre i.e. all patients visiting TB centre are referred for AFB stain irrespective of their HIV status. So, this study has been conducted to assess whether higher case detection of TB can be done (in comparison to direct microscopy of AFB stained smear) among HIV positive individuals when they are subjected to AFB culture in the very beginning of their HIV sero-positive status.

Methodology

This study was done in Tribhuvan University Teaching Hospital (TUTH), Maharajgunj during January 2004 to August 2005. Altogether 100 HIV infected persons were identified by periodic visit to different suspected sites such as OPD/indoor section of TUTH, Nava kiran plus, sparsha Nepal, Karuna Bhavan, Sneha Samaj, Maiti Nepal, Nepal Plus, Vision plus, SACTS-VCT, Nepal Youth, Aastha positive group and Blue diamond society. After taking

informed consent, questionnaires were filled to collect information regarding demographic variables and other variables such as smoking and alcoholic habit. Only those persons who smoke and consume alcoholic daily are considered to be smokers and alcoholic respectively. Then 3 sputum specimens from each person was collected. Diagnosis of TB was done by conventional methods such as direct microscopy of AFB stained smear, AFB culture in Ogawa medium. In direct microscopy 3 sputum specimens i.e. 1st spot specimen, 2nd early morning specimen and 3rd spot specimen were collected, stained by Ziehl-Nelsen staining technique and then reporting was done according to WHO/International Union Against TB and Lung disease positively grading system⁸. In cultural technique, each early morning specimen was subjected to modified Petroff's method followed by incubation at 37^oc for 8 weeks⁹. The data obtained from questionnaire and Laboratory investigation were entered into SPSS (11.5 version) and analyzed to get required information.

Results

Among 100 HIV cases, 66(66 %) were males and 34 (34%) were females. The majority of them were in the

age group 21-30 years followed by 31-40 years (31%). The mean and median ages of the subjects were 30 years and 28.2 years respectively (table 1). The overall prevalence of tuberculosis in HIV infected persons was found to be 23 percent (23/100). Among the 23 cases of tuberculosis, 22 cases were diagnosed by cultural technique, of which 4 cases were smear positive while the remaining one case was diagnosed by direct microscopy although it was culture negative as shown in table 2. The case detection rate by cultural technique was found to be 4.4 times more effective than direct microscopy (table 3). Among the 23 TB/ HIV co-infected persons, 73.9 percent (17/23) were males and 26.1 percent (6/23) were females. In both the sexes, the age groups 21-40 were predominantly co-infected. The mean age, medium age and age range of co-infected persons were found to be 30.28 years, 27.3 years and 31 years respectively (table 4). Majority of the TB/HIV co-infected persons were illiterates and unemployed as shown in table 5 and 6. Significant relationship was found between the smoking/alcoholic habit and the subsequent development of TB ($\chi^2=7.24$, $P<0.05$ for smoking habit and $\chi^2=4.39$ and $P<0.05$ for alcoholic habit) as shown in table 7.

Table 1: Age and gender distribution of studied subjects

Age Group	Male		Female		Total	
	No	Percent	No	Percent	No	Percent
11-20	1	1.5	1	3	2	2
21-30	37	56.1	23	67.7	60	60
31-40	23	34.8	8	23.5	31	31
41-50	3	4.5	2	5.8	5	5
51-60	2	3.1	0	0	2	2
Total	66	100	34	100	100	100

Table2: Modalities of diagnosis

AFB culture modified Petroff's method	AFB staining		Total
	AFB seen	AFB not seen	
Culture positive	4	18	22
Culture negative	1	77	78
Total	5	95	100

Table 3: Case detection rate of PTB: Direct Microscopy Versus Cultural Technique

Methods	Case detection rate	Inference
Culture	95.65 (2200/23)	Culture is 4.4 times more efficient than Direct Microscopy
Direct Microscopy	21.73 (500/23)	

