

Gender disparities in retreatment patients of tuberculosis: A north Indian study

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Abstract

Background: ‘Retreatment’ for tuberculosis (TB) has long been a neglected area in global TB control India. However India disproportionately accounts for nearly half of retreatment TB cases notified globally. Sex differences vary in different age groups and in different parts of the world. The present study focuses on whether gender-based differences are present in notification rates, clinical presentation, and treatment outcomes of different subcategories of patients registered under category II of Revised National TB Control Programme (RNTCP) Chandigarh. **Materials and Methods:** A longitudinal study was designed and the patients registered under RNTCP category II from June 2010 to December 2011. Out of total 607 patients registered during this period under category II of RNTCP in Chandigarh, 545 consented to participate in the study. These were followed-up to September 2012 till the completion of treatment. All 545 recruited cases were stratified into males and females and the results analyzed. The Z test for proportion (for comparing differences in proportions) and Student’s t-test (for comparing mean) were performed for statistical analysis. **Results:** From the cohort of 545 patients, 348 (63.9%) were males and 197 (36.1%) were female patients with overall male to female ratio 1.8:1. The proportion of male patients notified was significantly higher than females ($Z = 5.93, P < 0.001$). The proportion of extrapulmonary cases was higher in the females (28.4%) as compared with males (17%) ($P < 0.001$). Males outnumbered females in all the unfavorable outcomes death, default, and failure. The default in males was significant as compared to the females ($Z = 5.21, P < 0.001$). **Conclusions:** The findings of this study suggest a sex difference in the notification rate of retreatment cases of TB. Reasons for a better outcome and low notification rate for TB in females are more due to epidemiological factors than a differential access of the health care. Integrated research is required to outline the relative roles played by epidemiology.

Key words: Gender, India, retreatment, RNTCP TB

INTRODUCTION

There were an estimated 8.8 million incident cases of tuberculosis (TB) (range: 8.5-9.2 million) globally in 2010 equivalent to 128 cases per 100 000 population. India alone accounted for an estimated one quarter (26%) of all TB cases worldwide, and China and India combined accounted for 38%.^[1]

TB is one of the top killers of women, with 300 000 deaths among Human immunodeficiency virus (HIV)-negative women and 200 000 deaths among HIV-positive women in 2011. TB is responsible for more deaths in women in the reproductive age group than all causes of maternal mortality combined. The global male: female sex ratio for TB for the year 2011 was 1.7.^[1] The Revised National Tuberculosis Programme (RNTCP) detects nearly three times more male than female TB patients.^[2] Extrapulmonary disease has been reported more commonly in women with lymph nodes being the predominant site.^[3,4]

“Retreatment” for TB has long been a neglected area in global TB control) India, however, disproportionately accounts for nearly half of retreatment TB cases notified globally.^[5] The notification rate of retreatment TB in India has slowly but steadily increased over the past decade, from

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14 cases per 100,000 population in 2001 to 25 cases per 100,000 population in 2009.^[2]

Sex differences vary in different age groups and in different parts of the world. The reasons for the sex differences are not clear.^[6] Repeated visits, travel costs, delays in test reports, rigid service timings, socioeconomic and cultural adversities and reduce poor women's ability to access services. Despite all these factors women are less likely to default from the treatment as compared to men.^[2]

An extensive search of literature failed to reveal any research from North India that examined gender-related differences in different subcategories of category II of TB patients notified under the RNTCP. The objectives of the present study were to find out whether gender-based differences are present in notification rates, clinical presentation, and treatment outcomes of different subcategories of patients registered under category II of RNTCP Chandigarh, so as to enable effective targeting of TB control strategies.

