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A study on socio demographic profile of patients having cough of two weeks or, more along with their smear microscopy outcome attending a Tertiary Care Hospital of Jharkhand, India

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Abstract

Tuberculosis is a preventable and curable disease, but still millions of people suffer every year and a number of them die from this disease, resulting in devastating social and economic impact. Delay in tuberculosis diagnosis may also lead to a more advanced disease state at presentation, which contributes to adverse sequelae and overall mortality. Each sputum positive case can infect 10-15 individuals in a year, if not treated. Revised National Tuberculosis Control Programme (RNTCP) has also defined Pulmonary Tuberculosis (PTB) suspects as persons having cough of two weeks or , more with or, without presence of other symptoms suggestive of TB .So, cough symptomatics (having cough $\geq$ 2 weeks) are an important group to be followed for early diagnosis of TB infection. This study was carried with an objective of assessing the socio demographic profile, risk factors along with sputum microscopy outcome among cough symptomatics. It was a cross sectional, descriptive, hospital based study and conducted at DOTS Microscopy Centre (DMC) of Rajendra Institute of Medical Sciences (RIMS),during a period of nearly four months (75 working days assuming 20 working days per month).A total of 225 cough symptomatics were selected by simple random sampling and interviewed by using pre tested, semi structured questionnaire after getting their consent. Significant ($p<0.05$) association was seen in males, rural area, lower socioeconomic status, family history of TB, overcrowding, smoking and alcohol with sputum positivity rate.

Key words- Tuberculosis, cough symptomatics, sputum positivity, Jharkhand

Introduction

Tuberculosis (TB) is one of the oldest diseases known to mankind since time immemorial and continues to be a major public health problem even in today's modern world. It is a preventable and curable disease, but still millions of people suffer every year and a number of them die from this disease, resulting in devastating social and economic impact. [(1)] Its causative organism Mycobacterium tuberculosis was one of the first bacterial pathogens to be identified. The etiopathogenesis of the disease is clearly understood. A vaccine against tuberculosis has been available for close a century. Effective treatment against the disease has been available for over sixty years. Yet the disease is close to its highest levels ever and the World Health Organization declared tuberculosis as a global public health emergency in 1993. [(2-5)]

Pulmonary TB accounts for over eighty percent of the total cases suffering from tuberculosis. Transmission occurs by the airborne spread of infectious droplets and droplet nuclei containing the tubercle bacilli. When a person inhales, these

micro particles get lodged in the terminal bronchiole and the alveoli to infect a person. This infection may later on result into tuberculosis disease.[6] The source of infection is a person with sputum smear positive pulmonary TB.[7] Each sputum positive case can infect 10-15 individuals in a year, if not treated.[8]

Globally in 2012, there were an estimated 8.6 million incident cases of TB and 1.3 million people died from this disease. [9] TB is second only to HIV/AIDS as the greatest killer worldwide due to a single infectious agent. [10] The Tuberculosis (TB) burden in India is truly staggering. Every year nearly 2.2 million new TB cases occur, of which nearly 800,000 are infectious (smear positive pulmonary) TB cases. India has more people with active TB disease than any other country in the world. [6] Jharkhand is one of the major TB burden states of India. About 13,000 people die of Tuberculosis every year in this state i.e. more than 35 people every day. [11]

As cough is one of the cardinal features of TB. RNTCP has also revised definition of pulmonary tuberculosis (PTB) suspects as persons with a history of cough ≥ 2 weeks with or, without presence of other symptoms suggestive of TB. Thus, cough symptomatics is an important group to be traced for earlier diagnosis of TB. Screening of such patients provides a quick, cheap and convenient way to identify individual at a high risk of tuberculosis. According to RNTCP Technical and Operational Guidelines, about 2-3% of new adult outpatients in a general health facility are expected to have cough of 2 weeks or more and on an average 10% of the suspects are expected to have sputum positive pulmonary TB. [12] Majority of the PTB suspects prefer general Practitioners (public/private) for their initial symptoms as they serve the first point of contact for a significant number of patients with TB. This opportunity should not be lost. Doctors should be trained to "think TB", where in they maintain a high index of suspicion for TB and follow the standardized diagnostic procedures, thereby reducing the delay in diagnosis of TB. [13]Hence, the objective of this study was to assess the various socio-demographic factors and risk factors influencing sputum positivity rates for PTB among cough symptomatics.

Material and methods

Study design and study duration-

The present study was cross sectional, descriptive and hospital based study. It was conducted at DOTS Microscopy Centre (DMC) of Rajendra Institute of Medical Sciences (RIMS), Ranchi during a period of June-September 2014, nearly four months. RIMS is a tertiary care hospital which receives referrals from other private clinics, hospitals and general physicians not only from city but also from nearby districts and areas. A total number of 1755 TB suspects came at DOTS centre for RIMS for diagnosis and treatment in 2013. [14]

Data collection technique-

Those patients, who were > 14 years, having history of cough of two weeks or, more were taken as study subjects. Patients were selected by the use of simple random sampling and were interviewed by the use of pre-tested, semi structured questionnaire. In this way, a total of 225 patients were interviewed in 75 working days (nearly four months, considering 20 working days per month).

