

Determination of risk factors among Tuberculosis patients at public sector Hospital Lahore

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ABSTRACT

Background: Tuberculosis is a chronic bacterial disease caused by *Mycobacterium tuberculosis*. There are multiple factors make people susceptible to Tuberculosis infections. Tuberculosis is one of the major diseases of poverty linked to both overcrowding and malnutrition. There is multiple risk factors. Significant risk factor is chronic lung disease and threefold increase of Tuberculosis due to alcoholism and Diabetes mellitus.

Aim: To determine the risk factors among Tuberculosis patients at Public sector Hospital Lahore.

Methodology: Analytical Cross sectional study was conducted at outdoor of tertiary care public sector Hospital of Lahore from 1st January to 30th June 2017. After convenient sampling 1120 patients from whole Punjab were included. Adult Male and female patients with informed consent were included. Data were collected, entered and interpreted as frequency and percentage distribution. The data were analyzed by SPSS version 22.

Results: Among 1120 cases, 529 cases were males and 591 females. 277(24.73%) cases had close contact with Tuberculosis, 228(20.36%) cases had inadequate treatment, 108(9.64%) cases were malnourished, 82(7.32%) cases faced overcrowded places, 85(7.59%) cases were diabetics, 72(6.43%) cases had different Socioeconomic factors, 42(3.75%) cases were addict/alcoholics, 103(9.20%) cases were smokers, 56(5%) cases had silicosis, 25(2.23%) cases had chronic renal disease and 42(3.75%) cases had history of treatment with immunosuppressive drugs.

Conclusion: The risk factors like close contact with Tuberculosis patients, inadequate treatment, malnutrition, overcrowding, Diabetes Mellitus, socioeconomic factors, smoking, Silicosis, treatment with immunosuppressive drugs were commonly observed were commonly observed.

Keywords: Mycobacterium, Diabetes Mellitus, Immunosuppressive drugs, Silicosis,

INTRODUCTION

Tuberculosis (TB) is an infectious chronic bacterial disease caused by *Mycobacterium tuberculosis (MTB)*¹. According to World Health Organization, tuberculosis can be classified as pulmonary tuberculosis (PTB) and extra-pulmonary tuberculosis (ETB) involving organs other than the lungs. Tuberculosis is airborne disease. To become infected, a person needs only a few of bacteria².

Pakistan has been ranked 5th among 22 high tuberculosis burden countries and 6th among countries where multi-drug resistant tuberculosis has become a serious challenge³. Pakistan has developed multi-drug resistance in approximately 2-3.2% of newly diagnosed cases and 16% patients are of previously treated⁴.

There are multiple factors make people susceptible to tuberculosis infections. HIV/AIDS is the most important and common risk factor in the world; 13% of tuberculosis patients are infected by the HIV⁵. This is the major issue in areas of Africa (sub Saharan), The rates of HIV are very high in these areas^{6,7}. The HIV people are commonly infected with tuberculosis and have active disease during their lifetimes in 5-10% cases⁸; whereas 30% of HIV

patients develop active disease in the early stage⁸. Tuberculosis is one of the major disease of poverty linked to both overcrowding and malnutrition.⁹ High population risk thus include: the people who take drugs through injections, residents of locales where there is gathering of vulnerable people (e.g., homeless shelters and prisons), resource-poor people medically and underprivileged, ethnic minorities with high risk, health-care providers serving these patients and children those have close contact with high-risk people¹⁰. One of the significant risk factors is Chronic lung disease. There is increase of the risk about 30-folds due to Silicosis.¹¹ The smokers have double the risk of tuberculosis as compared to non-smokers¹². There is also increase of the risk of developing tuberculosis in other disease states. There is threefold increase of tuberculosis due to alcoholism¹³ and diabetes mellitus.¹⁴ HIV/AIDS people are 20 to 30 times more prone to develop active tuberculosis. The patients suffering from other diseases with impaired immune system are on greater risk of this disease.

METHODOLOGY

Analytical Cross sectional study was conducted at Outpatient Department of public sector Hospital at Lahore from 1st January 2017 to 30th June 2017. After taking informed consent, 1120 tuberculosis patients of 18 years or more from both sexes were included. Patients coming from

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different cities of Punjab were selected after convenient sampling. Data were collected on a specified questionnaire by a doctor and required information regarding the disease was recorded after interviewing the patients. The data were entered and interpreted as frequency and percentage distribution. Only registered patients of Tuberculosis fulfilling the inclusion criteria were included in this study. The data were analyzed by SPSS version 22.