MATERIALS AND METHODS

Chandigarh, a Union Territory, is also the capital of Punjab and Haryana situated in the northern part of the country. The Urban part of the city is divided into 21 wards and further into sectors and there are 23 villages in the city constituting rural area. The total population of Chandigarh 1,054,686 with 580,282 males and 474,404 females. Sex ratio (females per 1000 males) 818.^[7]

RNTCP was launched in Chandigarh on 25th January 2002. RNTCP is implemented in the Union Territory (UT) through District Tuberculosis Center (DTC) located in sector 34 DTC. There are three TB units. TB unit I is located at sector 22 polyclinic, while TB unit II is located at sector 45 polyclinic, and TB unit III is located at Community Health Centre (CHC), Manimajra. Microscopic centers have been linked with these TB units. There are 17 Designated Microscopy centres (DMC) in Chandigarh.

A longitudinal study was designed and the patients registered under RNTCP category II from June 2010 to December 2011 at various centers in Chandigarh formed the study cohort. Out of total 607 patients registered during this period under category II of RNTCP in Chandigarh, 545 consented to participate in the study. These were followed-up to September 2012 till the completion of treatment. Both pulmonary and extrapulmonary were enrolled, irrespective of the sputum status. Patients of category I, transferred out, transferred in during the period were excluded from the study. Informed consent was taken from the respondents (or guardians in case of minors)

and ethical guidelines under Declaration of Helsinki were followed. Institutional ethical committee also approved the study.

All 545 recruited cases were stratified into males and females and the results analyzed. The outcomes cured, treatment completed, failure, died, and default were in accordance with the RNTCP definitions.^[4] The Z test for proportion (for comparing differences in proportions) and Student's *t*-test (for comparing mean) were performed for statistical analysis.

RESULTS

From the cohort of 545 patients, 348 (63.9%) were males and 197 (36.1%) were female patients with overall male to female ratio 1.8:1. The proportion of male patients notified was significantly higher than females ($Z = 5.93, P < 0.001$). The mean ages of males and females were 38.79 ± 14.4 and 30.84 ± 15.85 years respectively with a significant difference (Student's *t*-test = 5.84, $P < 0.001$).

In the below 20 years age group, the notification rates in the females was higher (60.9%). With increasing age, the notification rate among males increased with the highest notification rates seen among males above the age of 40 years [Table 1].

Among the males, the proportion of treatment after default cases was significantly higher, while among females cases in other category were significantly higher [Table 2].

The proportion of extrapulmonary cases was higher in the females (28.4%) as compared with males (17%) ($P < 0.001$) [Table 3].

The favorable outcomes in terms of cure rate and treatment completion were higher in females (88.8%) as compared with the males (77.1%) and was significant ($Z = 3.61, P < 0.001$).

Males outnumbered females in all the unfavorable outcomes death, default, and failure. The default in males was significant as compared with the females ($Z = 5.21, P < 0.001$) [Table 4].

DISCUSSION

The present study reveals that the notification rates of TB in the retreatment groups before the age of 20 years are higher in the females. This could be attributed to cultural seclusion practices, socialization patterns, nutrition among the young females. Evidence exists for higher prevalence

Table 1: Distribution of category II tuberculosis patients by age and sex

Age groups	Male	Female	Total	Chi-square	P value
<20	27 (39.1)	42 (60.9)	69 (100)	50.98	0.001*
20-39	155 (57.8)	113 (42.2)	268 (100)		
40-59	127 (84.7)	23 (15.3)	150 (100)		
>60	39 (67.2)	19 (32.8)	58 (100)		
Total	348(63.9)	197(36.1)	545(100)		

*Statistically significant

Table 2: Distribution of category II patients by type and sex

Type of patient	Male (%)	Female (%)	Z test	P value
Relapse	169 (48.6)	95 (48.2)	0.089	0.47
Failure	29 (8.3)	10 (5.1)	1.48	0.069
Treatment after default	62 (17.8)	13 (6.6)	4.13	0.00001*
Other	88 (25.3)	79 (40.1)	3.52	0.0002*
Total	348 (100)	197 (100)		

