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EDITORIAL

Original Articles

Case Study

AIMS AND SCOPE:

The SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS is the official journal of the SAARC TB and HIV/AIDS Centre (STAC). The Journal's main aim is to continuing education of personnel and the dissemination of the most up-to-date information in the field of tuberculosis, lung diseases and HIV/AIDS. It is devoted to dissemination of knowledge concerning various aspects of tuberculosis, lung diseases and HIV/AIDS. All articles and health research relevant to the practice of this Journal are published. This Journal is a forum for the publication of articles concerning the social, economic, public health, epidemiology, diagnostics, genetics etc. in the area of tuberculosis, lung diseases and HIV/AIDS. The scientific manuscripts presenting the results of public health importance are encouraged. The novel case reports which adds to the existing knowledge and consistent with the scope of Journal will be considered for publication. The Journal accepts review/mini-review, case report, short communications, and letters to editors within the scope.

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Editorial

As a result of population ageing; urbanization; changes in diet; reduced physical activity, the prevalence of diabetes mellitus (DM) has increased worldwide. Moreover about 80% of the Global 415 million estimated DM cases are from low and middle income countries where the DM prevalence is estimated to rise most steeply with high Tuberculosis (TB) incidence over the next 30 years. The increase in the DM patients where TB is also endemic has led to the importance of DM as a risk factor for TB. This association these two diseases and their synergistic role in causing public health concern DM increases the risk of TB by two to three times and adversely affects TB treatment outcomes. The combination of tuberculosis and diabetes mellitus is a health threat to the increasing populations which are at the risk for both of these diseases.

In 2030, it is estimated that 12.6% of new TB cases in ten highest TB burden countries, will be attributable to DM, which is increase of 25.5% compared to 2010. DM affects the natural history of TB and related with the worse treatment outcomes. It is associated with the delayed sputum conversion and a higher probability of treatment failure. Therefore, it is important that the people with diabetes are screened for tuberculosis and vice-versa using cost effective screening strategies available. Taking in consideration, SAARC TB and HIV/AIDS Centre has recently completed a research on **"The prevalence and determinants of active tuberculosis among diabetes patients in tertiary care hospitals of Nepal, 2018."**The objective of the research was to assess the burden of active tuberculosis among the people with diabetes and describe the risk for the same attending the selected diabetic clinics of the tertiary care centers across the country. With 70 participants from the seven study sites, a total of 490 samples from the patients were used for data analysis. The study showed that the overall prevalence of TB among the diagnosed DM patient is 4.42% which is comparable with others studies conducted in Asia. Meta-analysis shows that the overall median prevalence of DM among TB patients in Asia is 17%. The study also shows the other co-morbidities related to diabetes such hypertension, nephritis, neuropathy and dyslipidemia as significant risk factors to develop TB. Patients with TB are vulnerable to high degree of co-morbidity and are at high risk of adverse effects of intensive glucose control. Therefore, more researches are necessary to examine whether the diagnosis and treatment of diabetes in TB patients may improve TB outcomes and the patient survival.

Chief Editor
Director, STAC

DIAGNOSTIC YIELD OF BRONCHOALVEOLAR LAVAGE XPERT MTB/RIF ASSAY (GENE XPERT ® IN SPUTUM SMEAR NEGATIVE PULMONARY TUBERCULOSIS PATIENTS – A ONE YEAR CROSS SECTIONAL STUDY

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ABSTRACT

Introduction: Tuberculosis remains a major public health issue and is one of the top ten causes of death worldwide. Seven countries worldwide account for 64% of the total incidence and India leading the count. Only about 50-60% of the cases are sputum smear positive, while rest are sputum scare or smear negative cases. Since December 2010, WHO has recommended the use of Xpert MTB/RIF assay due to its high-quality performance, as compared to microscopy in the diagnosis of tuberculosis. The present study was done to evaluate the early diagnosis of sputum smear negative pulmonary tuberculosis patients using Xpert MTB/RIF assay test in broncho-alveolar fluid and to evaluate prevalence of rifampicin resistance in these patients.

Methods: This was a one year cross section study conducted in a tertiary care hospital. A total of 143 suspected cases of pulmonary tuberculosis patients who were sputum smear negative were included in the study. All patients underwent bronchoscopy and the BAL specimen was subjected for Xpert MTB/RIF assay, smear by ZN staining and AFB Culture using MGIT 960 medium. The sensitivity and specificity of the Xpert MTB/RIF assay was compared to AFB culture which is considered as the gold standard method for diagnosing TB was calculated.

Results: Majority of the patients were males (74.83%) and under the age group of 30 years (26.57%). Out of 143 suspected, the final diagnosis of PTB was done in 93 patients. Out of 93 cases of PTB, 87(93.5%) patients were Xpert MTB/RIF assay positive, 80(86.0%) were AFB culture positive and 39(41.9%) patients were AFB smear positive. The sensitivity and specificity of BAL Xpert MTB/RIF assay was 92.5% and 79.37% respectively (p <0.0001).

Conclusion: The Xpert MTB/RIF assay is more sensitive and specific than smear microscopy for the diagnosis of PTB in sputum smear negative on specimens obtained from broncho-alveolar lavage (BAL).

Keywords: Xpert MTB/RIF assay, BAL, PTB, smear negative.

INTRODUCTION

Tuberculosis due to Mycobacterium tuberculosis remains a major public health issue. For the past 5 years, it has been the leading cause of death from a single infectious agent, ranking above HIV/AIDS[1]. India is one among the six countries that account for 60% of all new TB cases worldwide. Universal access to high-quality, patient-centered treatment for all TB patients is emphasized by WHO's Stop TB Strategy[2]. However, in many areas of the world, TB diagnosis still relies on insensitive, poorly standardized sputum microscopy methods[3]. As much as 50-60% of AFB culture-positive clinical specimens may fail to reveal AFB on smear made from the specimen. Ineffective TB detection and the emergence and transmission of drug-resistant MTB strains increasingly jeopardize global TB control activities[2].

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Xpert MTB/RIF assay meets the demands as mentioned below in a remarkable manner[3].It is a nucleic-acids amplification test for the detection of MTB complex in sputum or concentrated sputum sediment and the detection of RIF resistance-associated mutations of the *rpoB* gene. The Xpert MTB/RIF assay has the potential to bring standardized, sensitive and very specific diagnostic testing for both TB and drug resistance[3]. WHO recently has recommended Xpert MTB/RIF® assay test for the early diagnosis and rifampicin resistance and this has been incorporated in various national TB control programmes[1].Recent studies have found that when combined with Xpert MTB/RIF, Bronchoalveolar lavage fluid (BAL) could provide accurate results in detecting early-stage pulmonary TB, particularly in smear-negative pulmonary tuberculosis patients[4]. The present study was done to evaluate the role of BAL fluid for the early diagnosis of sputum smear negative pulmonary tuberculosis by using Xpert MTB/RIF assay test and to detect prevalence of rifampicin resistance in these patients.

MATERIALS AND METHODS

The present study was carried out in the KAHER's Department of Respiratory Medicine, Dr. Prabhakar Kore Hospital & Medical Research Centre, Belagavi, Karnataka between January 2017 to December 2017.All the patients with clinical and radiological suspicion of pulmonary tuberculosis with sputum smear negative for acid fast bacilli were included in the study. A total of 143 patients were included in the study.

Inclusion criteria: Patients of either gender aged 12 years and above, suspected cases of pulmonary tuberculosis, those who have not taken anti-TB medications or taking less than one week, HIV positive and immune compromised individuals.

Exclusion criteria: AFB smear positive cases, extra-pulmonary tuberculosis cases.

Bronchoscopy Procedure: Patients who were fulfilling the inclusion criteria were taken up for bronchoscopy after the informed written consent. Procedure was carried out electively after the patient being nil orally atleast for 4 hours. Bronchoscopy procedure was done using Flexible fibreoptic video bronchoscope in dedicated suite under conscious sedation. Broncho-alveolar lavage was obtained by instilling aliquots of 20 ml of 0.9 % saline at room temperature into a segment of an affected lobe or segment and aspirating available fluid, maximum up to 100 ml of fluid was instilled. The obtained Broncho-alveolar lavage fluid was subjected toAFB smear by ZiehlNeelsen staining, AFB culture using the MGIT 960liquid medium and Xpert MTB/RIF assay test.

Bronchoalveolar lavage samples: A volume of one ml of BAL sample was transferred to the G4 version of Xpert® MTB/RIF (Cepheid, USA) cartridges without initial decontamination or centrifugation. The remaining BAL fluid was processed by the standard decontamination protocol, using NALCNaOH method and centrifuged. AFB smear was done according to the standard protocol for ZiehlNeelson staining[5].The centrifuged sample after decontamination was inoculated for liquid culture in BACTEC mycobacterium growth indicator tube (MGIT) 960 system (BD Diagnostics, USA)[6]. The BACTEC 960 TB System has been reported to yield 15-20% increased culture positivity os clinical specimens as compared to conventional solid media such as LJ medium, with an average time to detection of positive growth from 8 to 14 days as compared to 3 to 5 weeks on solid media[6]. Isolates were identified as *Mycobacterium tuberculosis* by immunochromatographic test kit (SD MPT64TB Ag kit). Any diagnostic sample that was detected as nontuberculous mycobacterium (NTM) by culture method was considered as "nonTB."

Xpert® MTB/RIF Assay: It is an automated molecular test for *Myco tuberculosis* and its resistance to rifampicin, based on theCepheid GeneXpert system. It uses hemi-nested real time PCR assay to amplify a specific sequence of the rpoB gene, which is then probed with molecular beacons for mutations within rifampicin-resistance determining region, providing a result within 2 hours. It is a single test that can detect both *Mycotuberculosis* complex and rifampicin resistance within 2 hours after starting the assay, with minimal hands on technical time[7]. The assay utilizes single-use plastic cartridges with multiple chambers that are preloaded with liquid buffers

and lyophilized reagents beads necessary for sample processing, DNA extraction and hemi-nestedrt-PCR. Following sample loading all steps in the assay are automated and contained within the cartridge. The test procedure may be used directly on clinical specimens, either fresh sputum samples or sputum pellets, which are obtained after decontaminating and concentrating the sputum[8]. The test material is treated with a sodium hydroxide and isopropanaol-containing sample reagent, mixed by hand or vortex, and incubated at room temperature for 15 minutes. After incubation. 2 ml of the treated sample is transferred to the cartridge, and the run is initiated. The test platform employs a sonic horn that inserts into the cartridge base to cause ultrasonic lysis of the bacilli and release of the genetic material[9]. The assay then amplifies a 192 bp segment of the rp0B gene using a hemi-nested rt-PCR reaction.