Exclusion criteria:

1. Patients of 14 years or lesser were not included in the study.
2. Established cases of Tuberculosis and unwilling patients to participate in the present study.

Data collection tool-

A pre-tested, semi structured questionnaire was used for data collection which contains all the relevant information regarding socio-demographic profile which included their name, address, age, religion, caste, education and marital status. Known risk factors for Tuberculosis such as past history of TB, family history of TB, overcrowding, smoking and alcohol were also recorded in questionnaire after getting their written consent. Sputum examination for Acid fast bacilli (AFB) by Ziehl Neelsen technique was done for all study subjects after taking their consent.

Statistical Analysis-

Statistical analysis was done by using descriptive statistics. Data were collected in a predesigned Microsoft® Excel 2007.Significant association was established by the use of Chi square test.

Results

A total of 225 cough symptomatics (who met our inclusion criteria) were interviewed during the study period at DMC of RIMS, Ranchi.

The proportion of sputum smear positive samples was 24.0% with high preponderance of smear positive cases in the age group of more than 65 years (5,62.5%) followed by of 15-25years (16,27.6%) and 26-65years (33,20.8%) respectively. On the basis of gender of the patients, more than one-fourth (45, 28.1%) males were sputum positive pulmonary TB patients and only few (9, 13.84%) were females showing statistical strong association($p<0.05$).On the basis of religion, among sputum positive patients, nearly one-third (30, 35.3%) of the patients were Hindu followed by Christian (10, 27.8%), Muslim (3, 15.0%) and Sarna (11, 13.1%) respectively. Tribal were sputum positive in one fourth (27, 25.2%) of the cases. Area wise distribution of sputum positive patients revealed that more one fourth (45, 27.61%) patients belonged to rural area and only few (9, 14.52%) patients were from urban area. Among sputum positive patients, one third (8,33.33%) of the patients were educated up to higher secondary and above followed by primary school education (13,27.08%), secondary school education (11,26,19%) and literate patients (14,24.14%). Illiterate patients were sputum positive in few (8, 15.09%) cases. More than one-fourth (48,27.42%) married persons were sputum positive TB patients while only few(6,12.0%)sputum positive patients were unmarried. More than one-fourth (46, 26.74%) of the sputum positive patients belonged to lower SES followed by middle SES (5,18.52%) and upper SES(3,11.54%) patients(table no.1).

On the basis of risk factors of TB, overcrowding was present in nearly one third (49, 24.38%) of the smear positive pulmonary TB patients (table no. 2). Past history of TB was present in only (5, 20.83%) smear positive patients. As far as history of recent TB in the family is concerned, it was strongly associated with the sputum positivity ($p=0.008$).This factor was present in approximately half (16, 40.00%) of the smear positive pulmonary TB patients (table no.3). Present smokers were smear positive in nearly one-third (18, 36.73%) cases while non-smokers were sputum positive in only few (18, 13.04%) cases. Nearly one-third of the (24, 33.33%) smear positive patients were alcoholics ($p=0.024$), this shows strong association with sputum positivity status (table no.4).

Discussions

Early diagnosis and adequate treatment is very important for proper control of TB. Sputum positivity among cough symptomatics is an important tool for diagnosing suspected patients for TB. The findings of the present study reveals that smear positive cases was maximum in the age group of more than 65 years (5, 62.5%). It shows highly significant association of sputum positivity with advanced age. This finding is noteworthy because sometimes TB as a cause of cough in older groups may be ignored and chest symptomatic in this age group may be treated for other chronic respiratory tract infections (like asthma, chronic bronchitis, emphysema) which are of major importance in the upper decades of life [15]. A high suspicion /vigilance for the older age-groups attending the health facility with history of cough are required. Similar finding was also reported in a study done by Syed et al[16] ,the highest sputum positivity was found in age groups 55 and above. Study from Guinea-Bissau and three West African countries reported that increase in age was significantly associated with TB infection (P<0.0001). [17-18]

Majority of the males were sputum positive pulmonary TB patients. This could be due to more exposure of males to outside world which makes them more prone to infectious diseases. Thus, there is strong association between sputum positivity result and male gender (p<0.05). In a similar study done by Jethani S et al [19] reveals that maximum study subjects were males i.e.74.9% as compared to 25.1% females. Similar male dominance for pulmonary tuberculosis was found in studies conducted by Aarti Kaulagekar and Anjali Radkar[20](57.8% males v/s 42.2% females), Phalke Deepak Baburao et al. [21]