RESULTS

Among 1120 cases, 529 cases were males and 591 were females. 277(24.73%) cases had close contact with Tuberculosis, 228(20.36%) cases had inadequate treatment, 108(9.64%) cases were malnourished, 82(7.32%) cases belonged to overcrowded places, 85(7.59%) cases were Diabetics, 72(6.43%) cases had different Socioeconomic factors, 42(3.75%) cases were addict or alcohol consumers, 103(9.20%) cases were tobacco smokers, silicosis was reported among 56(5%) cases, 25(2.23%) cases had chronic renal disease and 42(3.75%) cases had history of treatment with immunosuppressive drugs for other diseases.

Among 277 cases with close TB contacts there were 104 males and 173 females while in those who do not have close TB contact there were 425 male and 418 female cases, the frequency of female cases was significantly higher with p-value < 0.05. Among 228 cases those had inadequate treatment, there were 104 males and 124 females while in those with adequate treatment there were 425 male and 537 female cases, the frequency of inadequate treatment was significantly higher in male cases with p-value < 0.05. In malnourished cases there were 42 males and 66 females while in well-nourished cases there were 487 male and 525 female cases with no significant association and p-value > 0.05. In cases those faced overcrowded places, there were 42 males and 40 females while 487 male and 551 female cases did not face overcrowded places with no significant association and p-value > 0.05. Close contacts with Tuberculosis cases,

inadequate treatment, malnutrition and overcrowding was also significantly associated with younger age groups with p-value < 0.05.

Among cases with diabetes there were 40 males and 45 females while 489 male and 546 female cases were non-diabetics with insignificant association and p-value > 0.05. Among cases with socioeconomic factors there were 32 males and 40 females with no significant association, while 32 males and 10 females were addict or alcohol consumers with significantly higher male to female ratio and p-value < 0.001. Moreover diabetes mellitus was associated with older age group with p-value < 0.05 and socioeconomic factors were associated with younger age group with p-value < 0.05. No association was found with age group and addict/alcohol consumer with p-value > 0.05.

Tobacco smoking was significantly higher in males with 70 males cases and 33 females with p-value < 0.05 while no significant association was found among silicosis, chronic renal diseases and with gender, p-value > 0.05. Tobacco Smoking, Silicosis and Treatment with immunosuppressive drugs were significantly associated with younger age group with p-value < 0.05 and no significant association was observed in old age group. Chronic renal diseases were significantly associated with all age groups except age group more than 64 years with p-value > 0.05.

Table: Risk factors among patients of tuberculosis

| Risk factors in Tuberculosis | n | %age |
|--|-----|-------|
| Close contact of TB cases | 277 | 24.73 |
| Inadequate treatment | 228 | 20.36 |
| Malnutrition | 108 | 9.64 |
| Overcrowding/overcrowded places | 82 | 7.32 |
| Diabetes Mellitus | 85 | 7.59 |
| Socioeconomic factors | 72 | 6.43 |
| Addiction/Alcohol Consumption | 42 | 3.75 |
| Tobacco Smoking | 103 | 9.20 |
| Silicosis | 56 | 5.00 |
| Chronic renal diseases | 25 | 2.23 |
| Treatment with immunosuppressive drugs | 42 | 3.75 |

| | | Close contact of TB cases | | Inadequate treatment | | Malnutrition | | Overcrowding | |
|-------------------|---------|---------------------------|--------|----------------------|--------|--------------|--------|--------------|------|
| | | Yes | No | Yes | No | Yes | No | Yes | No |
| Gender | Male | 104(37.35%) | 425 | 104(45.61%) | 425 | 42(38.89%) | 487 | 42(51.12%) | 487 |
| | Female | 173(62.45%) | 418 | 124(54.39%) | 467 | 66(61.11%) | 525 | 40(48.78%) | 551 |
| | p-value | <0.001 | | <0.001 | | 0.068 | | 0.452 | |
| Age group (years) | 18-24 | 52 | 1068 | 68 | 1052 | 08 | 1112 | 07 | 1113 |
| | 25-34 | 66 | 1054 | 40 | 1080 | 12 | 1108 | 11 | 1109 |
| | 35-44 | 70 | 1050 | 36 | 1084 | 18 | 1102 | 18 | 1102 |
| | 45-54 | 41 | 1079 | 54 | 1066 | 28 | 1092 | 18 | 1102 |
| | 55-64 | 33 | 1087 | 28 | 1092 | 28 | 1092 | 23 | 1097 |
| | >64 | 15 | 1105 | 08 | 1112 | 14 | 1106 | 05 | 1115 |
| p-value | <0.001 | | <0.001 | | <0.001 | | <0.001 | | |