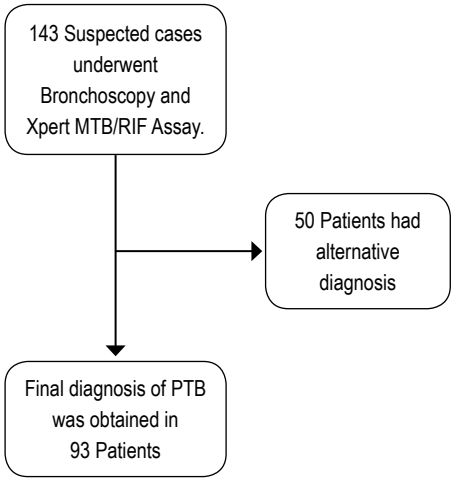
Final diagnosis: A final diagnosis of pulmonary tuberculosis was based on composite reference standard which included two criteria – AFB culture cases and probable PTB. "Culture confirmed PTB" were cases with MTB culture positive on MGIT culture. "Probable PTB" were cases without MTB on culture or alternate diagnosis, showing complete resolution in the clinical and radiological features of PTB to anti-TB drugs. The response to anti-TB drugs was monitored during follow up of patients every 2 months for a total of 6 months. Rests of the cases either with an alternate diagnosis or showing no improvement with anti-TB drugs were considered non-TB.

Before the commencement of the study the Ethical clearance was obtained from the Ethical and Research Committee, Jawaharlal Nehru Medical College, Belagavi.

Statistical analysis: Data analysis was performed using SPSS 20.0 software and Excel 2010 software. The demographical features like age, gender, clinical and radiological findings, past history of tuberculosis and history of contact with PTB patients were recorded. The sensitivity, specificity, positive predictive values (PPV), and negative predictive values (NPV) of Xpert MTB/RIF and smear microscopy, with culture as the reference standard was calculated. A "p" value of <0.05 was considered to be statistically significant.

RESULTS AND OBSERVATION

A total of 143 patients underwent BAL Xpert MTB/RIF assay, the final diagnosis of PTB was obtained in 93 patients (Method of achieving final diagnosis has been explained in Methods).



A total of 143 patients who were suspected to have pulmonary tuberculosis were included in the study, out of which 107(74.83%) were males and 36(25.17%) were female patients. Most of the patients included were <30 years of age and the mean age was 46.38 ± 17.11 yrs. The cough was the most common symptom in 117 (81.82%) the patients followed by fever in 81(56.64%), weight loss in 67(46.85%), decreased appetite in 41(28.67%), breathlessness in 27(18.88%) and hemoptysis in 25(17.48%) patients. 12(8.39%) of patients had history of contact with the TB patients and 67(46.85%) of patients had previous history of tuberculosis. The predominant findings on chest x-ray was infiltrations in 69(48.25%)patients, followed by cavity-27(18.8%), fibrosis-16(11.19%), consolidation-14(9.79%), destroyed lung-10(6.99%), pleural effusion-7(4.9%), pneumothorax- 1(0.7%) and chest x-ray was normal in 4(2.8%) patients. A total of 41(28.67%) patients were diabetics, 7(4.9%) patients were HIV positive and 12(8.3%) of the patients had other predisposing conditions.

Table 1: Percentage of positive results				
Diagnostic tests	**Present**	**%**	**Absent**	**%**
Xpert MTB/RIF	87	60.84	56	39.16
Smear method	39	27.27	104	72.73
AFB culture method	80	55.94	63	44.06

Out of 143 suspected cases of pulmonary tuberculosis, BAL Xpert MTB/RIF assay was positive in 87(60.84%) patients, BAL AFB Smear was positive in 39(27.27%) patients and AFB culture using the MGIT 960 medium was positive in 80(55.94%) patients.

Table 2: Sensitivity and specificity of Xpert MTB/RIF assay as compared to AFB culture	
Sensitivity	**92.50%**
Specificity	79.37%
Positive predictive value	85.06%
Negative predictive value	89.29%

The Xpert MTB/RIF assay was 92.5% sensitive and 79.37% specific as compared to the AFB culture which is the gold standard test for the diagnosis of tuberculosis with a p value of 0.0001 which is statistically significant, where as the sensitivity and specificity of BAL AFB smear as compared to the AFB culture was of 47.5% and 98.41% respectively.

Table 3: Correlation between Xpert MTB/RIF assay and AFB culture method						
Xpert MTB/ RIF Assay	**AFB culture**				**Total**	**%**
	Present	**%**	**Absent**	**%**		
Present	74	85.06	13	14.94	87	60.84
Absent	6	10.71	50	89.29	56	39.16
Total	80	55.94	63	44.06	143	100.00

Thirteen patients were Xpert MTB/RIF assay positive but AFB culture negative. Four patients with Xpert MTB/RIF assay positive with previous history of PTB had AFB culture negative. In the present study 13 patients with Xpert MTB/RIF positive and AFB culture negative were started on anti-tubercular treatment based on clinico-radiological grounds and 3 were lost to follow up and 10 were started on ATT and all of them showed clinico-radiological improvement.

Table 4: Distribution of patients by Refampiein resistance		
Rifampicin resistance	**No of patients**	**% of patients**
Present	16	11.19
Absent	127	88.81
Total	143	100.00

Table 4 Rifampicin resistance was found in 16 (11.19%) out of 87 patients who were Xpert MTB/Rif MTB/RIF positive and all (100%) were AFB culture positive.A total of 10(62.5%) patients who were Xpert MTB/RIF assay positive with previous history of PTB had rifampicin resistance.

Table 5: Final diagnosis by BAL Analysis		
Final diagnosis	**No of patients**	**% of patients**
Bacterial Pneumonia	7	4.89
Lung cancer	13	9.09
Non tubercular Mycobacterial Infection(NTM)	1	0.70
Pneumocystis Pneumonia	1	0.70
Post tubercular sequelae	28	19.58
Pulmonary Tuberculosis	93	65.03
Total	143	100.00

A total of 93(65.03%) patients had a final diagnosis of pulmonary tuberculosis by BAL analysis, 7(4.89%) - bacterial pneumonia, 13(9.09%) – lung cancer,1(0.70%) –non-tuberculous mycobacterium infection, 1(0.70%) – pneumocystis pneumonia, and 28(19.58%) patients were diagnosed with post-tubercular sequelae.

DISCUSSION

All the patients in the present study were sputum smear negative and clinically suspected cases of pulmonary tuberculosis. Almost 50-60% of the cases are found to sputum scarce or smear negative for the tuberculosis[10]. Although the relative transmission rate of smear negative tuberculosis is lower than that of smear positive cases, it is still responsible for 17% of tuberculosis transmission[11]. When the patients present with the

signs and symptoms of TB and if the sputum is found to be negative then the further investigation is required. The other respiratory specimens like the bronchial washings, bronchial aspirate, BAL, TBLB and gastric lavage in children examinations helps to achieve the diagnosis. Fibreoptic bronchoscopy constitutes an interesting alternative for TB diagnosis in smear-negative or sputum-scarce patients[12,13]. Paludet al[12] and Robert et al[14] observed that the use of bronchoscopy with BAL allows for better diagnosis and understand the inflammatory nature of many diseases and in patients with infectious granulomatous disease. In this study we have confirmed that bronchoscopy supplemented with lavage was useful in diagnosing TB[14].

The concentration of *M. tuberculosis*bacteria in clinical sputum samples can vary from over 10^7 to less than 20 CFU/ml[15]. The AFB smear requires 10^3-10^5 bacilli /ml of sputum; it is therefore difficult to diagnose the patients who are paucibacillary like in HIV individuals. Recent diagnostic tests like the Xpert MTB/RIF and Xpert Ultra can detect upto 131cfu/ml and 31cfu/ml in the given specimen, thus increasing the diagnostic rate of the disease[1].

Xpert MTB/RIF test integrates sample decontamination, hands free operation, onboard sample processing, and is an ultrasensitive hemi nested PCR for the simultaneous detection of Mycobacterium tuberculosis and rifampicin resistance, either in expectorated sputum or concentrated sputum sediments, in approximately two hours[16]. Testing is standardized and requires only moderate laboratory infrastructure and training. The conventional diagnostic methods for Mycobacterium tuberculosis are slow and/ or lack sensitivity[15]. A number of new diagnostic approaches like Xpert MTB/RIF assay have thus brought incremental improvements to detection and drug susceptibility testing.

In our study, out of 143 suspected cases of tuberculosis, BAL Xpert MTB/RIF assay was positive in 87 (60.84%) patients, BAL AFB smear was positive in 39 (27.27%) and AFB culture using the MGIT 960 medium was positive in 80 (55.94%) patients. This result indicates BAL Xpert MTB/ RIF assay is more sensitive and faster method for detection of tuberculosis as compared to AFB culture. However, in a retrospective study conducted by Paludet al[12], BAL Xpert MTB/RIF assay was 60% sensitive and culture was 66 % sensitive, but culture took longer time for diagnosis as compared to Xpert MTB/RIF assay.

So, the Xpert MTB/RIF assay was 92.5% sensitive and 79.37% specific as compared to the AFB culture which is the gold standard test for the diagnosis of tuberculosis (p value <0.0001). The results of our study are comparable with studies conducted by Barnard et al[17] which showed Xpert MTB/RIF assay sensitivity of 92.3% and specificity of 87.7%. Palud et al[12] included 162 patients and observed the sensitivity of the Xpert MTB/RIF assay to be 80% and specificity to be 98.6%. A study conducted by Khalifaet al[18] in Pakistan where the prevalence of TB is high showed that the Xpert assay helped in diagnosing the disease in 93 patients with a sensitivity of 91.86% and specificity of 71.42%.

