ORIGINAL ARTICLE

PREVALENCE OF TUBERCULOSIS IN KOTLI, AZAD KASHMIR

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Background: Tuberculosis is highly prevalent in Pakistan. It is a contagious disease and causes a lot of morbidity and mortality. Its treatment is costly especially for poor countries like Pakistan. But fortunately it is a preventable disease. Objective of this study was to analyse various epidemiological features of tuberculosis in District Kotli, a remote area of Northern Pakistan. **Methods:** This cross sectional study was conducted in District Kotli, Azad Kashmir from January to December 2009. Data was collected from eight national TB centres of District Kotli. It included all the diagnosed cases of tuberculosis, registered there during the study period. Various epidemiological aspects of these patients were analysed. **Results:** Total number patients registered during the study period were 752. Of these 579 (76.99%) were pulmonary and 173 (23%) were extra-pulmonary tuberculosis (EPT). Total prevalence of tuberculosis was found to be 100.27 per 100,000. Prevalence of pulmonary TB was 77.2 while that of EPT was 23.07 per 100,000. There were 405 males (53.85%) and 347 females (46.14%). Most patients were 61–75 years of age (220, 29.25%). Overall 417 (55.44%) were 46–75 years. Housewives were affected most frequently (324, 43.08%). Labourers were also commonly involved (40.82%). All cause mortality was 29 (3.85%). Mortality due to tuberculosis was 11 (1.04%). Among pulmonary tuberculosis, 259 (44.78%) were sputum smear positive and 320 (55.26%) were sputum smear negative. In EPT, most frequent was pleural effusion (74, 42%) and least frequent was skin involvement (3, 1.73%). **Conclusion:** Prevalence of tuberculosis in Kotli was lower than the overall prevalence in Pakistan. Male to female ratio was lower than that generally observed in Southeast Asia. It was more common in middle to old age population. Frequency was higher in housewives and labourers. Very significant proportion of pulmonary TB was sputum smear positive. Among EPT, pleural effusion was the most common mode of presentation.

Keywords: Tuberculosis, Prevalence, Azad Kashmir, Extra-pulmonary tuberculosis, Mortality, Pakistan

J Ayub Med Coll Abbottabad 2013;25(1-2):175–8

INTRODUCTION

Tuberculosis (TB) is one of the oldest infectious diseases in the human history. It is prevalent throughout the world and is the second commonest cause of death among the infectious diseases.[1] Approximately two billion people are infected on the globe but majority of them are asymptomatic (latent tuberculosis).[2] It is caused by mycobacterium tuberculosis which is a slow growing acid fast bacillus. Lungs are the most common site of involvement (pulmonary tuberculosis) but any other body system can be involved like bones, intestine, lymph nodes etc. (extra-pulmonary tuberculosis, EPT). It is more common in poor and underdeveloped countries. Transmission most commonly occurs by air borne droplet nuclei from patients suffering from pulmonary tuberculosis. Myco-bacterial cell wall has a very peculiar structure with high contents of mycolic acid and other cell wall lipids. It gives them acid fastness, ability to survive within macrophages and low permeability due to which most of the common antibiotics cannot enter the bacterium. This is the reason that only very few and specific antibiotics are effective against mycobacteria.[3] With proper treatment, disease is curable in almost all the cases of drug sensitive tuberculosis. Without treatment 50–65% of patients would die within five years.[3] Among sputum smear positive patients, 70% died in 10 years while in those with smear negative but culture positive, 20% died in the same duration.[1,5]

Millennium Development Goal (MDG) target was set by World Health Organization (WHO) to stop the progression and reduce the incidence of tuberculosis epidemic by 2015 (i.e., to decrease the prevalence and mortality by more than 50% to that of 1990) and to eliminate the TB as public health problem by 2050.[1]

