Gender Differences in Treatment Outcome among Tuberculosis Patients: A Retrospective Cohort Analysis in Pakistan

AH Khan1, M Israr2, O Mateen1, MA Hadi3, RA Aftab1

ABSTRACT

Background: Gender differences among TB patients are notable; however studies evaluating the impact of the gender on treatment outcomes have reported inconsistent results.

Aims and objective: The aim of current study is to observe the gender differences among TB patients and to evaluate the relation between TB patient gender and treatment outcome.

Method: A retrospective cohort study of all patients suffering from pulmonary and extra pulmonary TB patients, patients co-infected with HIV, hepatitis, and diabetes mellitus were included for current study that were treated at Khyber teaching hospital, Peshawar, Pakistan. On the basis of our study objective patients were categorised on gender basis and association with their demographics and clinical characteristics was observed. Treatment outcomes were evaluated on basis of smear testing at the end of treatment and the results were compared with TB patients’ gender.

Result: A total of 472 TB patients fulfilled the inclusion criteria, which included 238 (50.4%) male and 234 (49.6%) female patients. Two hundred and twenty eight (48.3%) male patients and 230 (48.7%) female patients were new TB cases whereas 224 (47.4%) male and 216 (45.6%) female patient TB type was pulmonary. TB patient age group, employment status and smoking status had a statistical significant association with gender (p < 0.002, p < 0.02, p < 0.001 respectively). The strongest predictor that affected TB patient gender was age group >55 years (OR 0.45, p < 0.001). Of 472 TB patients, 152 (32.2%) male patients and 136 (28.8%) female patient treatment outcome was unsuccessful whereas 86 (18.2%) male and 98 (20.7%) female patient treatment outcomes were successful. There was no statistical relation observed among treatment outcome and gender.

Conclusion: The ratio of male to female TB patients in current study was almost same. Comparatively, the treatment failure rate was high in male as compared to female TB patients.

Keywords: Gender differences, among tuberculosis patients

From: 1Department of Clinical Pharmacy, School of Pharmaceutical Sciences Universiti Sains Malaysia, 11800 Penang, Malaysia, 2District TB office Bannu, Pakistan, and 3School of Pharmacy, Monash University, 47500 Bandar Sunway, Selangor Darul Ehsan, Malaysia.

Correspondence: Dr AH Khan, Department of Clinical Pharmacy, School of Pharmaceutical Sciences, University Sains Malaysia, 11800 Penang, Malaysia. E-mail: dramer2006@gmail.com

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INTRODUCTION

Tuberculosis is an air borne transmitted infectious disease with high morbidity and mortality rates throughout the world. In 2013, 1.5 million people died from TB of the 9 million that were affected with TB (1). More than half (56%) of the TB patients belonged to South East Asia and West Pacific regions in 2013 (1). Despite the implementation of Direct Observational Therapy/Short Courses (DOTS) in Pakistan in the late 90’s, Pakistan stands among top six countries in 2013 with tuberculosis incidence of 370,000-650,000 (1). A Recent study reports, the sputum culture conversion rate were 53.4% at two months of treatment that represents a reasonable number of patients achieving culture conversion (2).

Gender differences among TB patients are striking and have been well documented in literature (3-6). World health organisation (WHO) has reported that the incidence of TB is nearly twice as high in male as compared to females (7). The difference in incidence of TB is often explained by socio cultural and economic factors especially in case of developing countries. Moreover the financial dependence and cultural inequality of women may result in limited access to medical attention and treatment adherence (4-6). Gender specific social roles also make males more vulnerable to TB exposure (3). The impact of sexual hormones and the difference of immunological reaction among gender has also been proposed as a causative factors for men to be more susceptible to *Mycobacterium Tuberculosis* (8,9)

The impact of gender on treatment outcomes has yielded inconsistent results. Clarifying gender disparities in treatment outcomes in a developing culturally rooted country like Pakistan can provide important information which may affect health strategies against TB. The purpose of current paper is to note the impact of patient demographic and clinical characteristics with TB patient gender and to evaluate the relation between TB patient gender and treatment outcome of TB treatment.
METHOD

The current study comprised of (1) association of patient demographic and clinical characteristics with TB patient gender by retrospective record viewing (2) retrospective cohort study evaluating association between TB patient gender and TB treatment outcomes.