Cochrane systematic review[19]done in 2013 has observed that Xpert MTB/RIF assay test to be highly accurate. When compared to culture, Xpert has about 88% sensitivity and 98% specificity for pulmonary TB in adults. In smear-negative patients with TB, Xpert had a sensitivity of 67%. For rapid detection of rifampicin resistance, the sensitivity is 94% and specificity is 98%[19].

As the incidence and prevalence of TB is high in India there is requirement of high suspicion and early diagnosis of TB so as to decrease the transmission rates, early initiation of treatment and also the early detection of MDR TB. There are several studies conducted in India which show the similar results. Study conducted by Hazarikaet al[20] showed that 88 out of 162 patients had Xpert assay positive. The sensitivity of Xpert was 78.89% and specificity was 95.83%.

The patients who have been treated for pulmonary tuberculosis can reveal Genexpert test positivity due to the presence of dead bacilli and their DNA gets amplified by this test[21]. One study has shown that up to 27 % of patients have been reported to remain sputum Xpert MTB/RIF positive 26 weeks after successful anti-tuberculous treatment was initiated[22]. Due to the nature of the polymerase chain reaction test, Xpert MTB/RIF amplifies any DNA whether it originates from alive or dead bacilli. Therefore, it cannot be assumed, solely on the

basis of the testthat a positive result equates to active disease[23].In this study 13(9.1%) patients were Xpert positive but culture negative out of which 4(30.7%) patients had previous history of tuberculosis, Xpert detects DNA from nonviable cells that are not intact, thereby suggesting that free DNA—and not just DNA from intact cells—is detected by Xpert, and this free DNA is non culturable[24]. This might be a possible cause of false positivity.

Six cases (10.71%) were Xpert Negative but culture positive. This might be due to the reason that the Xpert assay can detect upto 131cfu/ml of bacilli and the AFB culture can detect 10-100 bacilli/ml and hence in paucibacillary condition like in HIV positive individuals and immunocompromised conditions culture plays an important role in the diagnosis[25]. One patient was diagnosed to have non-tubercular mycobacterium infection based on the culture report and the patients Xpert assay was negative for MTB, the Xpert MTB/Rif assay does not detect DNA from nontuberculous mycobacteria, and almost all positive results likely reflect the true detection of M. tuberculosis complex DNA[24].

CONCLUSION

The findings of our study shows that the Xpert MTB/RIF assay is more sensitive and specific than smear microscopy for the diagnosis of pulmonary tuberculosis in sputum smear negative on specimens obtained from bronchial washing, and can be routinely utilized in patients with a high clinical suspicion of pulmonary tuberculosis. With increasing incidence and prevalence of MDR tuberculosis Xpert MTB/RIF assay can be a useful tool for early diagnosis, and the other major advantage is that it simultaneously detects Rifampicin resistance. Patients with Xpert MTB/RIF assay positive but AFB culture negative remains a conflict area and should be read cautiously taking the clinical and radiological findings into consideration before starting the treatment.

CONFLICT OF INTEREST

None

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IMPACT OF EDUCATION AND MEDIA EXPOSURE ON TUBERCULOSIS RELATED AWARENESS AMONG INDIAN ADULTS: A STUDY BASED ON NFH-3

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ABSTRACT

Introduction: Lack of awareness about a contagious disease like pulmonary tuberculosis (TB) among the general population may be a hindrance to early prevention of infection and timely care-seeking, besides being a stigma fuelling factor. The objective in this study is to identify the roles of education and media exposure on correct knowledge regarding the route of TB transmission across selected low awareness geographical regions of India, one of the 30 high TB burden countries according to the WHO.

Methods: The study is based on NFHS 3 (2005-06) unit level data on adult men and women using basic statistical tools and logistic regression analysis.

Results: Adults of both sexes in the northern, central and eastern regions of India are found to have lower than all India share of correct knowledge about the route of TB transmission. Education seems to be positively impacting correct knowledge among women in all three regions and among men, only in the East. Good exposure to mass media significantly raises the probability of correct knowledge among both genders in the east while leaving no impact in the north and central regions.

Conclusion: Adoption of a more holistic approach in fighting TB is the need of the hour. Besides addressing the medical aspect of the disease, region-specific deeper socio-economic factors like education and media exposure that can potentially impact disease related knowledge and awareness need to be incorporated in attempts to control TB particularly in a high endemic country like India.

Key words: Tuberculosis, Correct knowledge, Education, Media exposure

INTRODUCTION

Tuberculosis (TB), though an ancient scourge, remains a public health emergency contributing substantially to the global burden of disease. India features as one of the thirty high TB burden countries identified by the WHO, accounting for more than a quarter of the annual global incidence of TB[1].The Revised National Tuberculosis Control Program (RNTCP)with the Directly Observed Treatment, Short Course (DOTS) has steadily brought down TB prevalence and mortality in India over the years. However, it has failed to have much impact on the incidence of TB in India, implying that although the initiation of affected persons into the treatment trajectory has been taken care of to some extent, the aspects of prevention and completion of treatment have not been satisfactorily attended to. In this context, awareness regarding TB is expected to play an important role in prevention through timely care seeking and treatment completion, thus lowering incidence of the disease. Literature provides support to the role of education and media in impacting TB related awareness[2,3,4,5]. However, the situation among adults in India at a regional level with respect to TB related awareness and its correlates remains understudied. The pathways for better access to treatment of TB are not achieved

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only through mere physical availability of curative facilities and patients' affordability, but are also intertwined with the non-medical societal response of accepting and accommodating patients into the supply side network. These factors are expected to be improved with general education and wider exposure to mass media, along with improvement in some of the basic demographic and socio-economic characteristics. Given this background, the objectives of the present study are two-fold:

(i) Identifying regions in India where TB related awareness levels of both adult men and women are lower than their respective all India counterparts.

(ii) Determining the impacts of education and mass media exposure on the TB related awareness of both genders in the identified problem regions.

METHODOLOGY

The current study is based on the National Family Health Survey (NFHS) 3 (2005-06) unit level data for 62,570 men and 96,556 women in India. It also makes use of household level data to determine the prevalence of TB. The present study makes an attempt to explore the impacts of education and media exposure on tuberculosis related awareness with socio-economic variables in control, for adult men and women across identified poor performing low- awareness regions in India. Apart from simple statistical tools, the specific econometric method used in for the study is Logistic Regression Analysis and data has been analyzed with the help of the Stata 12 software.

The paper has tried to capture TB related awareness in terms of whether individual respondents had '*correct knowledge without misconceptions about the mode of transmission of TB'*. In NFHS-3, questions regarding tuberculosis transmission process were imposed on only those individuals who responded as 'yes' to the question

- *Have you ever heard of an illness called tuberculosis or TB?*

The share of respondents who answered as 'no' to the above question is 8.03 percent and 12.33 percent for men and women respectively. Our dataset comprises of those respondents who conformed to ever having heard of the disease, since hearing about TB ever is a necessary pre-requisite for having any further knowledge about transmission of TB. The specific question asked by NFHS 3 that addresses the particular issue of correct knowledge is:

- *How does tuberculosis spread from one person to another?*
  i. By air when coughing or sneezing
  ii. By sharing utensils
  iii. By touching a person with TB
  iv. Through food
  v. By sexual contact
  vi. By mosquito bites
  vii. By sharing clothes/bed/towel
  viii. By blood/blood transfusion
  ix. By smoking bidis/cigarettes/tobacco
  x. By spit/sputum/stepping on spit
  xi. Don't know

Individuals having *'correct knowledge without misconceptions about TB transmission'* are those who responded as 'yes' to the first option, i.e. 'By air when coughing or sneezing' and 'no' to all of the rest, which are misconceptions. Individuals with incorrect knowledge about TB transmission therefore include

- those who said 'yes' to one or more of the remaining options despite saying 'yes' to the first one
- those who said 'no' to the first option
- those who responded as 'Don't know'

Only identifying the actual route of TB transmission could have been taken as the base for correct knowledge, notwithstanding the fact whether the person is choosing any other wrong route(s) besides the actual one. However, this is not only technically and medically unacceptable, but also has certain implications for stigma that arises largely from perceived knowledge about transmission of disease. Hence in this study those who have reported only the first route have been taken as possessing correct knowledge about TB transmission (without misconceptions).

The generated variable '*correct knowledge about TB transmission without misconceptions'* is the

dependent variable in the study. It is a binary variables taking values 0 (misconception) and 1 (correct knowledge without misconception).The explanatory variables that have been considered are '*highest individual education level*' and'media *exposure'*. Highest individual education level is a categorical variable with categories 'no education' and 'primary' clubbed as 'primary and below'; the other two categories are 'secondary' and 'higher'. The three forms of media considered by NFHS-3 during interview were newspaper/magazine, radio and television. The paper briefly describes how the explanatory variable 'media exposure' has been generated: those who read newspapers 'not at all' and 'less than once a week' have been clubbed as 'irregular exposure 'while those who read it 'at least once a week' and 'almost every day' have been clubbed as 'regular exposure'. A similar exercise has been repeated for each of radio and television. The paper then defines individuals with 'poor mass media exposure' as those who had irregular exposure to all three and/or regular exposure to any one form of media and 'good mass media exposure' as those who had regular exposure to at least two forms of media. The control variables considered are:

- *Age:* 15-54 for men and 15-49 for women
- *Residence:* Urban and Rural
- *Religion:* Hindu and Non-Hindu
- *Reservation:* Reserved (Scheduled Caste& Scheduled Tribe) and Non-Reserved (Other Backward Classes& Others)
- *Wealth Index:* Poor, Middle Income and Rich
- *Occupational Status:* Unemployed and Employed
- *Family Structure:* Nuclear and Non-Nuclear

NFHS-3 provides data for 29 states across India. Since the paper intends to carry out the exercise across selected geographic regions of India, 29 states have been clubbed into 6 geographic regions as Table 1 shows.

RESULTS

Regional variation in correct knowledge

From Table 2: Shares of Correct Knowledge & Stigma among Men & Women across Regions of India it is seen that at all India level, only 1.88 percent households report as having a member who suffers from TB. When looked across regions, northeast has the highest share of households who report positive TB status of a family member, followed by the east. The percentage is lowest in the north. The unit of enquiry being the household when looking at TB prevalence, there is no variation in the reported percentage between men and women. At all India level, 25 percent men and 19.41 percent women possess correct knowledge without misconception about TB transmission. East performs worst in terms of correct knowledge. North, central and east have lower than all India share of correct knowledge among both men and women. In this analysis, the critical regions for correct knowledge are identified as north, central and east. Thus it is pertinent to locate the possible barriers to increasing correct knowledge regarding TB among the general population in India. Identifying causal determinants in particular regions, with their demographic and socioeconomic characteristics in control, is expected to help policy makers to locate the specific sectors to intervene for best results.

