

A study of the various environmental factors associated with pulmonary tuberculosis at tertiary health care center

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Abstract

Background: Tuberculosis (TB), an infection caused by Mycobacterium tuberculosis (MTB), is a pandemic, and the Centers for Disease Control and Prevention state that one-third of the world's population is infected with the bacteria. **Aims and Objectives:** To Study the various Environmental factors associated with pulmonary tuberculosis at tertiary health care center. **Methodology:** This was a case-control study carried out at in the patients of Tuberculosis at the DOT centre of Rural Health Training centre under Department of Community Medicine of a tertiary health care centre during the one year period i.e. June 2017 to June 2018. With the written informed consent 53 TB patients were enrolled for the study randomly in the one year they were taken as Cases and similarly other patients attending the OPD for other illness were enrolled were 53 they considered Controls. The statistical analysis was done by unpaired t-test and chi-square test analyzed by SPSS 19 version software. **Result:** In our study we have found that the average age of Cases and Controls - 47 ± 4.57 and 48 ± 5.12 was comparable with each other ($t=1.06, df=104, p>0.05$); The male and female ratio was also comparable 1.52:1 and 1.94:1 ($\chi^2=0.3651, df=1, p>0.05$). The environmental factors like Overcrowding [$\chi^2=15.14, df=1, p<0.001, OR=4.93(2.15-11.24)$] Indoor Smoking ($\chi^2=6.0, df=1, p<0.01, OR=3.1(2.15-1.2-8.0)$] Source of Cooking ($\chi^2=4.28, df=1, p<0.01, OR=3.1(1.024-9.503)$] Cross Ventilation- ($\chi^2=7.20, df=1, p<0.001, OR=3.16(1.342-7.441)$] were significantly associated with patients of Tuberculosis at tertiary. **Conclusion:** It can be concluded from our study that the environmental factors like Overcrowding, Indoor Smoking, Source of Cooking like Bifuels /Chullah, Absence of Cross Ventilation were significantly associated with patients of Tuberculosis at tertiary. **Key Word:** Pulmonary tuberculosis, Environmental factors, Overcrowding, DOTS.

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INTRODUCTION

Tuberculosis (TB), an infection caused by Mycobacterium tuberculosis (MTB), is a pandemic, and the Centers for Disease Control and Prevention state that

one-third of the world's population is infected with the bacteria¹. Globally, TB remains the second leading cause of death from an infectious disease^{2,3}. TB affects mostly adults in the economically productive age groups; around two-thirds of cases are estimated to occur among people aged 15–59 years and also more common among men than women.⁴ In the majority of those infected, however, the infection remains latent, meaning that it does not progress to an active disease. Many factors affect whether TB become an active infection that can then result in more than 2 million deaths a year^{1,5-6}. Poor housing quality, overcrowding and dampness is associated with poverty, and increased susceptibility to disease^{7,8,9}. So, we have studied the Environmental factors associated with pulmonary tuberculosis at tertiary health care centre.

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METHODOLOGY

This was a case –control study carried out at in the patients of Tuberculosis at the DOT centre of Rural Health Training centre under Department of Community Medicine of a tertiary health care centre during the one year period i.e. June 2017 to June 2018. With the written informed consent 53 TB patients were enrolled for the study randomly in the one year they were taken as Cases and similarly other patients attending the OPD for other illness were enrolled were 53 they considered Controls. All details of the patients like age, sex, and the Environmental factors like Overcrowding (No. Persons per Room criteria used); Indoor Smoking (Bidi/Cigarette /Chilim/Hukka etc. inside the non isolated room was considered as Indoor Smoking; Source of Cooking - Biofuel/Chullah Gas Electric ; Cross Ventilation –Cross-windows with the area of window in proportion to wall area) etc. The statistical analysis was done by unpaired t-test and chi-square test analyzed by SPSS 19 version software.

Table 1: Distribution of the patients as per the socio demographic factors

| Age | Cases (n=53) | Controls (n=53) | p-value |
|------------------------|--------------|-----------------|-----------------------------|
| Average age (Mean ±SD) | 47 ± 4.57 | 48 ± 5.12 | t=1.06,df=104,p>0.05 |
| Sex | | | |
| Male | 32 | 35 | $\chi^2=0.3651,df=1,p>0.05$ |
| Female | 21 | 18 | |

The average age of Cases and Controls-47 ±4.57 and 48± 5.12 was comparable with each other (t=1.06,df=104,p>0.05); The male and female ratio was also comparable 1.52:1 and 1.94:1 ($\chi^2=0.3651,df=1,p>0.05$).