| | | Diabetes Mellitus | | Socioeconomic and Behavioral factors | | Addiction/Alcohol Consumption | |
|-----------|---------|-------------------|------|--------------------------------------|------|-------------------------------|------|
| | | Yes | No | Yes | No | Yes | No |
| Gender | Male | 40(47.06 %) | 487 | 32(44.44%) | 497 | 32(76.19%) | 497 |
| | Female | 45(52.94%) | 546 | -40(55.56%) | 551 | 10(23.81%) | 581 |
| | p-value | 0.973 | | 0.624 | | <0.001 | |
| Age group | 18-24 | 05 | 1115 | 08 | 1112 | 08 | 1112 |
| | 25-34 | 12 | 1108 | 14 | 1106 | 10 | 1110 |

| | | | | | | | |
|---------|---------|--------|------|-------|------|-------|------|
| (years) | 35-44 | 20 | 1100 | 14 | 1106 | 08 | 1112 |
| | 45-54 | 21 | 1099 | 16 | 1104 | 08 | 1112 |
| | 55-64 | 23 | 1097 | 14 | 1106 | 05 | 1115 |
| | >64 | 04 | 1116 | 06 | 1114 | 03 | 1117 |
| | p-value | <0.001 | | 0.005 | | 0.080 | |

| | | Tobacco Smoking (n=103) | | Silicosis (n=56) | | Chronic renal diseases (n=25) | | Treatment with immunosuppressive drugs (n=42) | |
|-------------------|---------|-------------------------|------|------------------|------|-------------------------------|------|---|------|
| | | Yes | No | Yes | No | Yes | No | Yes | No |
| Gender | Male | 70(67.96%) | 459 | 29(51.79%) | 500 | 12(48.00%) | 517 | 22(52.38%) | 507 |
| | Female | 33(32.04%) | 558 | 27(48.21%) | 502 | 13(52.00%) | 578 | 20(47.62%) | 571 |
| | p-value | <0.001 | | 0.784 | | 0.938 | | 0.496 | |
| Age group (years) | 18-24 | 15 | 1105 | 12 | 1108 | 04 | 1116 | 03 | 1117 |
| | 25-34 | 22 | 1098 | 11 | 1109 | 05 | 1115 | 07 | 1113 |
| | 35-44 | 23 | 1097 | 13 | 1107 | 05 | 1115 | 13 | 1107 |
| | 45-54 | 21 | 1099 | 09 | 1111 | 07 | 1113 | 11 | 1109 |
| | 55-64 | 13 | 1097 | 07 | 1113 | 04 | 1116 | 05 | 1115 |
| | >64 | 09 | 1111 | 03 | 1117 | 00 | 1120 | 03 | 1117 |
| | p-value | <0.001 | | 0.022 | | 0.264 | | 0.002 | |

DISCUSSION

The tuberculosis may be commonly found in lower economic class or most populous districts or may be due to social problem resulting from many factors like low family income, large families, food malnutrition, poor education, non-existent housing, high density communities, migration flows, associated diseases, alcoholism, deficiency of the health system, mental illness and AIDS^{15,16}.