Table 1: Geographical regions of India

NORTH	CENTRAL	EAST	NORTHEAST	WEST	UTH
J & K	Uttar P	West Bengal	Sikkim	Gujarat	Andhra P
Himachal P	Chhattisgarh	Jharkhand	Arunachal P	Maharashtra	Karnataka
Uttaranchal	Madhya P	Bihar	Manipur	Goa	Kerala
Haryana		Orissa	Mizoram		Tamil Nadu
Delhi			Nagaland		
Punjab			Tripura		
Rajasthan			Meghalaya		
			Assam		

Source: Analysis of NFHS 3 unit level data

Table 2: Shares of Correct Knowledge & Stigma among Men & Women across Regions of Ind												
	NORTH		CENTRAL		EAST		NORTHEAST		WEST		SOUTH	
	M	W	M	W	M	W	M	W	M	W	M	W
TB prevalence in households	1 .23		1.93		2.47		2.95		1.54		1.29	
Correct Knowledge	18.60	15.65	12.48	10.86	16.65	9.90	31.14	23.67	35.02	30.33	31.81	28.66
Education above primary %	74.94	58.42	66.97	44.20	64.18	47.23	74.61	63.77	82.05	70.62	73.77	67.66
Media exposure Good%	63.81	42.69	58.70	34.38	54.06	30.97	61.65	45.47	74.50	55.92	74.69	52.82

Source: Analysis of NFHS-3 unit level data. All values in percentages

Table 3: Logistic Regression Results for Correct Knowledge: Men						
Variables	NORTH		CENTRAL		EAST	
	OR	Marginal effect	OR	Marginal effect	OR	Marginal effect
Education Primary& below Ref						
Secondary	1.03	0.005	0.95	(-) 0.005	1.43***	0.05
Higher	1.19	0.03	1.01	0.001	2.08***	0.11
Poor media exposure Ref						
Good	0.94	(-) 0.01	1.04	0.005	1.6***	0.06
Age of the respondent (in years)	0.99*	(-) 0.001	0.99	0	1.01**	0.001
Residence Urban Ref						
Rural	0.9	(-) 0.02	0.77***	(-) 0.03	1.52***	0.05
Religion Hindu Ref						
Others	1.03	0.005	1.01	0.001	0.46***	(-) 0.08
Caste Reserved Ref						
Unreserved	1	0	1.09	0.01	1.35***	0.04
Wealth index Poor Ref						
Middle	1.22	0.03	1.54***	0.05	1.11	0.01
Rich	1.62***	0.07	1.44***	0.04	1.15	0.02
Occupation Unemployed Ref						
Employed	0.82**	(-) 0.03	0.91	(-) 0.01	0.81*	(-) 0.03
Family structure Nuclear Ref						
Non-nuclear	1.03	0.005	0.98	(-) 0.002	0.85**	(-) 0.02

*Source: Analysis of NFHS-3 unit level data, *** significant at 1 per cent level, ** significant at5 per cent level, * significant at 10 per cent level*

Results of Causal Analysis: Effects of education and media exposure on TB related correct knowledge

The logistic regression results for TB related correct knowledge for both men and women across the northern, central and eastern regions of India are summarized in Table 3&4. All the regressions satisfy the F-Test.

From Table 3, we find no impact of education (secondary or higher) or better exposure to mass media exposure on TB related correct knowledge of transmission without misconceptions among men in the northern and central regions, though both appear to have significant control in the eastern zone**.** The marginal effect of higher education in the east is quite strong. The corresponding marginal effect from media exposure, though significant, is far lower in that region. Among the control variables, the effect on correct knowledge appears to be heterogeneous in nature and degree. Older respondents have better knowledge in the east, though no such crucial impact is recorded in other regions. Geographical locations have opposite impacts in central and eastern regions. While in the former the people in the rural areas have lower awareness about correct knowledge, the opposite appears to be true in the latter. Religion and ethnicity have strong presence in the east as men belonging to religious groups other than the Hindus and socially backward castes have far lower correct knowledge. No such impact is found in the other two regions. Economic status has significant impact in the central and northern zones.

Similar analysis for women in Table 4 below reveals far stronger impact of education on correct knowledge across regions, with marginal effects highest in north region. The impact of exposure to media, however, is only statistically significant in eastern region. Similar to the men, geographical

Table 4: Logistic Regression Results for Correct Knowledge: Women

Variables	NORTH		CENTRAL		EAST	
	OR	Marginal effect	OR	Marginal effect	OR	Marginal effect
Education Primary & below Ref						
Secondary	1.45***	0.05	1.24***	0.02	1.93***	0.06
Higher	1.82***	0.09	1.35***	0.03		
Poor media exposure Ref						
Good media exposure	0.97	(-) 0.004	1.01	0.001	1.23***	0.02
Age of the respondent (in years)	1	0	0.99**	(-) 0.001	1	0
Residence Urban Ref						
Rural	1.05	0.01	0.66***	(-) 0.04	1.33***	0.02
Religion Hindu Ref						
Others	1.02	0.002	0.88**	(-) 0.01	0.74***	(-) 0.02
Caste Reserved Ref						
Unreserved	1.01	0.001	0.93	(-) 0.01	0.86**	(-) 0.01
Wealth index Poor Ref						
Middle	1.1	0.01	0.96	(-) 0.003	1.1	0.01
Rich	1.26**	0.03	0.93	(-) 0.01	1.46***	0.03
Occupation Unemployed Ref						
Employed	0.98	(-) 0.002	0.98	(-) 0.002	0.89	(-) 0.01
Family structure Nuclear Ref						
Non-nuclear	1.02	0.003	1.04	0.004	0.94	(-) 0.005

Source: Analysis of from NFHS-3 unit level data *** significant at 1 per cent level, ** significant at 5 per cent level, * significant at 10 per cent level

residence, religion and caste have significant effects in the east. Interestingly, religion has strong effects among women in central region too, though the effect was absent among the men. As discussed in popular media, however, family structure does not create any relevance in any region. However, in general, the marginal effects of education and media exposure are smaller in magnitude among women.

DISCUSSION

The eastern, northern and central regions appear to be critical with respect to the proportions of men and women possessing correct knowledge about the path of transmission of TB. Share of women having correct knowledge is less than that of men at the country level as well as across regions. Among women, in all of the north, central and east, education (both secondary and higher) is strongly, positively associated with correct knowledge whereas media has awareness improving role only in the east. Neither education nor media has any strong impact on TB related awareness among men in the north and central regions with the exception of the east. A survey of adult patients across four north Indian states at the beginning of treatment in the public sector demonstrated that overall TB related knowledge was positively and significantly associated with literacy and education[6]. The eastern zone presents one area of concern, where the prevalence of TB is the highest, following the north eastern states. However, there is significant impact of education and exposure to mass media to increase correct knowledge regarding the disease among both sexes. A study conducted in Ethiopia which is one of the high TB burden countries using its health and demographic survey data reveals that overall knowledge among adults regarding TB was low and lower among men than a woman which is contrary to the finding of the present study. Additionally, rural residence and unskilled manual and agricultural labourers in case of women and primary and lower level of education, lowest wealth quintiles and lack of access to media in case of both genders were significantly associated with low awareness of TB[7]. The present paper succinctly brings out a crucial point pertaining to TB management. For nearly asymptomatic communicable diseases like TB, in the initial phases, people do not actually realize that they are infected and hence often demand less of care, even if they are physically available and free of cost. Lack of knowledge creates barriers for patients to reach the window of health care. Also, undertaking preventive measures becomes a challenge. Hence, in addition to free public services for cure, optimal levels of education and awareness programs are called for. The paper delves deeper to find that improved education and media exposure really cannot solve the problem in isolation, rather interaction of a set of socio-economic factors also plays a crucial role. This is in sync with the findings of a number of studies[8,9].

CONCLUSION

TB related awareness in communities is indispensible as it complements efforts and programs targeted at controlling the TB epidemic. Correct knowledge without misconceptions about the route of transmission of TB infection not only provides primary prevention from infection on following cough etiquette but also ensures that people do not suffer from myths and baseless fears about the disease which may encourage stigma.The success of the target oriented RNTCP in tuberculosis control in India relies heavily on passive case detection and self-reporting by patients to the health facility, which largely remains as only a supply-side response to the problem. Providing correct information relating to symptoms and mode of spread of pulmonary TB can potentially increase the demand for sputum smears. With such demand issues remaining grossly unaddressed, universal coverage and effectiveness of TB control programs is less probable.Singular focus on treatment of reported cases leaves out many diseased individuals who are potential threats to community health but have not been medically diagnosed because they did not seek medical assistance by self-reporting due to reasons including TB related knowledge deficiency and/or stigma issues. The paper highlights the need to look beyond the jargon of ‘detection and cure rates’as the TB control program in India most often tends to focus on. A part of such program, the Information-Education-Communication (IEC) wing in particular should be consciously directed to information dissipation and delivery of TB

related messages via alternative forms of media, taking particular care to address socio-economic vulnerabilities specific to regions, that pose further challenge to ensuring the effectiveness of raising awareness. Door to door campaign might be suggested as a step towards improving the awareness scenario.

CONFLICT OF INTEREST

None

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None

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ASSESSMENT OF HEALTH-RELATED QUALITY OF LIFE AMONG TUBERCULOSIS PATIENTS WITH AND WITHOUT DIABETES IN WESTERN REGION OF NEPAL

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ABSTRACT

Introduction: Currently Tuberculosis is a great public health importance globally especially in developing countries due to the converging epidemics of communicable diseases. Quality of life is important for people with diabetes and TB and their health care providers for several reasons. Objective of the study was to assess status of quality of life among tuberculosis patients with and without diabetes.