*Statistically significant

Table 3: Classification of disease by sex of the patients

Disease Classification	Male (%)	Female (%)	Chi-square	P value
Pulmonary	289 (83)	141 (71.6)	9.944	0.002*
Extrapulmonary	59 (17)	56 (28.4)		
Total	348 (100)	197 (100)		

*Statistically significant

Table 4: Different favorable and unfavorable outcomes in retreatment cases by gender

Outcome	Male (%)	Female (%)	Z test	P value
Favorable	269 (77.3)	175 (88.8)	3.61	0.0003*
Cure	185 (53.2)	98 (49.7)	0.78	0.433
Treatment complete	84 (24.1)	77 (39.1)	3.59	0.0003*
Unfavorable	79 (22.7)	22 (11.2)	3.62	0.0002*
Failure	32 (9.2)	14 (7.1)	0.875	0.382
Default	31 (8.9)	1 (0.5)	5.2	0.0001*
Death	16 (4.6)	7 (3.6)	0.573	0.566
Total	348 (100)	197 (100)		

*Statistically significant

of TB disease (2.8 times higher) among strict vegetarians relative to those who eat a varied diet.^[8,9]

With increasing age, the TB notification rates are higher in males. This difference is most marked in the age group 40-59 years in the present study. A similar increase in the incidence of TB in aging males has been seen in other studies.^[10-12]

The higher rates of TB among older men compared with women have been attributed to the higher prevalence of infection among men from early adulthood onward because

of a higher chance of exposure.^[6] In addition, older men tend to have a high rate of progression to disease.

In low-income countries women often have a lower socioeconomic status, reduced access to economic resources, and fewer educational opportunities as compared with men. As a result, many women are unable to locate and reach appropriate health services.^[11] The decision regarding a woman's treatment is made by the husband or senior members of the family.^[10,12]

Furthermore, the stigma attached to a positive TB diagnosis leads many women to forgo seeking necessary medical attention. In low-income countries, women tend to self-medicate or seek out traditional healers instead of accessing public TB clinics because they are afraid of being recognized as a TB patient by members of the community.^[13] A comparison between age- and sex-specific prevalence and notification rates from 29 surveys in 14 countries suggested that the reasons for a low notification rate for TB in females were more due to epidemiological factors than a differential access of the health care.^[14]

The male predominance for TB in the present study is consistent with data from other countries and could reflect occupational, behavioral, or immunological contributions to risk.^[14-16] Earlier studies have explained the role of cellular immunity in pathogenesis of TB.^[17] Sex hormones, greater antibody production, and higher CD 4 count in women as compared with men have implicated for better immune response in many earlier studies.^[18-20]

It is evident that biological factors, in addition to the sociocultural factors are to a large extent responsible in the decreased incidence of TB in females, especially in the reproductive age group.^[10]

In the present study, women had higher incidence of extrapulmonary TB as compared with men. Similar trends have been noted in previous studies and the cause of this sex differences are not well-understood.^[19-22]

Higher success rate was observed in the present study among the women than men. This is significant in the view that even in the retreatment groups women have better success rates. This further suggests that epidemiological factors are more responsible rather than differential access to the health care. Women are less likely to die, default, or fail on treatment has been shown in the previous studies and this finding collaborates with the present study.^[10,18,23]

The lack of education and knowledge among females TB patients probably make them more dependent on their directly observed treatment (DOT) providers. RNTCP

has made efforts to increase access to services through community outreach services (ASHA workers and community DOTS providers) and provision of DOTS service providers of acceptable gender, caste, and religion. And in the long run, these DOT providers have ensured better adherence to treatment and hence better treatment outcomes.

Although the exact mechanisms that lead to such differences in treatment outcome among males and females are still unknown, our results provide a basis for further studies.

Limitations

This study has a drawback, which needs to be taken into consideration, when the findings are reviewed. The findings of study are representative for retreatment patients of Chandigarh.

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