Most (30,35.3%) of the sputum positive patients were Hindu. As Hindu religion is widely distributed in the society thus showing significant association with sputum positivity (p<0.05). Jethani et al [19] also found in their study that sputum positivity was observed more in Hindus (40.1%) as compared to Muslims (37.8%) and Sikhs (10%) and it was similar to observation by N Shetty et al[22] who also reported higher number of cases in Hindus (72%). And this association was found to be statistically significant. The finding of the present study shows that ethnicity does not affect sputum positivity status as it was not found statistically significant (p=0.68).On the contrary, Aarti Kaulagekar and Anjali Radkar [20] in their study "Social status makes a difference: tuberculosis scenario during National family health survey – 2", conducted at Pune (1998-99), reported a descending order of prevalence among different castes i.e. scheduled tribes 1.85%, scheduled castes 0.64%, other backward castes 0.54% and other advanced caste groups 0.43%.

Area wise distribution of sputum positive patients revealed that sputum positivity was more common in rural area in comparison with urban area and it was also statistically significant (p=<0.05).This may be attributed to the fact that lack of knowledge of TB with its transmission and inaccessible health care services in rural areas. Thakur et al [23] in their study" Delay in diagnosis and treatment among TB patients registered under RNTCP Mandi, Himachal Pradesh, India, 2010" found that 91.4% of TB patients belonged to rural area and only 7.7% patients were from urban area. Married persons were sputum positive in most of the cases thus showing strong association between sputum positivity and marital status (p<0.05). Similar finding was also observed by Bhatt et al [24] where maximum i.e. 55 % sputum positivity was found amongst married subjects while minimum in unmarried group.

Majority of the sputum positive patients belonged to lower SES (46, 26.74%) due to poverty, illiteracy and inaccessible health care services. Syed et al [16] also found that highest sputum positivity rate was prevalent among patients in the socio-economic class IV; these findings were consistent with observations reported by Krishneda et al.[25]

Overcrowding is an established risk factor for occurrence of tuberculosis. This factor is also significant by the result of the present study which reveals that overcrowding was present in nearly one third (49, 24.38%) of the smear positive pulmonary TB patients. In a similar study done in Karachi by Mohsin et al [26] revealed that overcrowding (≥3persons/room) was a significant (69.60%) risk factor for TB.

On the basis of past history of TB, sputum positivity is not influenced by this factor as past history of TB was present in only (5,20.83%) patients. It was also statistically not significant (p=0.70).As far as history of recent TB in the family was concerned, it was strongly associated with the sputum positivity (p=0.008).This factor was present in approximately half (16, 40.00%) of the smear positive pulmonary TB patients. Patients with no History of (H/O) contact and negative family H/O of TB are another high risk groups that need immediate attention for screening in OPD settings. This is reinforced with the findings by Syed et al [23] that recorded high sputum positivity rate among chest symptomatic having no H/O contact and with no family H/O TB.

From the present study, it was found that smoking is strongly associated with sputum positive result (p=0.001).Some evidences showing a link between tuberculosis and smoking. A possible explanation is that nicotine stops the production of TNF-alpha by the macrophages in the lungs, making the patient more susceptible to the development of progressive disease from latent Mycobacterium tuberculosis infection. Similarly**,** Mohsin et al in Karachi [26] found that the most common addiction in patients was smoking (48.8%).

Alcohol consumption is also strongly associated with the occurrence of TB as the present study revealed that nearly one-third of the (24, 33.33%) smear positive patients were alcoholics(p=0.024).Shevchenko studied pulmonary TB in alcoholics. Pulmonary TB was found to occur in chronic alcoholics more frequently than in those without chronic alcoholism, to run relatively badly, therapeutical efficiency was reduced and long-term prognosis was under question.[27]

Conclusion

All health care providers should pay high attention towards cough symptomatics for earlier diagnosis of TB.As evident from the findings of the present study that 24% cough symptomatics were found to be smear positive on sputum microscopy outcome. Thus, cough symptomatics are an important group to be traced for early symptoms of TB. Sputum positivity was higher among older age group especially in males. Sputum positive results were maximum among Hindu, married, lower socioeconomic status and belonged to rural area. Various risk factors such as overcrowding, family history of tuberculosis, smoking and alcohol were found to be strongly associated with sputum positivity results. Information, education and communication(IEC) materials should be widely disseminated in general public regarding socio demographic determinants and risk factors responsible for TB.