Methods: This research was health facility based cross sectional study and carried out among TB patients registered under directly observed treatment short course therapy and receiving treatment from health facilities of Western Region of Nepal. Interview schedule was used to collect the data. Quality of life was assessed by using Nepali version of WHOQOL-BREFF questionnaires. Data was entered in Epi Data software and analysis was performed with the help of the statistical package for social science version 20.

Results: A total 390 TB patients were participated in this study. The overall prevalence of diabetes mellitus among TB patient was 10.8%. More than half of participants were 15-40 years of age. WHOQOL-BREF measure overall quality of life of TB patients was 68.82±10.79 and it was poor levels of quality of life. Among different socio-demographic variables such as older people, married and illiterate participants had poor QOL than others. HRQoL is affected by age, sex and marital status. TB with diabetes patients had lesser overall quality of life (88.1%) than the TB without diabetes patients (94.4%).

Conclusion: The finding suggests that to improving for TB Patients of Health literacy and counselling are promoted to achieve optimum levels of QOL.

Key words: Diabetes, Tuberculosis, Quality of Life, Western Nepal

INTRODUCTION

Tuberculosis (TB) remains a considerable global public health concern, mainly affecting poor and vulnerable populations. Every year, more than 9 million people fall ill with this infectious disease, and close to 2 million die from it[1].According to the World Health Organization, there were an estimated 8.8 million incident cases of TB globally in 2010[2]. Tuberculosis (TB) remains a major public problem in Nepal. In 2017/18, the total of 32,474 cases of TB were notified and registered at NTP[3]. Health-related quality of life (HRQOL) provides a multidimensional perspective that encompasses a patient's physical, emotional, and social functioning[4].

The World Health Organization defines quality of life (QOL) as an "individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.

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It is a broad-ranging concept affected by an individual's physical health, psychological state, and level of independence, social relationships, and their relationship to salient features of their environment[5]. Health-related quality of life (HRQOL) provides a multidimensional perspective that encompasses a patient's physical, emotional, and social functioning[4].Quality of life is important for people with diabetes and TB and their health care providers for several reasons.

This study was conducted with objective to assess quality of life among tuberculosis patients with and without diabetes in western region of Nepal.

METHODS

Study design

This study was carried out as an institutional based cross sectional study design in DOTS centres of western region of Nepal.

Study period

The study period was from September 2016 to June 2018.

Study setting

The study was conducted in DOTS centres of Nawalparasi, Tanahun and Kaski of western development region of Nepal.

Sample size and sampling procedures

The sample size was determined by assuming latest diabetes among TB patients for adults in Nepal by 2015. So the prevalence was 9.1% [6].

The sample size was determined by using the formula

$n = z2pq/d2$

Where:

n = Desired sample size

z = Standard normal deviate, usually set at 1.96 which corresponds to 95% confidence level

p = 0.09

d = Permitted error (5%, if the confidence level is 95%); 0.05

q = 1 – p; (1-0.09 =0.91)

Therefore no = (1.96)2*0.09*0.91

(0.05)2

= 126

Design effect for cluster sampling = 3 (126*3=378)

Required sample = 390 (Adding for 12 participants because easy to divide in different districts and clusters)

A total required number of participants were 390, which was obtained from thirty cluster sampling. Thirteen participants were selected from each cluster (DOTS centre) from selected districts.

The sample was selected by cluster sampling techniques.

First Stage: Three districts (Nawalparasi, Tanahun and Kaski) were chosen from two ecological zones (Flat and Hilly) as randomly. Second Stage: Total no. of DOTS Centers functioning in each district, list was prepared. DOTS Cnters from each district were selected by cluster method. Thirty clusters (equal number of DOTS centre was selected from each district) sampling techniques was applied for the selection of the DOTS Centers from three districts. Third Stage: Participants from each DOTS centre was recruited as proportioned basis upon the total number of patients registered under DOTS Centers in each district. A total 390 participants were selected from 29 clusters of three districts.

Study population

Study population was the tuberculosis patients under DOTS therapy.

Inclusion criteria and Exclusion criteria

Tuberculosis patients were receiving medication under DOTS therapy and completed intensive phase and aged 15 years and above were considered as the study participants. Patients who were unavailable on the day of data collection were excluded.

Data collection tools and techniques

Data were collected through interview using an interview schedule, and also through review of

patient's treatment cards for necessary information. Interview schedule was divided into three sections. First section included the socio-demographic characteristics of the participants. Second section focused about life style and related behaviors of participants. Third section focused on the quality of life which was assessed using Nepali version of WHOQoL-BREF questionnaires. Data was collected by face to face interview method using an interview schedule. WHO-BREF provides a multidimensional perspective that encompasses a patient's physical, psychological, social and environmental functioning.

Nepali version of WHO quality of life questionnaire (WHOQOL-BREF) which was a 26 item questionnaire which is closed ended and options were given in Likert scale. The 5-point Likert scale ranges from 1 through 5. Higher scores indicate a better quality of life. The WHOQoL-BREF contains four specific domains which include: (a) physical health, (b) psychological well-being, (c) social relationships and (d) environment. The raw scores for each domain of WHOQOL-BREF were calculated by adding values of single items. Raw scores were transformed on the scale ranging from 0 to 100, where 100 is the highest and 0 the lowest health related quality of life.

The Glucometer instrument was used for the purpose of estimation of Blood Glucose levels and status of disease condition such as Diabetes Mellitus to the TB patients. For self reported diabetes condition, if patients were able to show their medication slips or patient cards or diagnosis slips with blood glucose level that ensure the confirmation of diabetes mellitus. Height was measured by using stadiometer and weight was measured by using bathroom scale and calibrate this machine was followed by every day at starting phase.

DM status was assessed through the Glucometer instrument for the estimation of Blood Glucose levels and status of disease condition such as Diabetes Mellitus to the TB patients. Participants whose random blood sugar level ≥140 mg/dl at the time of the study and it was tested by using glucometer (CLEVER CHEK TD-4279 Blood Glucose Monitoring) system was considered to have diabetes.

Statistical information

Data were entered in Epi Data software and analysis was performed with the help of the statistical package for social science (SPSS) version 20. Frequency distribution and cross tabulation between dependent and independent variables was used to describe and summarize the basic background and characteristic of participants. Descriptive statistics (i.e., frequency, percentage, mean and standard deviation) was applied to calculate the mean scores of the overall QoL. Logistic regression was applied to identify the factors associated between dependent and independent variables.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Committee of Pokhara University Research Center. Administrative permission obtained from regional health directorate office, Pokhara, kaski. Participants were fully informed regarding study objectives and written consent was obtained prior to the initiation of the data collection. Informed consent was taken from participants whose age was equal and more than 18 years, but for those less than 18 years of age assent was also taken from their guardian.

RESULTS

A total 390 TB patients were participated in this study. Table 1 showsMore than half of participants were 15-40 years of age. Majority (64.61%) of participants were male. Jointand extended family was common among participants. Majority (28.20%) of participants were upper caste groups. Based on religion, most (81.3%) of them were Hindu. Majority (78.97) of participants were from urban area

Table 1: Socio-demographic characteristics of the participants		
Characteristics	**Frequency**	**%**
Age		
15-40 years	218	55.9
41-64 years	122	31.3
65-92 years	50	12.8
Mean: 40.67, SD: 17.912		
Gender		
Male	252	64.61
Female	138	35.38
Family Type		
Nuclear	125	32.05
Joint and Extended	265	67.94
Ethnicity		
Dalit	62	15.89
Disadvantaged non-dalitTerai caste	46	11.79
Disadvantaged Janajatis	80	20.51
Religious minorities	37	9.48
Upper caste groups	110	28.2
Relatively advantaged Janjatis	55	14.1
Religion		
Hindu	317	81.3
Islam	4	1
Buddhist	58	14.9
Christian	11	2.8
Marital Status		
Unmarried	105	26.92
Married	242	62.05
Divorced	4	1.02
Widowed	11	2.82
Bidur	28	7.17
Temporary Residence		
Urban	308	78.97
Rural	82	21.02

Table 2: Socio-economic characteristics of the participants		
Characteristics	**Frequency**	**%**
Educational Status		
Illiterate	72	18.46
Non-formal	101	25.89
Primary & Lower secondary level	79	20.25
Secondary & higher secondary level	114	29.23
Bachelor& above	24	6.15
Currently Employed		
Yes	92	23.58
No	298	76.41
Occupation		
Agriculture	71	18.20
Job	38	9.74
Business	40	10.25
Household works	68	17.43
Daily wages/ labor	23	5.89
Unemployment	150	38.46

Table 2 shows that Illiteracy was quite high (18.46%). Only 23.58% of participants were currently employed while majority (76.41%) of them was unemployed whereas 18.20% were engaged in agriculture and 17.43% household works.

Table 3 shows that raw scores for each domain of WHOOQL-BREF was calculated by adding the value of single item and all scores were transformed to reflect 0–100 for each domain with higher scores corresponding to a better QOL. Total score, mean score, minimum, maximum and standard deviation were calculated. Domain wise mean score and standard deviation for physical domain was 63.01±12.56, for psychological domain was 66.45±12.52, for social domain it was 74.34±13.83, for environment domain was 71.70±14.76 and for overall QOL, it was 68.82±10.79

Table 3: Descriptive statistics of transformed score of QOL of patients with TB					
Domains	**Total score**	**Minimum**	**Maximum**	**Mean**	**Stand. Deviation**
Physical	100	13	94	63.01	12.56
Psychological	100	13	94	66.45	12.52
Social relations	100	0	100	74.34	13.83
Environment	100	0	94	71.50	14.76
Overall QOL	100	8	90.75	68.82	10.79

Table 4 shows that Participant with the score of 50 and above were classified as having good QOL and less than 50 score as having poor QOL. It was seen that majority (94.4%) of TBNDM participants had good overall quality of life whereas TBDM participants (88.1%) had good overall quality of life. Domain wise among TBNDM, 90.3% had good physical QOL, 93.3% had good psychological QOL, 96.9% had good social QOL and 95.4% had good environmental QOL. Among TBDM, 83.3% had good physical QOL, 83.3% had good psychological QOL, 97.6% had good social QOL and 95.2% had good environmental QOL.

Table 5 shows that association between socio-demographic variables and domains of QOL. Among different socio-demographic variables, age was associated with all domains except social domain and overall QOL. Similarly, marital status of participant was associated with physical, psychological and overall QOL while educational level was associated with physical domain, psychological, social domain and overall QOL.