According to estimates there were about 8.7 million new cases of tuberculosis in the world in year 2011 (equivalent to 125 cases per 100 000 population). In the same year 1.4 million people died of tuberculosis.[1] There has been a lot of success in achieving the MDG targets. There was a steady decline in the incidence of tuberculosis since 2001 (at a rate of 2.2% from 2010 to 2011) and mortality of TB has decreased by 41% compared to 1990.[1] Cambodia is a good example of this achievement where prevalence of tuberculosis has decreased by 45% since 2002.[1] Tuberculosis is very closely related with human immunodeficiency virus (HIV) infection (13% of TB cases were also infected with HIV and among dead, 430,000 were HIV positive).[1] TB was one of the most common cause of mortality in women in 2011, causing 500,000 deaths. Highest numbers of TB cases were

found in Asia and Africa. As a whole 40% of the world TB cases lived in China and India and overall 60% in Southeast Asia and western pacific. All over the world 3.7% new cases and 20% old cases were having multi-drug resistant (MDR) tuberculosis.[1]

Pakistan was included in top five countries of the world with very high number of tuberculosis cases (0.3–0.5 millions). (First 4 were: India 2–2.5, China 0.9–1.1, South Africa 0.4–0.6, and Indonesia 0.4–0.5 million). According to WHO survey, incidence and prevalence of TB in Pakistan is 230 and 310 per hundred thousand population respectively and mortality due to TB is 39 per hundred thousand.[4]

Tuberculosis can cause significant morbidity and mortality. Although it is treatable but the cost of treatment may be tremendous especially for poor countries like Pakistan where the prevalence is high. But by applying proper preventive measures not only morbidity and mortality of the disease can be decreased but also the expenditure on the treatment can be minimized. To apply the preventive measures effectively we must collect the relevant epidemiological data in the area. For this reason we wanted to measure the prevalence of TB in Kotli, a remote area of Northern Pakistan with relatively poor health facilities.

MATERIAL AND METHODS

This was a cross sectional study conducted in District Kotli, Azad Kashmir from January to December 2009. The area is situated towards north of Pakistan and has a population of 750,000. Data were collected from eight national TB centres of District Kotli. It included all diagnosed cases of TB registered during the study period. Various epidemiological aspects of these patients were analysed.

RESULTS

Total of 752 patients were registered during the study period. Of these, 579 (76.99%) were pulmonary and 173 (23%) were extra-pulmonary tuberculosis. Prevalence of tuberculosis during the year 2009 was 100.27 per 100,000. Prevalence of pulmonary TB was 77.2 while that of extra-pulmonary TB was 23.07 per 100,000.

Various epidemiological characteristics studied are shown in Table-1. There were 405 males (53.85%) and 347 females (46.14%). Highest numbers of patients were between 61–75 years of age (220, 29.25%). Overall 417 (55.44%) were between 46 and 75 years. Housewives were affected most frequently (324, 43.08%). Labourers were also commonly involved (307, 40.82). All cause mortality was 29 (3.85%). Mortality due to tuberculosis was 11 (1.04%).

Among pulmonary TB, 259 (44.78%) were sputum smear positive and 320 (55.26%) were sputum smear negative (Table-2). Out of 173 extra-pulmonary TB patients, most frequent was pleural effusion (74, 42.77%) and least frequent was skin involvement (3, 1.73%). (Table-3).

Table-1: Epidemiological variables of TB patients

Variables	Subcategories	No.	%
Gender	Male	405	53.85
	Female	347	46.14
Age	1–15 year	25	3.32
	16–30 year	80	10.63
	31–45 year	120	15.95
	46–60 year	197	26.19
	61–75 year	220	29.25
	>75 year	110	14.6
Occupation	Housewives	324	43.08
	Students/teachers	12	1.05
	Labourers	307	40.82
	Jobless	23	3.05
	No information	86	11.43
Mortality	Death due to TB	11	1.04
	Death due to co-morbidity	18	2.45
	Total deaths	29	3.85

Table-2: Sputum smear positive and negative patients among pulmonary TB patients (n=579)