Study area and study sample

The current study was designed as retrospective analysis of all patients diagnosed of TB from November 2009 to December 2010 at khyber teaching hospital located at the Peshawar city of the Khyber Pakhtunkhwa (KPK) province of Pakistan. An ethical approval from khyber teaching hospital was taken prior to conducting the study.

All eligible patients with pulmonary and extra pulmonary TB that were treated at Khyber teaching hospital, Peshawar, Pakistan were included for current study. Pregnant TB patients were excluded from current study. On the basis of our study objective patients were categorised with respect to their gender, and association was noted with their demographics and clinical characteristics.

Treatment outcome evaluation

A TB patient is defined cured if he/she is smear negative one month prior to the completion of treatment. Treatment outcomes were evaluated on basis of smear testing at the end of treatment and the results were compared with TB patient’s gender. In case of extra-pulmonary tuberculosis, treatment outcomes were evaluated on basis of chest x ray, patient clinical presentation and doctor expert opinion.
Ethical approval

An ethical approval from khayber teaching hospital was taken prior to conducting the study.

Data collection

All eligible TB cases were identified by reviewing TB registration book at the study site. A self developed validated data collection form was used to record patient demographic and clinical data. Proper coding was given to each case so as to avoid repetition.

Statistical analysis

Data was analyzed by using statistical package for social sciences (version 20.0, SPSS Inc, Chicago, IL). Categorical data was illustrated as numbers and percentage while continuous data was represented as mean standard deviation (SD). Chi-square and Fischers Exact test were used to detect significance between variables. Univariate analysis was used to identify patient factors that affect smoking among TB patient. A p-value of .05 or below was considered statistically significant.

RESULTS

A total of 472 TB patients fulfilled the inclusion criteria for current study. The sample was divided according to different age groups. Of the total male patients, 58 (24.3%) male TB patients were aged >55 years where as the least number of male patents 19 (7.9%) were aged 45-55 years. In case of female patients, most 61 (26%) were aged 15-24 years whereas least number of female patients belonged to 35-44 year age group. Two hundred and twenty eight (95.7%) male patients and 230 (98.2%) female patients were new TB cases whereas 10 (4.3%) male and 4 (1.8%) female patients were relapse cases. Two hundred and twenty four (94.1%) male and 216 (92.3%) female patient TB type was pulmonary whereas 14 (5.8%) male and 18 (7.6%) female patient TB type was extra pulmonary. TB patient age group,
employment status and smoking status had a statistical significant association with gender (p 0.002, p 0.02, p < 0.001 respectively) (table 1)

Tb patients’ demographic and clinical data that had statistical significance with gender were further analysed using univariate analyses. The model contained three variables that included patient age group, employment and smoking status. The strongest predictor in TB patient age group that affected patient gender was age group >55 years (OR 0.45, p 0.001). A similar case was observed with regards to employment and smoking status of TB patients with gender (OR 1.60, p 1.07-2.4; OR 0.17, p <0.001 respectively) (table 2)

In evaluating treatment outcome among TB patients with respect to patient gender, 152 (63.8%) male patient and 136 (58.1%) female patient treatment outcome was unsuccessful whereas 86 (36.2%) male and 98 (41.9%) female patient treatment outcomes were successful. There was no statistical relation observed among treatment outcome and gender (table 3)