Table 4: Categories of quality of life based on scores

Domain	TBNDM		TBDM	
	Good Scores (≥50)	Poor Scores (< 50)	Good Scores (≥50)	Poor Scores (< 50)
Physical QOL Score	90.3%	9.7%	83.3%	16.7%
Psychological QOL Score	93.3%	6.7%	83.3%	16.7%
Social QOL Score	96.9%	3.1%	97.6%	2.4%
Environment QOL Score	95.4%	4.6%	95.2%	4.8%
Overall QOL Score	94.4%	5.6%	88.1%	11.9%

Table 5: Association between Socio-demographic characteristics of participants and domains of Quality of Life among TB patients

	Physical Domain		Psychological Domain		Social participation		Environment Domain		Overall facets	
Variables	P-value	OR (C.I.)	P-value	OR (C.I.)	P-value	OR (C.I.)	P-value	OR (C.I.)	p-value	OR (C.I.)
Age 15-40/ 41-92	0.001*	0.370 (0.238-0.576)	0.001*	0.291 (0.170-0.499)	0.074	0.456 (0.224-0.965)	0.001*	0.415 (0.226-0.763)	0.001*	0.326 (0.185-0.577)
Gender Male/ Female	0.362	0.72 (0.36-1.44)	0.610	1.25 (0.52-2.95)	0.445	1.66 (0.44-6.26)	0.49	1.44 (0.50-4.14)	0.719	1.18 (0.47-2.97)
Ethnicity Upper caste group/Others	0.627	1.19 (0.581-2.46)	0.229	1.65 (0.72-3.75)	0.802	0.84 (0.22-3.17)	0.621	1.28 (0.47-3.52)	0.698	1.20 (0.47-3.03)
Religion Hindu/Non-Hindu	0.206	0.61 (0.28-1.32)	0.652	1.28 (0.429-3.85)	0.349	2.58 (0.32-20.37)	0.397	1.88 (0.42-8.39)	0.947	1.03 (0.34-3.16)
Marital Status Unmarried/ Married	0.016*	0.29 (0.10-0.84)	0.022*	0.21 (0.04-0.91)	0.140	0.24 (0.03-1.87)	0.121	0.32 (0.07-1.44)	0.015*	0.12(0.01-0.91)
Temporary Residence Urban/Rural	0.678	1.19 (0.50-2.83)	0.219	2.12 (0.622-7.261)	0.707	1.34 (0.288-6.24)	0.642	1.34 (0.38-4.77)	0.381	1.73 (0.50-5.99)
Education Status Illiterate/ Literate	0.035*	2.06 (1.04-4.09)	0.026*	2.51 (1.09-5.80)	0.030*	3.91 (1.04-14.68)	0.051	2.62 (0.96-7.13)	0.006*	3.58 (1.37-9.36)

Table 6: Association of TBNDM and TBDM with domains of QOL and overall QOL					
Domain	TBNDM n(%)	TBDMn(%)	p-value (Chi-square)	OR	C.I.
Physical domain Good QOL Poor QOL	 317(91.1%) 31(8.9%)	 35(83.3%) 7(16.7%)	 0.109	 0.489	 0.201 1.192
Psychological domain Good QOL Poor QOL	 329(94.5%) 19(5.5%)	 35(83.3%) 7(16.7%)	 0.006*	 0.289	 0.113 0.735
Social domain Good QOL Poor QOL	 337(96.8%) 11(3.2%)	 41(97.6%) 1(2.4%)	 0.782	 1.338	 0.168 10.634
Environment domain Good QOL Poor QOL	 332(95.4%) 16(4.6%)	 40(95.4%) 2(4.8%)	 0.962	 0.964	 0.214 4.346
Overall QOL Good QOL Poor QOL	 331(95.1%) 17(4.9%)	 37(88.1%) 5(11.9%)	 0.063	 0.380	 0.133 1.090

TBNDM: Tuberculosis with not Diabetes MellitusTBDM: Tuberculosis with Diabetes Mellitus

Table 6 shows that it was seen that only psychological domain of QOL was associated with TBNDM and TBDM while others were not.

DISCUSSION

This study revealed that Domain wise quality of life score was recorded in social relationship domain of health 74.34±13.83 while the lowest was in the physical domain was 63.01±12.56. The mean transformed quality of life score in the other domains of health included 71.70±14.76for environment domain and 66.45±12.52for psychological domain. This is similar to the study conducted in Africa and KotlinaJeleniogórska, German[7].

The study shows that Age, marital status and educational status influenced the health related quality of life scores in different dimensions. The study conducted in Tehran also shows that there is Sex, marital status, education, job status, place of residence, and cigarette smoking, influenced the HRQoL[8].

This Study assessed domain wise impact in Quality of life and factors associated with them. In this study, it was seen that majority of TBNDM participants had good quality of life while participants with TBDM had poorer quality of life. In the study, age is significantly associated with physical and psychological domains of QOL the younger age group had better quality of life in the physical, psychological and social relationship domains of QOL compared with those with advancing age groups. This is similar to the study conducted in Africa. Males had better QOL than females whereas in study by Adeyeye et al. females were found to have better QOL than males. The reason behind it may be that females in our society are care taker of family members but they are not cared while they are sick or have any type of disease condition. Those with spouses had a better QOL in all the domains of

QOL while those without spouses fared worse in the all domains of quality of life which is contrary to the study by Olufunke O. Adeyeye[9].

CONCLUSION

WHOOQL-BREF measure overall quality of life of TB patients was 68.82±10.79 and it was poor levels of QOL. Domain wise mean score and standard deviation for physical domain was 63.01±12.56, for psychological domain was 66.45±12.52, for social domain it was 74.34±13.83, for environment domain was 71.70±14.76. It was seen that majority (94.4%) of TBNDM participants had good quality of life whereas lesser number of TBDM participants (88.1%) had good quality of life. Among different

socio-demographic variables such as older people, married and illiterate participants had poor QOL than others. HRQoL is affected by age and sex.

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CONFLICT OF INTEREST

None

RECOMMENDATIONS

WHOOQL-BREF measure overall quality of life of TB patients was poor and lowest domains are physical and psychological. So, health services would be focused to improve the both dimension of health. Health literacy and exercise are promoted to achieve optimum levels of QOL. Co-morbidity of DM affects the overall quality of life of TB patients, so develop and implement disease management strategies for both disease conditions.

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THE PREVALENCE AND DETERMINANTS OF ACTIVE TUBERCULOSIS AMONG DIABETES PATIENTS IN TERTIARY CARE HOSPITALS OF NEPAL 2018

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ABSTRACT

Introduction: Researches implicated diabetes as independent risk factor for multi-drug resistant tuberculosis and unfavorable outcome of treatment. There is no data to address the association between diabetes mellitus (DM) and tuberculosis (TB) in Nepal. Thus we assessed the burden and demographics of active tuberculosis among diabetic patients attending tertiary care hospitals in Nepal.

Methods: A cross-sectional study was conducted in adult DM patients attending seven tertiary care hospitals representing five development region of the country. Relevant data were collected and participants were screened for active TB (symptom screening and microbiological diagnosis).

Results: Among the 520 enrolled DM patients screened, 23 had active TB. The prevalence was 4.42% (CI 2.96 - 6.54). The positive cases had older age group with the mean age of 59.73 ± 17.36 years with male predominance of 78% (18/23). Among the 23 positive cases, only two (8.69 %) had extra pulmonary TB. Diabetic control had significant (p=0.006) relationship to develop Tuberculosis. The comorbid conditions e.g., Hypertension (OR 13, 95% CI: 4.54 to 37.14); diabetic nephritis (OR 9.25, 95% CI: 2.03 to 42.20); and Diabetic neuropathy (OR 26.66, 95% CI: 5.16 to 137.71) are significant risk factors to develop tuberculosis among the diabetes patients. There were no significant differences in occupation, literacy rate, tobacco or alcohol consumption, HbA1c levels between TB and non-TB participants.

Conclusion: The prevalence of tuberculosis among diabetic patients is low in Nepal. This is the result of tertiary care hospital outdoor patients only, thus representativeness was compromised. Thus to assess the magnitude of comorbidities, mandatory screening in all level were recommended.

Key words: Diabetes, Tuberculosis, Prevalence

INTRODUCTION

The burden of diabetes and tuberculosis are enormous, particularly in developing countries. The International Diabetes Federation has reported that there were 451 (95% CI 367 – 585) million cases of diabetes worldwide in the year 2017 and about 79% of people with diabetes live in low- and middle-income countries.[1] Meanwhile, the World Health Organization has reported that an estimated 10.4 million cases of tuberculosis occurred worldwide in the year 2016 and 87% of all the cases occurred in the 30 high-burden countries, many of which are low and middle income countries.[2] The interactions between these two diseases present additional clinical as well as a public health challenge. Diabetes has long been recognized as an important risk factor for tuberculosis. The widely quoted systematic review published in 2008 had found that DM was associated with an increased risk of TB by three-fold (Relative Risk 3.11, 95% CI 2.27-4.26).[3] The more recent studies have however estimated this risk to be between 1.77 (95% CI 1.48–2.11) to 2 (95% CI 1.78 – 2.24).[4,5] A systematic review

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and meta-analysis has also reported that diabetes confers a small but statistically significant risk of latent TB infection (pooled odds ratio 1.18 (95% CI, 1.06–1.30).[6] Diabetes also affects the natural history of tuberculosis and is associated with the worse treatment outcomes. It is associated with the delayed sputum conversion (aOR 1.51, 95% CI 1.09 to 2.10) and a higher probability of treatment failure (aOR 2.93, 95% CI 1.18 to 7.23).[7] A systematic review has implicated diabetes as a risk factor for death (RR, 1.89; 95% CI, 1.52 to 2.36), and increased risk of relapse (RR, 3.89; 95% CI,2.43 to 6.23) as well.[8] In another meta-analysis, diabetes has also been identified as an independent risk factor for the multi-drug resistant tuberculosis (OR 1.71; 95% CI = 1.32, 2.22).[9] Conversely, tuberculosis in itself can worsen glycemic control among the people with diabetes. The interactions between the drugs can further complicate the picture, leading to a reduction in the effectiveness of both tuberculosis and diabetes treatments, as well as potential worsening of drug side-effects.[10, 11]Available studies have reported that the prevalence of active tuberculosis among the people with diabetes range from 0.38% to 14% with the overall median global prevalence as 4.1% (IQR 1.8%-6.2%). The median prevalence from Asia has been reported as 3.5% (IQR 0.9 – 10.5%).[12] A screening program in six diabetes clinics of tertiary healthcare centers in India identified 18 cases of active tuberculosis as a result of the screening program.[13] Another study at a single tertiary care hospital from Bangladesh identified 37 cases of active tuberculosis while screening the people with diabetes.[14] A cross-sectional study in a tertiary care center in Eastern Nepal detected eight cases of tuberculosis among the 100 patients with established diabetes.[15]