There are many risk factors for tuberculosis. The important one is HIV which is particular problem in sub-Saharan Africa with high incidence.¹⁷ There is increase of risk of tuberculosis two to four times in those who smoke more than 20 cigarettes a day.¹⁸ Diabetes Mellitus is common risk factor in developing countries¹⁹ and silicosis has the risk about 30 fold.²⁰ Hodgkin lymphoma, alcoholism, chronic lung disease, severe renal disease and malnutrition increase the risk of tuberculosis.²¹ A family genetics has important role in the development of tuberculosis.²² There is also risk of tuberculosis with low body weight. There is increase of risk 2 to 3 times with BMI below 18.5. With the increase of weight the risk is minimized.²³ Gastrectomy, jeuno-ileal bypass, cardiac and renal transplants, cancer of the head and neck, leukemia and lung cancer increase the risk.¹⁹ Prisoners are vulnerable to HIV/AIDS and Tuberculosis. The conditions of imprisonment play a great role in the spread of tuberculosis due to poor nutrition, overcrowding and poor health facilities. There had been many outbreaks of tuberculosis in jails and prisons in the world and particularly in USA.²⁴ There are many conditions those increase the risk include the recent tuberculosis infection, cases of tuberculosis not adequately treated, X-Ray chest showing previous TB nodules and fibrotic lesions, compromised immune system, treatment with prolonged corticosteroid therapy, reticuloendothelial and hemolytic diseases, malabsorption syndrome, intestinal bypass and vitamin D deficiency.²⁵ HIV/AIDS is important risk factor but it is not common in our country.

In this study among 277 patients those had close contact with Tuberculosis cases; there were 37.55% male and 62.45% female cases. No significant association was seen between gender and age groups, p-value was > 0.05.

There were 45.61% males and 54.39% female cases among 228 patients those had inadequate treatment. No significant association was seen between gender and age groups, p-value was > 0.05. There were 38.89% males and 61.11% female cases were malnourished. No significant association was observed between gender and age groups, p-value was > 0.05. There were 51.21% male and 48.78% female cases among 82 patients who faced overcrowding or overcrowded places. No significant association was seen between gender and age groups, p-value was > 0.05. From 85 Diabetic cases there were 47.06% male and 52.94% female cases. No significant association was seen between gender and age groups, p-value was > 0.05. There were 44.44% males and 55.56% female cases those had socioeconomic factors. No significant association was seen between gender and age groups, p-value was > 0.05.

In one study, alcohol consumption was also one of the risk factors for the development of multi-drug resistant tuberculosis (MDR-TB). It might be associated with its significant role for default and failure rate among new TB cases. Hence, it increases the rate of MDR-TB cases. In another studies, alcohol consumption was frequently reported as one of the risk factors for MDR TB²⁶ and was also a risk factor for default²⁷.

A study conducted in developing countries suggested that main risk factors for tuberculosis were smoking, behavioral factors specially cigarette smoking and use of alcohol have negative effect on treatment of tuberculosis. Cigarette smoking changes the lungs and there is suppression of the immune response of individuals affecting response of patient to treatment of tuberculosis. Alcohol also suppresses the immune response and they forget to have treatment of tuberculosis and appointments of hospitals, causing interruptions. Alcohol use and cigarettes smoking had shown association with interruptions with treatment with similar findings in Nigeria taken by Luka Ibrahim et al²⁸. In one study 50.9% cases were pulmonary tuberculosis and 43.7% with extra pulmonary tuberculosis, 5.4% were with both pulmonary tuberculosis and extra pulmonary tuberculosis. There is differentiation of this data from national data stated that 80-90% cases are pulmonary tuberculosis and 10-15% are

*extra pulmonary tuberculosis (EPTB)*²⁹. In this study it was observed that *pulmonary tuberculosis* was more common as compared to *extra pulmonary tuberculosis*. This was also observed that *pulmonary tuberculosis* was more common in males (54.4%) as compared to females (45.6%). *Extra pulmonary tuberculosis* was 67.3% and the same results were observed in a study conducted by K. Noertjojo et al³⁰.

In this study there were 76.19% males and 23.81% female cases were addict or alcohol consumers. No significant association was seen between gender and age groups, p-value was > 0.05. From 103 cases there were 67.96% male and 32.04% female cases those were tobacco smokers. No significant association was observed between gender and age groups, p-value was > 0.05. There were 51.79% male and 48.21% female cases among 56 patients of silicosis. No significant association was seen between gender and age groups, p-value was > 0.05. All patients were screened for HIV/AIDS but no case was diagnosed for this disease but it does not mean that HIV/AIDS has no association with Tuberculosis.

CONCLUSION

It was concluded that risk factors like close contact with tuberculosis patients, inadequate treatment, malnutrition, living in or facing overcrowded places, Diabetes Mellitus, socioeconomic factors, tobacco smoking, Silicosis, treatment with immunosuppressive drugs for other diseases were commonly observed in this study. Addiction/ Alcohol consumption was not commonly observed whereas no case of HIV/AIDS was observed in this study because this disease is not common in this country.

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