Table 4: Age and gender distribution of TB/HIV coinfecting Person

Age group	Male		Female		Total	
	No.	percent	NO.	percent	No.	percent
21-30	12	70.6	3	50	15	65.2
31-40	3	17.6	3	50	6	26.1
41-50	1	5.9	0	0	1	4.3
51-60	1	5.9	0	0	1	4.3
Total	17	100	6	100	23	100

Table 5: Distribution of HIV patients by tuberculosis and educational status

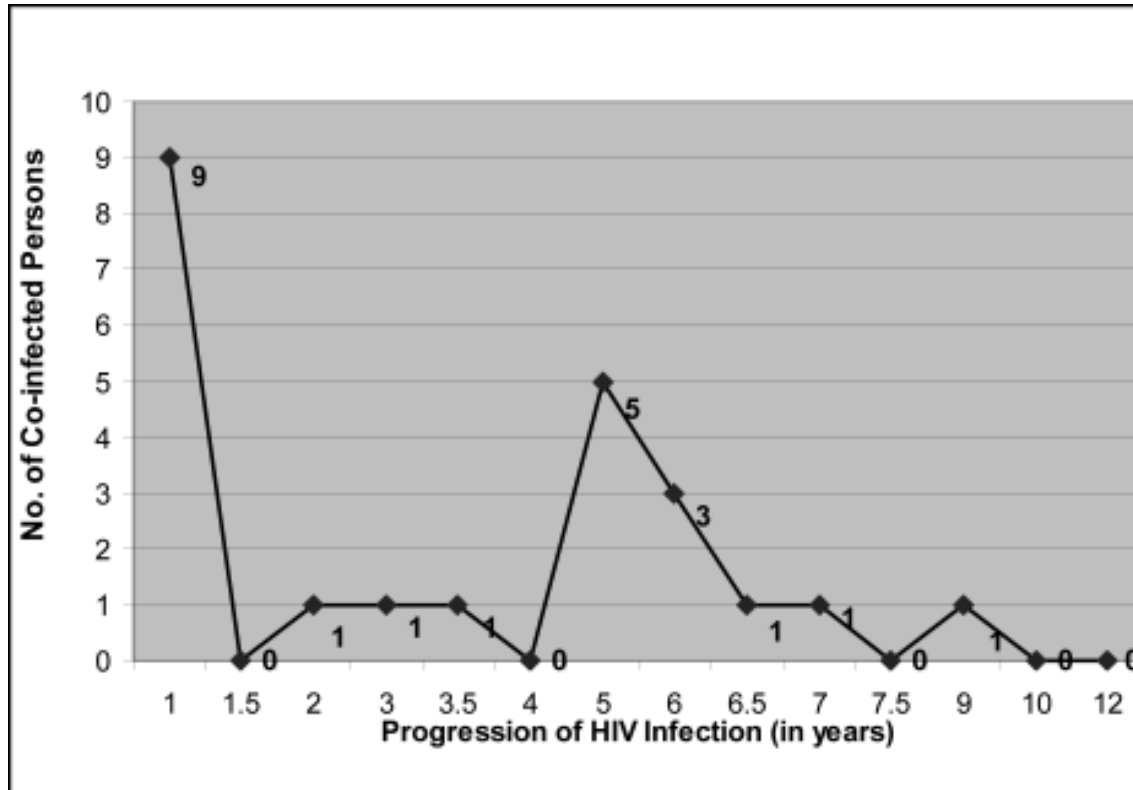
Educational Status	Tuberculosis				Total	
	Positive No.	percent	Negative No.	percent	No.	percent
Illiterate	9	39.1	45	58.5	54	54
Just literate	9	39.1	22	28.5	31	31
Primary level education	1	4.4	1	1.3	2	2
Secondary level education	3	13	6	7.8	9	9
Intermediate level education	0	0	3	3.9	3	3
Bachelor and above	1	4.4	0	0	1	1
Total	23	100	77	100	100	100