For optimal outcomes of both the conditions, therefore, people with diabetes should be considered for evaluation of tuberculosis and vice –versa. World Health Organization (WHO) and the International Union Against Tuberculosis and Lung Disease launched the Collaborative Framework for the care and control of diabetes and tuberculosis in 2011.[16] It provides a guidance to the policy makers and health-care professionals in combating the dual epidemic with an emphasis on operational and clinical research to build-up and strengthen the evidence base for action. It has been further emphasized in the Bali declaration in 2015 which declared the looming tuberculosis-diabetes co-epidemic as a public health priority and called for early and decisive action.[17]

Nevertheless, the adaptation and implementation of the collaborative framework under national programs have been slow. Several programmatic issues challenge the implementation of the TB-Diabetes bidirectional screening and its cost-effectiveness, particularly in the resource limited settings.[18] The lack of non-communicable disease program or systematic and decentralized diabetes management centers in many developing countries make it more difficult to implement an effective collaborative model of care.[19]

Thus, it is imperative that the people with diabetes are screened for tuberculosis and vice-versa using the cost-effective screening strategies available, which are also feasible under the programmatic conditions. In this study, we aimed to estimate the prevalence of active tuberculosis among the people with established diagnosis seeking care at large public healthcare centers using the existing tools as per the national tuberculosis program protocols. We also aimed to assess the risk factors for developing active tuberculosis among the diabetic population to help identify the most appropriate individuals who will likely benefit from TB screening. This study also assessed the baseline knowledge of tuberculosis among those patients with diabetes mellitus

METHODOLOGY

This study aimed to assess the prevalence of active tuberculosis among the people with established diabetes. Therefore, a cross-sectional research design had been applied. The study sites were selected purposely. The diabetes care in Nepal is mainly provided through tertiary care centers or specialized private centers by endocrinologists and internists. These centers are concentrated in more accessible cities and Kathmandu, the capital city, contributes to a significant proportion of patients who seek diabetes care. Accordingly, this study had identified one major city in each of the five development regions. The centers identified are all large public hospitals, preferably university hospitals with a high volume of patients and services for diabetes management. Due to the high volume of patients, three major university teaching

hospitals had been identified from Kathmandu valley. Thus the sites were Institute of Medicine, Tribhuvan University Teaching Hospital, National Academy of Medical Sciences, Bir Hospital and Patan Academy of Health Sciences, Patan Hospital from central region; BP Koirala Institute of Health Sciences from Eastern region; Pokhara Academy of Health Sciences, Gandaki Regional Hospital from western region; Bheri Zonal Hospital from Mid- Western region and Seti Zonal Hospital from Far-Western region.

People with established diabetes mellitus, who were attending to above hospitals during study period (August to October, 2019). The primary sampling units were each of the study site with diabetes clinics selected for the study and secondary sampling units were patients with established diabetes mellitus attending those hospitals.

The sample size had been calculated by the formula $n = Z^2P(1-P)/d^2$. P is expected the prevalence active TB among the people with diabetes taken as 3.5%[12]. An additional 20% non-response rate had been estimated. Multi stage sampling was done. First stage was done by selecting each center considered as a cluster. Within each cluster, second stage was by systematic random sampling. The first sample was selected randomly and then every 5th patient with diabetes were included in the study till the required number of participants was obtained.

Consented adults of 16 or more years of age with established diabetes mellitus according to ADA 2018 criteria for the diagnosis of Diabetes were included in the study.

In every study site, a focal person took the responsibility in close collaboration with the head of the institution to coordinate the data collection. A team from the SAARC TB and HIV/AIDS center comprising of the Principal Investigator and study team members visited each study sites and short training was done. A definite algorithm (Referenced by the national tuberculosis program) were followed to screen the study participants.

Operational definitions were clearly defined in the data collection tool. The strategy of screening for active TB and testing them for confirmation has been validated and recommended by the World Health Organization, including in the settings of TB prevalence surveys.[20, 21]

Data management and analysis

Data entry was done in Microsoft Excel 2016 and Analysis in IBM SPSS 23. Socio-demographic and other relevant characteristics of the study participants using mean, standard deviation, median and percentages as appropriate. Data was statistically analyzed with the significance level setting as two-tailed and at p value <0.05. Descriptive statistics for continuous variables were described as means ± standard deviation, while categorical data were reported as frequency and percentage. Differences between the two groups (males and females) were compared using Fisher's exact test for categorical variables, or independent t-test for continuous variables. Odds ratio were calculated to identify the risk factors associated with active tuberculosis.

Ethical approval

Ethical approval were taken from Nepal Health Research Council and appropriate local ethical board of Pokhara Academy of Health Sciences, Gandaki Regional Hospital, Patan Academy of Health Sciences, Patan Hospital

RESULTS

A total of 520 eligible participants were enrolled in the study and went through the data collection and laboratory diagnosis. Among them, 23 were diagnosed as having Tuberculosis. The prevalence counted as 4.42%. The mean age of the study subjects was 54.34 ± 12.67 years. 18 (3.5%) subjects were aged less than 30 years, 23 (4.4%) aged between 31–35 years, 34 (6.5%) of them were aged between 36–40 years, 62 (12%) subjects were aged between 41–45 years, 72 (13.8%) between 46–50 years, and 311 (59.8%) of them were aged >50 years. The mean age of the positive TB cases were 59.73 ± 17.36 years with a minimum 28years, maximum 83 years and median age of 62 years. The gender-wise demographic information of all participants is detailed in Table 1. Females were comparatively younger than male (53.57±12.12 vs. 55.40±13.17 years; p = 0.001). Gender difference were seen in educational status, occupation and personal habits. Majority of men

Table 1: Demographic details of the Study				
Characteristics	**Total (n=520)**	**Male (n=228)**	**Female (291)**	**P value (Male vs. Female)**
Age (years) Values are mean ± SD	54.34±12.67	55.40±13.17	53.57±12.12	0.001
Educational Status				
Literate	293 (56.34 %)	172 (75.43 %)	121 (41.58%)	Not significant
Illiterate	219 (42.1%)	53 (23.24%)	166 (57%)	
Personal habit				
Smoking	77 (14.8%)	56 (24.56%)	21 (7.21%)	Not significant
Alcohol	59 (9.8%)	51 (22.36%)	8 (2.75%)	Not significant
Tobacco	45 (8.65%)	35 (15.35%)	10 (3.43%)	Not significant

** χ^2 test and Fisher's exact test were done

were employed compared to women. Above 22% of men gave history of smoking or consuming tobacco in other form and about 15% consumed alcohol. Among the positive TB cases, 78% (18/23) were male and 21% (5/23) were female.

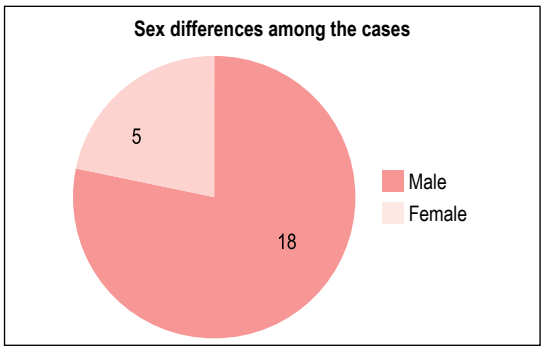

Figure 1: Shows the sex differences of the positive cases who were positive to have TB.

Among the 23 positive cases, only two (8.69 %) had extra pulmonary TB. Rest 23 (91.3%) were diagnosed to have pulmonary TB.

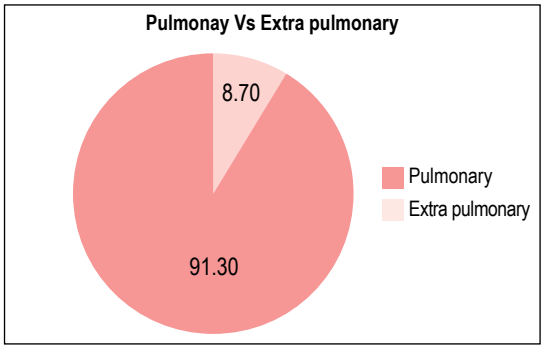

Figure 2: Common type of Tuberculosis among the diabetic patients, Nepal, 2018

While going through the demographic detail, none of the educational status, marital status shows any significant relation with the positive TB cases

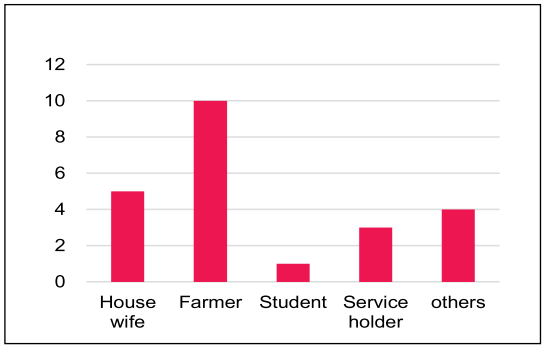

Figure 3 : The occupation of the Cases were classified

Personal habit like tobacco and alcohol consumption or chewing of betel nuts or any other addictive substance didn't show any significant relationship to develop TB among the diabetic patients. However the other co morbidities associated with diabetes showed as a risk factor to develop Tuberculosis among the participants.