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Table 1: Association of sputum sample results with Demographic Variables (n=225)

Variables	Sputum examination result		Total Number (%)	P value χ^2,df
	Positive No. (%)	Negative No. (%)		
Age (in completed years)				
15-25	16(27.6%)	42(72.4%)	58(100.0%)	χ^2=7.828 df=2 P=0.0199*
26-65	33(20.8%)	126(79.2%)	159(100.0%)	
>65	5(62.5%)	3(37.5%)	8(100.0%)	
Gender(M/F)				
Male	45(28.1%)	115(71.88%)	160(100.0%)	χ^2=5.167 df=1 P=0.02301*
Female	9(13.84%)	56(86.15%)	65(100.0%)	
Religion				
Hindu	30(35.3%)	55(64.7%)	85(100.0%)	χ^2=12.59 df=3 P=0.0056*
Muslim	3(15.0%)	17(85.0%)	20(100.0%)	
Christian	10(27.8%)	26(72.2%)	36(100.0%)	
Sarna	11(13.1%)	73(86.9%)	84(100.0%)	
Ethnicity				
Tribal	27(25.2%)	80(74.8%)	107(100.0%)	χ^2=0.17 df=1 P=0.6801
Non-tribal	27(22.9%)	91(77.1%)	118(100.0%)	
Area				
Rural	45(27.61%)	118(72.39%)	163(100.00%)	$\chi^{2=}$4.22 df=1 P=0.0399*
Urban	9(14.52%)	53(85.48%)	62(100.00%)	
Education				
Illiterate	8(15.09%)	45(84.91%)	53(100.00%)	χ^2=3.812 df=4 P =0.4320
Literate	14(24.14%)	44(75.86%)	58(100.00%)	
Primary	13(27.08%)	35(72.91%)	48(100.00%)	
Secondary	11(26.19%)	31(73.81%)	42(100.00%)	
Higher secondary & above	8(33.33%)	16(66.67%)	24(100.00%)	
Marital status				
Married including divorced,widow/widower	48(27.42%)	127(72.57%)	175(100.00%)	χ^2=5.075 df=1 P=0.0242*
Unmarried	6(12.0%)	44(88.0%)	50(100.00%)	
Socioeconomic status				
I & II(Upper)	3(11.54%)	23(88.46%)	26(100.00%)	$\chi^{2=}$3.368 df=2 P=0.185
III(Middle)	5(18.52%)	22(81.48%)	27(100.00%)	
IV&V(Lower)	46(26.74%)	126(73.26%)	172(100.00%)	
Total	54(24.0%)	171(76.0%)	225 (100.00%)	

*Statistical significant result($p<0.05$)

Table 2-Association of sputum sample result with known risk factors of Tuberculosis

Overcrowding	**Sputum smear examination**		**Total No.(%)**	**P value χ^2,df**
	Positive No. (%)	**Negative No. (%)**		
Present	40(29.63%)	95(70.37%)	135(100.00%)	χ^2=5.864
Absent	14(15.56%)	76(84.44%)	90(100.00%)	df=1
Total	**54(24.0%)**	**171(76.0%)**	**225 (100.00%)**	P=0.01545*

Table 3-Distribution of sputum examination result on the basis of past history of TB and history of recent TB in the family

Past history of TB	**Sputum smear examination**		**Total No.(%)**	**P value χ^2,df**
	Positive No. (%)	**Negative No. (%)**		
Present	5(20.83%)	19(79.17%)	24(100.00%)	χ^2=0.148
Absent	49(24.38%)	152(75.62%)	201(100.00%)	df=1
Total	**54(24.0%)**	**171(76.0%)**	**225 (100.00%)**	P=0.7004
History of recent TB in the family				
Present	16(40.00%)	24(60.00%)	40(100.00%)	χ^2=6.828
Absent	38(20.54%)	147(79.45%)	185(100.00%)	df=1
Total	**54(24.0%)**	**171(76.0%)**	**225 (100.00%)**	P=0.0089*

Table 4-Association between sputum examination result and smoking habit and alcohol consumption

Smoking habit	**Sputum smear examination**		**Total No.(%)**	**P value χ^2,df**
	Positive No. (%)	**Negative No. (%)**		
Present smoker	18(36.73%)	31(63.27%)	49(100.00%)	χ^2=13.769
Past smoker	8(28.57%)	20(71.43%)	28(100.00%)	df=2
Non-smoker	18(13.04%)	120(86.96%)	138(100.00%)	P=0.00102*
Total	**54(24.0%)**	**171(76.0%)**	**225 (100.00%)**	
Alcohol consumption	**Sputum smear examination**		**Total No.(%)**	**P value χ^2,df**
	Positive No. (%)	**Negative No. (%)**		
Yes	24(33.33%)	48(66.67%)	72(100.00%)	χ^2=5.057
No	30(19.61%)	123(80.39%)	153(100.00%)	df=1
Total	**54(24.0%)**	**171(76.0%)**	**225 (100.00%)**	P=0.0245*

*Statistical significant result ($p<0.05$)