**DISCUSSION**

The current study indicates an almost equal distribution of male to female ratio among TB patients contrary to other findings, indicating higher prevalence in males (10, 11). The social and cultural values may play an important role of a higher incidence of TB among gender. Literature suggests that higher incidence of TB among males might be due to their large social contacts whereas culturally women tend to stay at home or work at field in developing countries. However, in case if developed countries such cultural and social difference may not play a same role as both genders have high social contacts. In such cases biological mechanism play an important role in determining gender differences in infection rates (12). Globally, more men are infected to TB than females however, in some settings as in Afghanistan, parts of Pakistan bordering Afghanistan and Iran, more women are infected with tuberculosis than males (5, 13). TB is one of the leading causes of mortality among
reproductive age women, accounting for 510,000 deaths alone in 2013 (13). Factors as social, cultural, economic and reproductively active age for women are one of the main reasons responsible for delayed presentation of TB. There is growing evidence that vitamin D deficiency caused by poor diet and inadequate exposure to sunlight may be associated with TB infection (14). Studies indicate Pakistani women have low levels of vitamin D (15). These reasons may explain findings from current study, conducted at part of Pakistan bordering Afghanistan, where a high proportion of young female were infected with tuberculosis.

Studies have indicated smoking is a risk factor in the development of not only cancers and coronary heart diseases but also in case of TB (16, 17). Independent of other risk factors such as intravenous drug use, alcohol consumption and socioeconomic condition, exposure to tobacco smokes increases the risk for the development of TB (17, 18). A case control study in India reports an association between tobacco smoke and development of pulmonary tuberculosis and is a potential risk factor for the development of tuberculosis (19). The current study indicates higher prevalence of smoking among male TB patients then female, and not surprisingly a statistical significant association was observed among gender and TB patient smoking. Higher prevalence of smoking in males suggests a higher risk of TB infection, which may lead higher mortality and morbidity rates in male patients. One of the potential reasons for no difference of TB incidence observed among gender from current study might be due to our study design since the current study was a single centred. A multi centre study with a larger sample size may provide us with a better picture.

Older age and co morbidities associated with senility including diabetes and renal insufficiency are well documented risk factors for tuberculosis (20, 21). The current study observes a statistical significant association among patients aged > 55 years and gender. In
TB patients with age group > 55 years, the incidence of TB was higher in male patients compared to female patients (58 males to 30 female) moreover, in age group >55 years the incidence of TB among males was reported to be the highest (n=58) compared to other age groups. A similar finding was reported in a study in Taiwan that reported that the proportion of male TB patients escalated as age increases. The findings indicate that the TB epidemics in Taiwan mostly occurred in elderly patients (22).

The impact of gender on treatment outcomes has been evaluated in different studies and yielded inconsistent results. Higher mortality and greater treatment failure was observed in studies from Mexico and India (23,24) where as in contrast similar treatment outcomes were observed among gender have been reported in Egypt and Brazil (25,26). The current study reports higher treatment failure among male patients (n=152) as compared to female patients (n=136) and higher treatment success rates among female patients (98) as compared to male patients (86), however no significant statistical association was observed among gender and treatment outcomes (p 0.2). Poor compliance to the drug therapy is the single most important factor for the cause for treatment failure in TB programs (27). A study in Ghana report that the poor compliance was higher in males as compared to female patient however the author did not gave an explanation (27). Smith et al hypothesize that one explanation in higher compliance among women TB patients were barrier of diagnosis to TB in women screen out women who were likely to default from treatment, such women were highly motivated and thus more likely to comply to treatment (28). This may explain our findings of comparatively higher treatment success rates among as compared to female patients.

One of the main limitations of current study was the methodology of the study that was single cantered. So our results cannot be generalised. A multicentre study with a larger sample size can provide us with a better picture of over al scenario.
CONCLUSION

Social and cultural difference play an important role in incidence rates of TB however the incidence of TB among gender in current study was almost same. The incidence of TB increased as the age progressed, higher smoking status, social contacts and older age made male patients more susceptible to TB infections. The treatment failure rates were higher in males as compared to female patients.
REFERENCE


