*Int.j.pathol.2020;18(2):43-47*

**Original Article**

# Smear-positivity of Tuberculosis in in-door patients of DHQ hospital, Swabi, Pakistan

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**ABSTRACT**

**Background:** Tuberculosis is an infectious disease with a historical background caused by acid fast bacillus bacterium, *Mycobacterium tuberculosis* which is transferred by droplets. It contributes to affect about one-third population globally. Tuberculosis has a wide prevalence and death rate just second to the HIV infection.

**Materials and methods:** The study was conducted during a year from January-December 2018 to observe the infected rate of tuberculosis in district Swabi. The aim of the study is to pinpoint the prevalence rate of the infection to speed up the access of health care programs to the infected people for effective treatment in the population. The suspected patients were belonging to district Swabi. The sputum was sampled, covered and labelled carefully from all the suspected patients. Each sample was smeared, stained on slid and was examined carefully for acid fast bacilli.

**Results:** The overall result examined was 18.15% in which male contributed 53.81% and female 46.18%. The highest prevalence rate, 26.27%, was observed in the age group 16-30. The highest frequency rate in male was observed in the age group 61-75 while in female in the age group 16-30. Moreover, the farmer occupation was more infective in comparison to others.

**Conclusion:** Results concluded that, the prevalence rate of tuberculosis is quite high in the study area which is due to the lake of health education, awareness and medical care.

**Key words:** tuberculosis, *Mycobacterium tuberculosis*, prevalence, smear positive.

## Introduction

Tuberculosis, one of the historical and primitive infectious diseases, is caused by *Mycobacterium tuberculosis* (acid fast bacilli) and has been suffering human beings for 17000 years. In Europe and Middle East, 4000 years old skeletons were reported to be died due to the bone Tuberculosis which indicates its historical background and a wide health challenge that time. It is written on the record that the patients were reported with the symptoms, coughing, chest pain and frequently blood in sputum, allows Hippocrates to diagnose tuberculosis (TB). The disease was that time known as consumption [(1).]

According to WHO report, tuberculosis is a global emergency of this era and is the principal cause of death as single infectious agent among the adults, which estimates 3 million deaths annually and the global burden of TB will reach to more than one billion till 2020 if this continued [(2)].

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Unfortunately, poor resource countries contribute more than 80% in the disease burden because the reemerging rate of disease is faster there due to the poor TB control and health education. But only 10% of the resources are spent for disease control, helping in the reemergence of the disease which increases global burden [(3)].

Recently, *Mycobacterium tuberculosis* (*M. tuberculosis*) affects about one-third population all around the word. About 14 million prevalent cases, 9.4 million incident cases and 1.3 million deaths in HIV-negative people and 0.38 million deaths were reported in the HIV-positive patients in the latest report of WHO [(4)].

*M. tuberculosis* among the top 10 killer infectious diseases, second only to the HIV disease worldwide and is transmitted by droplet nuclei or airborne particles that can be generated by infected patients while sneezing, coughing or speaking [(5)]. According to previous study, this acid-fast bacterium caused about 9.27 million new cases globally in 2007. The Asia an Africa regions contributed 55% and 31% respectively in that global burden that time [(6)]. Pakistan is the seventh most Tuberculosis affected country in the World, a burden it shares with other countries in the region. There are over half a million current cases and

over a quarter of a million new cases occur annually. Case detection is around 36%. However significant progress has occurred recently. A treatment success rate (with DOTS) of 75% of smear positive cases along with 100% coverage with its DOTS strategy was achieved in 2005. The national effort is well coordinated by a National Tuberculosis program that provides strategic guidance and conducts prevention and treatment activities that are orchestrated via local governments at district level and via public-private partnerships [7].

Although several studies have been conducted on TB epidemiology from different districts, towns and cities of Pakistan [8,9]. But there was no data available on the prevalence of TB in district Swabi. Therefore, the study was aimed to pinpoint towards the current prevalence rate of smear positive TB in Swabi district in order to develop a framework and control strategy for present and future prospects.

## Materials and Methods

**Study design:** The diagnostic study of Tuberculosis (TB) was reported in the population of district Swabi Pakistan. In this study, we reported the infection rate of TB both in male and female in the population. The data has collected and processed during a year from January to December 2018 from the TB center of DHQ Hospital at district Swabi which included 1300 suspected patients. The patients participated in the study were belonging to district Swabi and the other patients were strictly excluded from the study data. A questionnaire was developed and filled from the suspected TB patients with their consent regarding their name, sex, age, profession, location, medical history and chest X-rays. The study was conducted in DHQ hospital because this possesses very trustable center for TB diagnosis**.**

**Samples' collection:** Sputum samples were collected carefully from the patients visited to T.B center of DHQ Hospital Swabi for diagnosis and samples processing were done in Pathology Laboratory, TB center, Swabi. The suspected TB patients having positive x-rays were directed to take a deep breath and then cough deeply. The patients took out sputum into the container. The container was examined for the sufficient amount of sputum. After that the container covered and labelled with the name, number of the patient, and date of collection of specimen (sputum) [10].