Subgroups	No.	%
Sputum smear positive	259	44.73
Sputum smear negative	320	55.26
Total patients of pulmonary TB	579	100

Table-3: Organ involvement in patients of pulmonary TB (n=173)

Organ involved	No.	%
Bone	14	8.09
Lymph Nodes	20	11.56
Abdominal TB	43	24.85
Meningitis	4	2.31
Spinal	15	8.67
Pleural effusion	74	42.77
Skin	3	1.73

DISCUSSION

This study was conducted in District Kotli Azad Kashmir, an area towards north of Pakistan. Prevalence of TB was found to be quite high in this area (100.27 per 100,000). But still it was significantly less than the estimated prevalence in Pakistan by WHO (310/100,000).[4] Pakistan is included among those countries with very high disease burden of TB. China, India, Bangladesh, Indonesia and Pakistan together share almost half (48%) of the new cases of TB in the world.[4,6] According to WHO report, in 2011 a total of 270,394 cases were reported from Pakistan.[1] The lower prevalence found here may indicate a lower notification rate, but possibly the actual prevalence is low.

In our study, number of male patients was more than female patients. Male to female ratio (MFR) in various regions was found to be 1.35–1.00 in Africa, 1.49–1.00 in Americas, 2.03–1.00 in South-east Asia, and 2.16–1.00 in Europe.[7] MFR in our study was not like South-East Asia. Rather it was more like Africa (even lower than Africa). Although males generally have a higher prevalence of TB all over the world as

well as in our study but there are areas like Afghanistan (MFR 0.50:1.00), Lebanon (MFR 0.70:1.00) and Iran (MFR 0.90:1.00) where females are affected more than the males. It is interesting to note that Pakistan is bordered toward east with India with high MFR and towards west with Afghanistan and Iran with low MFR. A study by Dogar *et al* about the gender distribution of TB in Pakistan showed a lower MFR in Western provinces bordering Afghanistan and Iran compared to eastern provinces bordering India.[7] This disparity may be attributed to gender differences in labour, cultural seclusion and socialisation patterns.[7,8] It was noted that chances of active disease and progression of latent disease to active tuberculosis were higher in women.[7] In countries where women's general health and nutrition is poorer than men, the risk of disease is increased.[8] Risk of TB increases with vitamin D deficiency and tubercle bacilli are rapidly killed by sunlight.[7,9,10] So exposure to sunlight may affect the susceptibility to TB. In western provinces men spend more time outdoor while women are restricted mainly to indoor activities.[7] If there is a sick patient at home, women are the main caretaker, which exposes them to the disease.[7] TB in women is an important issue. It affects the whole family and economy of the society but because of fear and stigma associated with the disease there may be hindrance in getting timely treatment, making their position more vulnerable.[8,11] Tuberculosis control programmes should take care of these factors to help them in getting proper and complete treatment.

Tobacco smoke, smoke due to biomass fuel and coal fire is associated with TB.[7] The population in western provinces of Pakistan is mainly rural.[7] There is a positive correlation between exposure to smoke, both due to cigarettes and biomass fuel, and tuberculosis. A study from India showed that exposure to biomass fuel was an independent risk factor for pulmonary tuberculosis.[12] Women in rural areas may be more exposed to these different types of smoke which may explain high frequency of TB in females in western provinces.[7] Pregnancy can lead to impaired T-cell immunity which can increase the chances of TB.[13] Early marriages and increased fertility rate may be responsible for these gender differences in western provinces of Pakistan.[7]

In our study most commonly affected people were old to middle age. Overall 55.44% were 46–75 years. Frequency in children and younger people was found to be low. In a study conducted in northern Pakistan, 61.52% patients of TB were 20–50 years of age.[14] The disease mostly affects the people at an age when they have increased social and economic responsibilities. This may have profound effect on social and economic conditions of their families as well as the country at a larger scale. Occupation wise most commonly affected subgroups in the community were housewives (43.08%), and labourers (40.82%). Reasons for higher frequency of TB in housewives may be same as discussed earlier in the discussion of higher susceptibility of female gender. Labourers may be affected more commonly because of poor socioeconomic conditions. In a study by Khattak MI *et al*, similar results were found. In their study 46.12% patients were housewives and majority of the patients were from poor social class with 50% of the patients having monthly income of less than PKR 4,000 per month.[14]