Table 6: Distribution of HIV patients by tuberculosis and occupational status

Occupation Status	Tuberculosis				Total	
	positive No.	percent	Negative No.	percent	No.	percent
Unemployed	8	34.8	51	66.3	59	59
House wife	3	13.10	4	5.2	7	7
Business	1	4.3	5	6.5	6	6
Agriculture	1	4.3	4	5.2	5	5
Service	0	0	3	3.9	3	3
Mason	2	8.7	1	1.3	3	3
Driver	1	4.3	1	1.3	2	2
Foreign Employer	2	8.7	0	0	2	2
Other	5	21.8	8	10.30	13	13
Total	23	100	77	100	100	100

Table 7: Distribution of HIV patient by Tuberculosis status, smoking and alcohol habit

Variables	TB positive (23) n(%)	TB negative (77) n(%)	χ^2 (chi-square)
Smoking			
yes	15(65.2)	26(33.8)	7.4
no	8(34.8)	51(66.2)	(P<0.05)
Alcohol			
yes	12(52.2)	22(28.6)	4.39
no.	11(47.8)	55(71.4)	P<0.05

Figure 1: Tuberculosis in course of HIV/AIDS

Discussion

Through this intensive case finding of active pulmonary TB, we observed that as high as 23 percent HIV/AIDS patients, predominantly of productive age group i.e. 21-40 years were affected by PTB. Previous similar study conducted in Kathmandu has shown that only 14 percent HIV positive were found to have PTB¹⁰, suggesting that TB is in increasing trend among these group of people. Similarly, TB status in HIV positive patients visiting United Mission hospital, Tansen, sharply increased from 10.8 percent in 2002¹⁰ to 39.57 percent in 2004¹¹. Under these situations, early case detection of TB and provision of ATT through DOTS is seemed to be the most essential component in controlling HIV related TB and improving the quality of life of such people. This study has also demonstrated that high active TB cases can be detected through cultural technique as compared to direct microscopy of AFB stained smear. Table 3 revealed that cultural technique is 4.4 times more efficient than direct microscopy for the diagnosis of TB in HIV positive individuals. It is a matter of NTP to think about the necessity of sputum culture along with direct microscopy for known HIV positive patients, irrespective of their symptoms. Until now in Nepal, there is no NTC policy to refer for TB culture unless

AFB are seen even after the completion of first phase of TB treatment under DOTS. On the basis of the findings of the study it can be recommended that, if culture facilities are accessible, all known HIV positive individuals should be referred for Sputum culture.

Of the 2 peaks of TB cases during the progression of HIV/AIDS, The first peak (within a year) suggests the late diagnosis of HIV i.e. TB and HIV are diagnosed at the same time while the 2nd peak (during 5th year) suggests that HIV has caused the resurgence of TB. The second peak revealed that chance of TB development increases with the increase in duration of HIV infection and this fact is of practical importance in TB surveillance among HIV positive individuals i.e. patients with advanced stage of HIV, should be regularly screened for TB.

This study demonstrated that illiterate and unemployed young adults were under high risk of HIV infection, and smoking/alcoholic habit were major risk factor for TB development, involved in unsafe sexual practice and drug addiction were also high risk of acquiring HIV infection, as confirmed by other studies¹². Slightly higher prevalence of tuberculosis in males than female may be by chance

as the males have relatively higher exposure to the outside environment. Similar findings was observed in the previous study done in United Mission Hospital, Tansen⁷.

Conclusion

Smoking and/or alcoholic habit were found to be risk factors for active TB development. Intensified case finding of active pulmonary TB among people living with HIV/AIDS through quality assured cultural technique was found to be more effective since as high as 23 pulmonary TB cases was detected in 100 subjects (23% prevalence rate). The case detection rate obtained by cultural technique was found to be 4.4 times more efficient as compared to direct microscopy of AFB stained smears.

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