**Sample processing:** The collected samples were processed accordingly and smear of each sample was prepared on slide carefully. After smear formation, the smear of each sample was stained with Ziehl Neelsen staining and examined microscopically for acid fast bacilli with most precautionary measure [11].

**Statistical analysis:** All the data were analyzed applying Pearson's Chi-square test by using SPSS software (version 20.0). The P value equal or less than 0.05 is considered as significant.

## Results

The duration of the epidemiological study was covered with the aim to report the prevalence rate of tuberculosis in the population visiting to Hospital, Swabi, Pakistan. This was the first epidemiological study of Tuberculosis in this district.

A total of 1300 suspected patients were examined during this study. In which 534 (41.07%) were male patients and 766 (58.92%) were female patients. The suspected patients, both males and females, were grouped into different age groups. The age group, 30-45, had more 149 (28.05%) while age group more than 60 (≥61) had less (9.50%) suspected patients among the males. In contrast to male, the age group, 16-30, had more suspected patients, 230 (30.41%), while age group ≥61 had less **(Fig. 1).**

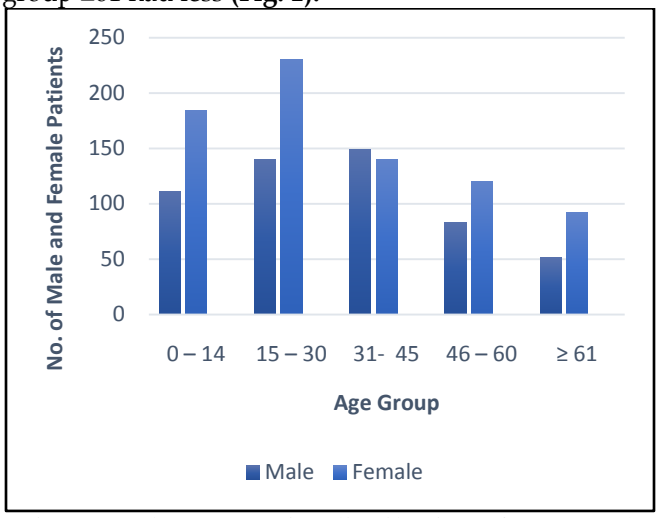


**Figure 1: The group wise distribution of suspected male and female patients.**

**Prevalence rate of Tuberculosis among infected patients:**

The Overall prevalence rate of Tuberculosis infection among the suspected patients was 236 (18.15%). Out of these, 127 (53.81%) were female patients while males were 109 (46.19%). Moreover, high prevalence rate (26.27%) was observed among the age group 16-30 years. Among females, high frequency (31.50%) was

observed in the age group 16-30 years while for males the highest frequency value lied in the age group 61-75 years. The association between patients (gender wise) and their age groups was statistically most significant (p=0.009) (see Table 1).

**Table 1: Association of sex with the age of Tuberculosis patients**

| Age in years | Male no. | Patient % | Female no. | Patient % | Total no. | Total % | p-value |
|---|---|---|---|---|---|---|---|
| 0-15 | 16 | 14.68 | 21 | 16.54 | 37 | 15.68 | 0.009 |
| 16-30 | 22 | 20.18 | 40 | 31.50 | 62 | 26.27 | |
| 31-45 | 18 | 16.51 | 28 | 22.05 | 46 | 19.49 | |
| 46-60 | 24 | 22.02 | 24 | 18.90 | 48 | 20.34 | |
| 61-75 | 27 | 24.77 | 10 | 7.87 | 37 | 15.68 | |
| 76-90 | 2 | 1.83 | 4 | 3.15 | 6 | 2.54 | |
| **Total** | **109** | **46.19** | **127** | **53.81** | **236** | **100** | |

**Socio-economic status of infected individuals:**

The socio-economic status of patients was observed among the different age groups. Patients having age less than 15 years were observed in the upper class. Patients who belonging to middle class had age range from 16-45 years, while the patients of the upper class were all above the 31 years. The highest frequency rate, 62 patients, belonging to the middle-class were observed in the age group 16-30. The relation between the patient's status and their age group was highly insignificant (p=2.84). See **(Table 2).**

**Table 2: Socio-economic status of patients among different age groups.**

| Age group (years) | Upper class | | Middle class | | Lower class | | Total | Total % | P-value |
|---|---|---|---|---|---|---|---|---|---|
| | No. | Patient % | No. | Patient % | No. | Patient% | | | |
| 0-15 | 37 | 100 | 0 | 0 | 0 | 0 | 37 | 15.68 | 2.84* |
| 16-30 | 0 | 0 | 62 | 72.1 | 0 | 0 | 62 | 26.27 | |
| 31-45 | 0 | 0 | 24 | 27.9 | 22 | 19.47 | 46 | 19.49 | |
| 46-60 | 0 | 0 | 0 | 0 | 48 | 42.48 | 48 | 20 | |
| 61-75 | 0 | 0 | 0 | 0 | 37 | 32.74 | 37 | 16 | |
| 76-90 | 0 | 0 | 0 | 0 | 6 | 5.31 | 6 | 3 | |
| **Total** | **37** | **100** | **86** | **100** | **113** | **100** | **236** | **100** | |