In our study, 44.73% patients of pulmonary tuberculosis were sputum smear positive and 55.26% were sputum smear negative. According to WHO report in 2011, out of 270,394 notified cases of TB from Pakistan, 105,733 were sputum smear positive and 103,824 were sputum smear negative which indicated that approximately 50% of new pulmonary cases were smear positive.[1] In a study by Khattak MI *et al*, 52% patients of pulmonary TB were sputum AFB positive. Prevalence of sputum smears positive pulmonary TB in our study came out to be 34.53 per 100,000. It was relatively lower than 2008 estimates which showed that the incidence of new sputum smear positive pulmonary cases was 81 per 100,000.[4,15] In a study from Poland in 2010, it was found that 40.1% cases of pulmonary TB were sputum smear positive.[16] Sputum smear positive cases are most dangerous and they can easily and efficiently spread the infection in the community. Their early detection and immediate treatment is very important. Early detection and treatment of such cases is an important part of the WHO strategy to reduce the global burden of the disease.[2]

In our study, 173 (23%) patients were suffering from EPT. During the year 2011 out of 2 where females are affected more than the males 70 394 total notified cases of TB, 45 537 (16.84%) were extra-pulmonary.[1] EPT has become more common due to emergence of HIV infection all over the world including developed countries like USA where it constitutes 10–15% of tuberculosis cases.[18] Patients of tuberculosis who are co-infected with HIV may have up to 50% extra-pulmonary involvement.[18] In countries with good diagnostic and reporting systems, EPT constitutes 20–25% of TB cases. In 2007, EPT accounted for 14% of reported cases.[19] A study from Kenya showed an increase of EPT from 6.4 to 16.7% from 1994 to 1997.[18] According to WHO 2011 report, in Ethiopia EPT constituted 32% of the total reported cases of TB during 2010.[5,18] In EPT, pleural effusion was most common followed by abdominal tuberculosis. In a study on EPT from Ethiopia, overall prevalence of EPT was 9.9%. Among them lymph node tuberculosis was most common (82.4%) followed by pleural involvement (8.8%). HIV infection was found to be the most important risk factor associated with these patients (52.9% were positive for HIV).[18] Extra-pulmonary TB

involving lymph nodes and pleura constitutes about 25% of the cases in adults at initial presentation.[20] In Burundi >25%, and in South Africa 20% cases of tuberculosis had tuberculous pleural effusions.[20]

According to Fanning A, lymph node TB is more common in children below 15 years of age and genitourinary and musculoskeletal involvement increases with increasing age. HIV is an important risk factor for EPT. In non-HIV patients only 20% of TB cases are due to EPT but in HIV-positive patients this proportion may reach up to 53–62%.[21]

During the study period, 1.04% among the notified patients died of tuberculosis. According to WHO report, global mortality rate from tuberculosis has fallen by 41% since 1990. During 2011 total of 990,000 patients (14/100,000) who were HIV-negative died of TB. After including HIV-positive patients as well this estimate reached 1.4 million (20/100,000).[1] The low death rate in our patients shows the efficacy of treatment. Without treatment one third of TB patient's die of TB within one year and one half die within 5 years after the diagnosis.[3]

CONCLUSION

Prevalence of tuberculosis in Kotli, Azad Kashmir is lower than the overall prevalence in Pakistan. MFR was lower than that generally observed in Southeast Asia. It was more common in middle to old age population. Frequency was higher in housewives and labourers. Very significant proportion of pulmonary TB was sputum smear positive. Among EPT, pleural effusion was the most common mode of presentation followed by abdominal tuberculosis. Death rate due to tuberculosis, among the diagnosed cases, was found to be low.

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