Table 2: Relationship of the comorbidities			
Co morbidities	Odds ratio	95% CI	Significant level
Hypertension	13	4.54 to 37.14	P < 0.0001
Diabetic nephritis	9.25	2.03 to 42.20	P = 0.0040
Diabetic Neuropathy	26.66	5.16 to 137.71	P = 0.0001
Dyslipidemia	2.77	0.84 to 9.08	P = 0.0911

Table 2 shows the relationship of the comorbidities which acted as a risk factor. Among the positive

twenty three cases, the duration of diabetes calculates as 11.48 ± 7.72 years (mean ± SD). They are taking treatment of diabetes for average 9.83 years. Diabetic control had significant (p=0.006) relationship to develop Tuberculosis. We asked five questions to assess the baseline knowledge of tuberculosis among the patient with diabetes. The variables were fact tuberculosis and its cause, symptoms, transmission and risk factors and Tuberculosis. The response of these are tabulated in Table 3.

Table 3: Baseline knowledge of tuberculosis among the patient with diabetes

S.N.	Questions	Positive answers (%)
1.	Do you know, Tuberculosis is a curable disease or not?	60
2.	Tuberculosis is caused by?	52.17
3.	How Tuberculosis is transmitted?	60.86
4.	Do you know the risk factor for tuberculosis?	73.91
5.	Can you mention the symptoms for tuberculosis?	73.91

DISCUSSION

In this study the overall prevalence of Tuberculosis among the diagnosed diabetes patient was seen as 4.42%, which is comparable with other studies which it shows that among the 78 studies, 48 (61.5%) studies were conducted in countries of Asia and showed prevalence rates ranging from 5.1% in Saluru-South India to 44% in Kerala-India[12]. This meta-analysis also showed, overall median prevalence of DM among TB patients in Asia was calculated to be 17% (IQR 11.4%-25.8%).

Among the positive cases we see male predominance (78%). In many of the studies, diabetes was associated with a progressive shift of male predominance with tuberculosis[22]. It might be because, male are more active in outside social activities then women and in Asian countries in middle and lower socio economic group. Though the other socio cultural variables were not evaluated in this study, different factors might play important role to explain this gender gap including biological differences in disease and disease presentation and different access to health care specifically in developing countries[23]. Also the mean age of the positive TB cases were 59.73 ± 17.36 years with a minimum 28years, maximum 83 years and median age of 62 years, which shows prevalence is more in older age group. Similar phenomena was seen in some other studies where they found diabetic group of TB was older in age with longer duration of cough [24].

Pulmonary tuberculosis were more (91.3%) among the study participants. This might be because of the diagnostic hurdle and unavailability of the diagnostic facilities among the study sites. On the other hand, pulmonary tuberculosis is predominant in these settings of Nepal. Most of the positive cases were farmer (43%). Other occupation poses minimal threat to develop Tuberculosis. The exact cause of this occupational relationship were not revealed in depth.

In many studies, Diabetes mellitus itself was identified as a risk factor for developing tuberculosis infection. In this study smoking, consumption of alcohol, educational level didn't pose any threat to develop tuberculosis among the diabetes patients. But tuberculosis developed most frequently in patients with poor diabetic control and associated co morbidities were significant risk factors to develop tuberculosis.

Similarly, poor glycemic control in Asian populations represents a potentially important risk factor for TB[25]. This might be because, hyperglycemia could play a role to alter the immune responses to the causative organism of tuberculosis in diabetic patients. Some studies shown that poor Diabetes control (indicated by HbA1c level) was associated with differences in the innate and cellular cytokine responses to stimulation with purified protein derivative from M. tuberculosis, thus facilitating progression to active TB[26]. Another recent study, that recruited 4,690 elderly diabetic patients in Hong Kong, showed that the patients with greater HbA1c value (>7%) had a hazard risk of active TB that was 3 times increased compared with those who had HbA1c < 7% (HR 3.11; 95% CI 1.63–5.92, $\boldsymbol{p} < 0.01$)[27].

In this study, other co morbidities related to diabetes e.g., Hypertension, Nephritis, Neuropathy and Dyslipidemia came up as significant risk factors to develop tuberculosis. The reason might be same as hyperglycemia; compromised and poor immune response;and interaction of the microorganism etc.

The study participants had overall good conception regarding tuberculosis. Several questions were asked to reveal the baseline knowledge of tuberculosis. More than half of the participants came up to have good knowledge.

However there were some limitations of the study. As much as an effort has been made to take samples representative of the whole country, many of the health centers could not be included. The private diabetes centers, which also hold a significant number of patients with diabetes, have not been included in the study. Also all the patients have not been screened for microbiological analysis. Thus the study result could not be generalize to be representative of Nepal.

Thus more comprehensive study is recommended including the private sector, indoor patients. Also it is recommended to have mandatory tuberculosis screening to all indoor and outdoor patients who will be coming to take health care.

CONFLICT OF INTEREST

None

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Case Study

A COMMON DISEASE WITH UNCOMMON PRESENTATION: SPINA VENTOSA

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ABSTRACT

Introduction: Tuberculosis of short tubular bones of hand and foot is called tuberculousdactilitis or "spinaventosa". This is uncommon type of osteoarticular tuberculosis more often seen in children than adults.This report describes tuberculosis affecting third metacarpal bone in a 25-year-old male patientpresenting with a firm, painless, progressively increasing swelling over the dorsum of left hand. Diagnosis was made by cytological examination of aspirate from the affected area.

Keywords: tuberculousdactylitis, spinaventosa.

INTRODUCTION

Tuberculosis affecting short tubular bones such as metacarpals, metatarsals and phalanges called as tuberculousdactylitis. This entity is uncommon and also called 'spinaventosa'('spina' = a thorn/short bone;'ventosa' =full of wind or distendedwith air). There is a spindle-shapedexpansion of the affected bone due to underlying granulomatouslesion. Radiography of left hand revealed cystic expansion of the bone. The bone of hands are more affected than bone of feet. This condition is rarely seenafter the age of five years[1].The present report describes a case of spinaventosa involving third metacarpal bone in an adult male with absent ofprimary foci of tuberculosis at other body site.

Case report

A 25 year old male student presented with a swelling onthe dorsal side of left hand for the last five months. The swelling was insidious, gradually increasing in size but painless. He denied any history of trauma, fever or constitutional symptoms. He had no known medical conditionsand was not receiving any medications.

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On examination, there was a 3x5 cm sized nodular swelling around the left third metacarpal. It was firm to hard in consistency, slightly tender todeep palpation with ill-defined margins and normal skin temperature. Movements at the adjacent metacarpophalangeal joint were slightly restricted. There was no lymphadenopathy. General physical examination and clinical evaluation of other systems were unremarkable.Skiagramof the left hand revealeda cystic expansile lesion at the third metacarpal bone. The margins were well defined with internal septations and cortical sclerosis but without any periosteal reaction.

Figure 1

Routine investigations including blood counts, serologic test for the human immunodeficiency virusandother biochemical tests, etc were normal except a raised ESR (55 mm in 1st hour). The chest radiography was also normal. Fine needle aspirationcytology from the lesion showedgranuloma composed of clusters of epithelioid cells, multinucleated langhans type giant cell and lymphocytein the background of abundant caseous necrosis. The subsequent tuberculin skin test revealed an induration of 35 mm. The patient was initiated on combination chemotherapy with isoniazid, rifampicin, ethambutol, and pyrazinamide according to body weight. Initial two months follow up showed a reduction in the swelling but the patient did not come to follow-up visits thereafter.

DISCUSSION

Tuberculousdactylitis is a rare form of osteoarticular tuberculosis that involves short tubular bones of hands and feet. The first anatomical description of this condition was given by Boyer in 1803, Nelaton subsequently proved its tuberculous nature in 1837 and Parrot presented the autopsy findings in 1880[2]. The literature and statistics on tuberculousdactylitis are scarce and mostly consists of case reports. Only 58 cases were traced on Google search engine and MEDLINE by Ali and coworkers[3] from 1971 to 2013; who further added three more cases in their report.

Bones of the hand are more commonly involved than of the foot. In hand, the proximal phalanx of the index and middle finger are the most common sites than metacarpals whereas, in feet, the involvement of metatarsals is more common than phalanges. The most common predisposing factors mentioned are low socioeconomic status and immunodeficiency followed by malnutrition, local trauma, and history of contact with tuberculosis3. The condition usually presents as a painless local swelling of a few month's duration as seen in our case. It often follows a benign course without constitutional symptoms. Pain and discharging sinuses may appear in the later stage of presentation[3, 4]. Tuberculousdactylitis is predominantly a disease of early childhood with very few cases reported in adult including ours[5].

The radiographic feature of spindle-shaped cystic expansion of short tubular bones has led to the name of "SpinaVentosa" for tuberculosis dactylitis of the short bones of the hand[6]. During childhood, short tubular bones have a lavish blood supply through a large nutrient artery entering almost in the middle of the bone. The first inoculum of the infection is lodged at the centre of the marrow cavity and the interior of the short tubular bone is then converted virtually into a tuberculous granuloma. Tuberculousgranuloma expands the relatively soft bony cortex as it gets resorbed or infarcted by the underlying process. The resultant fusiform expansion of the bone with thinned out cortex and relatively radiolucent marrow space due to trabecular destruction resembles an inflated balloon (SpinaVentosa). The radiographic picture was classical in our case. Periosteal reaction and sequestra are less common but may occur. Sclerosis may also be seen in the late stage of the disease. In natural course, the disease heals with shortening of the involved bone and deformity of the neighboring joint[1].

The differential diagnoses of tuberculousdactylitis include chronic pyogenic osteomyelitis, syphilitic, mycotic infection, brucellosis, neoplastic conditions i.e. enchondromata and sarcoidosis, etc. Relatively benign courses, absence of fever, diffuse osteopenia and absence of sequestration points toward underlying tuberculosis etiology. However, cytopathological, bacteriological and other investigations are mandatory for confirming the diagnosis in doubtful cases[1, 4].

Management of tuberculousdactylitis essentially includes anti-tuberculosis therapy apart from rest to the affected part in functioning position and early active exercise of the involved parts or joints[1]. In patients with unfavorable response or recurrence of infection, surgical debridement may be considered. Excision arthroplasty, corrective osteotomy or amputations are rarely indicated in the era of effective anti-tuberculosis drugs provided the diagnostic delay is avoided. A high index of clinical suspicion, timely diagnostic workup and early institution of therapy result in a favorable outcomes in such cases.

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