Table 2: Distribution of the various Environmental Factors associated with Cases

| | Cases (n=53) | Controls (n=53) | Significance |
|--------------------------|--------------|-----------------|--|
| Overcrowding | | | |
| Present | 35 | 15 | $\chi^2=15.14,df=1,p<0.001, OR=4.93(2.15-11.24)$ |
| Absent | 18 | 38 | |
| Indoor Smoking | | | |
| Present | 19 | 8 | $\chi^2=6.0,df=1,p<0.01, OR=3.1(2.15-1.2-8.0)$ |
| Absent | 34 | 45 | |
| Source of Cooking | | | |
| Biofuel/Chullah | 18 | 5 | $\chi^2=4.28,df=1,p<0.01, OR=3.1(1.024-9.503)$ |
| Gas Electric | 35 | 48 | |
| Cross Ventilation | | | |
| Absent | 24 | 11 | $\chi^2=7.20,df=1,p<0.001, OR=3.16(1.342-7.441)$ |
| Present | 29 | 42 | |

The environmental factors like Overcrowding[$\chi^2=15.14,df=1,p<0.001, OR=4.93(2.15-11.24)$] Indoor Smoking ($\chi^2=6.0,df=1,p<0.01,OR=3.1(2.15-1.2-8.0)$] Source of Cooking ($\chi^2=4.28,df=1,p<0.01,OR=3.1(1.024-9.503)$] Cross Ventilation- ($\chi^2=7.20,df=1,p<0.001,OR=3.16(1.342-7.441)$] were significantly associated with patients of Tuberculosis at tertiary.

DISCUSSION

TB remains one of the biggest challenges in resource poor setting and developing countries¹⁰. One of the obvious reasons for this dilemma is the involvement of multiple factors in increasing the susceptibility of infection and progression of the disease¹¹. Pathogenesis of TB in man is a two stage process. In the first stage, the infection is initiated when a person is exposed to an infected individual and inhales the virulent bacterium through sneezing and coughing of an infected individual. Inhalation of droplet nuclei that are smaller enough (1-2 µm) to reach the alveolar surface of the lower respiratory tract can cause the infection. At this stage, a person's duration to exposure, immune response, innate host resistance and other risk factors (environmental and social) play an important role to determine whether the infection will progress to disease or not. If a person having long duration of exposure and is also immunosuppressed, his chance of developing the disease will increase while in the opposite condition he can successfully overcome the infection¹². Apart from host related factors, many environmental and social risk factors have been reported to be involved in the increased susceptibility of infection and progression of the disease¹³⁻¹⁶. The environmental and social factors reported include proximity of contact, crowding, indoor pollution and use of biofuels (especially in rural areas), housing conditions, living style, ethnicity, education and socio-economic status. In our study we have found that the average age of Cases and Controls-47±4.57 and 48±5.12 was comparable with each other (t=1.06, df=104, p>0.05); The male and female ratio was also comparable 1.52:1 and 1.94:1 ($\chi^2=0.3651,df=1,p>0.05$). The environmental factors like Overcrowding[$\chi^2=15.14,df=1,p<0.001,OR=4.93(2.15-11.24)$]Indoor Smoking ($\chi^2=6.0,df=1,p<0.01,OR=3.1(2.15-1.2-8.0)$] Source of Cooking ($\chi^2=4.28,df=1,p<0.01,OR=3.1(1.024-9.503)$] Cross Ventilation- ($\chi^2=7.20,df=1,p<0.001,OR=3.16(1.342-7.441)$] were significantly associated with patients of Tuberculosis at tertiary. These findings are similar to Khaliq A¹⁷ they found For environmental factors they found the factors like Overcrowding, increased family

size, poor ventilation and use of biofuels (OR: 4.60, 1.75, 3.29 and 3.90) etc were significantly associated with the patients of Tuberculosis.

CONCLUSION

It can be concluded from our study that the environmental factors like Overcrowding, Indoor Smoking, Source of Cooking like Biofuels /Chullah, Absence of Cross Ventilation were significantly associated with patients of Tuberculosis at tertiary.

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