***Insignificant**

Subjects were divided into three societal classes according to their socioeconomic status observed from their occupation and status of living. Out of the total 236 positive subjects, 113 (47.88%) were belonging to Lower class people, followed by Middle-class and then Upper-class with number 86 (36.44%) and 37 (15.68%) respectively. So, most frequent infection was found in lower class people. The relation between patients and their socio-economic status was statistically insignificant (p=0.92) as shown in **(Table 3).**

**Table 3: Socioeconomic grading of patients infected with TB infection**

| Gender | Economic status | | | Total | P-value |
|---|---|---|---|---|---|
| | Upper class n (%) | Middle class n (%) | Lower class n (%) | | |
| Male | 16 (14.68) | 40 (36.70) | 53 (48.62) | 109 | 0.92* |
| Female | 21 (16.54) | 46 (36.22) | 60 (47.24) | 127 | |
| **Total** | **37 (15.68)** | **86 (36.44)** | **113 (47.88)** | **236** | |

***Insignificant**

## Discussion

District Swabi is the fourth most populous district of the Khyber Pakhtunkhwa (KP) province of Pakistan, lies between the Indus River and Kabul River in the Province. Swabi is surrounded by big beautiful mountains on its north side and mighty River Indus with cold water running through on the south, irrigating its fertile land. There are about 100 Villages in District Swabi. The socioeconomic profile of District Swabi reports that it is comprised of about 1543 square kilometers area with about 0.8 million people and a literacy rate of 40% [12]. Tuberculosis, a fatal ailment is responsible for perverting more than one-third of the world's population. According to a report, there were 9.4 million incident cases, and 14 million prevalent cases of Tuberculosis (TB) [13].

Our study used retrospective analysis to examine the sputum of suspected patients from the area under study. This study reported 18.15% prevalence rate among the inhabitants of Swabi belonging to different setups on the bases of age, gender and status, which is in line and close with the studies of Muvunyi *et al*., who reported an average prevalence of 17.3% among population of Rwanda [6]. The observed prevalence suggested that a voluminous part of suspected patients in Swabi is infected with TB. This high prevalence may be related to the low socioeconomic status, less awareness of people, less medical care and lack of preventive measures to avoid the disease. Further analysis revealed that females were more affected as compared to males. The higher frequency (53.81%) in females is related to the illiteracy, lack of medical care and living in unhygienic conditions. The nearly closed frequency of male (46.18%) can be related to the observation of Sharma *et al*, (2010) that the prevalence of TB is significantly higher in males. Gender wise study of prevalence indicated that patients of age 16-30 years are more exposed to the infection. An overall frequency of 26.27% is obtained for this age group while considering age wise prevalence of TB [14].

Moreover, it was observed that for both males and females, the frequency of infection was higher at the Middle ages such that it was 22 (20.18%), 18 (16.51%), and 24 (22.01%) for males of age groups 16-30, 31-45, and 46-60 years respectively. This revelation confirmed the findings of Holmes *et al*. (1998), and Muvunyi *et al*. (2010), both of them reported that chances of TB infection was higher at the age 15-44 years. One of the major reasons for this is that these subjects are frequently exposed to the community and thus are at an increased risk of acquiring the disease. The high frequency in males of age group 31-45 and 46-60 points toward the dilemma that men are more affected at a stage when they are bearers of a family and others depend upon them [6, 15].

The examination reported that majority (47.88%) of TB positive patients were that of low socioeconomic status. This finding can be related to a general agreement that poor lower class of people lives in a less hygienic conditions, are medically deprived and illiterate, therefore, such a high frequency of the infection is observed among. Overcrowding in small enclosed spaces with prolonged contact with other family members provides an opportunity for infection to spread from one individual to the other through droplets or coughing and same study was also conducted by Hussain and Kunwal (2000) in Lahore showed that majority (71%) of the Tuberculosis patients were members of the poor, deprived and lower social class [16].

## Conclusion

Our analysis pinpointed the high prevalence of Tuberculosis in the people belonging to the less socio-economic setup of District Swabi. Moreover, it was concluded that Tuberculosis is highly prevalent among the adults as compared to child's and older individuals. It may be due to their frequent social interaction in the unhygienic conditions in the community. It is strictly recommended that Govt. organizations should take keen preventive measures by organizing health-based seminars, awareness companies to avoid further spread of the disease, improve the socioeconomic status of inhabitants, provide good medical care and create awareness about the epidemic disease..

## Acknowledgement

We thank and acknowledge all the technicians from the TB center DHQ hospital of Swabi for their collaboration and technical help.

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| HISTORY | |
|---|---|
| Date received: | 17-07-2019 |
| Date sent for review: | 10-10-2020 |
| Date received reviewers comments: | 17-10-2020 |
| Date received revised manuscript: | 11-11-2020 |
| Date accepted: | 26-11-2020 |

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