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Original Article

Prevalence and Awareness Survey of Tuberculosis in The Suspected Population of Bajaur Agency in Fata, Pakistan

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ABSTRACT

Tuberculosis is most common infectious disease of the lungs and is a leading cause of Mortality among infectious caused by Mycobacterium tuberculosis. Its infections occurring in about 1% of the population each year. **Objective:** To trace out the effects of TB in peoples of different ages, areas, and lifestyle and also check the Awareness level of TB in Educated and Married peoples. **Methods:** A total of 200 Samples were collected from Agency Headquarter hospital Khar Bajaur Agency and were screened out for TB by Microscopic examination, X-rays and Gene Xpert. **Results:** The Result revealed that out of 200 individuals 68 (34%) were positive, of which 36 (31.03%) were Male and 32(38.09%) were female. **Conclusions:** TB was higher in female as compared to Male. Prevalence of TB in different age groups was measured. The highest percentage was 39(69.64%) in age group 11-20 years while the lowest was 8(26.66%) in age group of 1-10 years. The major modes of transmission were spitting, coughing, sneezing, talking and singing.

INTRODUCTION

Tuberculosis is a specific chronic infection caused by Bacteria Belonging to Mycobacterium. This is the core infectious disease in communal healthiness. It can affect any organ of the body but in two third of the cases it involves the lungs, Central nervous system parenchyma and circulatory system are mostly affected by this disease. This form of tuberculosis is called pulmonary tuberculosis, it may be primary or secondary depending upon prior exposure [1]. The WHO declared tuberculosis a global disaster due to its epidemic scale and urgent need for better control. WHO promoted the DOTS strategy for global tuberculosis control, which involves directly observed treatment for a short course? It is effective in areas with high prevalence of Multidrug resistant tuberculosis [2]. Tuberculosis is an infectious bacterial disease caused by tubercle bacilli, leading to high mortality and morbidity rates globally, particularly in developing countries. It's associated with poverty, deprivation, and immunodeficiency and affects all age groups [3]. *Mycobacterium Tuberculosis* is a common human pathogen with a complex life cycle of various stages in different environments. Its ability to survive within the host for decades contributes to its success. It is 1-4 micrometers in length. It is due to its unusual cell wall however there needs to be more information about the modulation of call wall component when environment is changing for them. It is more resistant and persistent because of several genes' expression on the same time. Mycobacterium Tuberculosis

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is the primary cause of TB in humans and is part of the Mycobacterium TB complex, which also includes *M. microti*, *M. bovis*, and *M. africanum*. *M. africanum* infections are rare, and *M. microti* doesn't cause TB in humans. *M. bovis* has a larger host range and primarily causes TB in other animal species. Humans usually contract *M. bovis* through consuming infected animal products like milk, milk derivatives, or meat [4]. Though other organs are also affected, the illness mostly affects the lungs. Drug-susceptible strains of TB may almost always be cured with adequate treatment. If left untreated, tuberculosis can be fatal within five years in more than half of cases. In 2001, the WHO reported over 3.8 million new cases of TB, with 90% of cases coming from developing nations. Estimates suggest that there were 8 million new TB cases globally in 2001, with 90% from underdeveloped nations in Africa (2 million), Asia (5 million), Latin America (0.4 million) and the Middle East (6 million). Furthermore, Nepal alone had 1.8 million TB-related deaths. Therefore, effective treatment involves timely medication and proper education [5]. Extra-pulmonary infection sites of tuberculosis include the nervous system (tuberculosis meningitis), pleura (tuberculosis pleurisy), genitourinary system (urogenital tuberculosis), bones and joints (osseous tuberculosis) and lymphatic system (scrofula of the neck) [6]. Extra-pulmonary specimens are body fluids, biopsies, and aspirates from lymph nodes and other sites. To detect extra-pulmonary tuberculosis infection, peritoneal fluid, lymph node aspirates, ascitic fluid and cerebrospinal fluid are examined. [7]. In mostly developing countries among the top infectious Bacterial disease. Tuberculosis is a major cause of health problems, resulting in 1.6 to 2.2 million deaths per year worldwide. It is a highly contagious airborne disease affecting people of all ages, and over 95% of TB-related deaths occur in low- and middle-income countries. Among women aged 15 to 44 years, TB is among the top three causes of death. It is more prevalent in developing countries, particularly those aged 50 or older. Around one-third of the world's population is estimated to be infected with the TB microbe [8]. The situation is further become problematic due to increasing incidence of drug-resistant TB, but a positive step is that new radiometric and Molecular diagnostic methods have been announced and widely used now; it is assessed that between 60 percent and 70 percent of all TB cases are diagnosed by mean of sputum smear examination new moods for diagnosis and treatment of TB are needed as still millions of people are suffering and dying from this disease. It is one of the top three infectious killing disease which kills 2 million people each year, it's because TB is commonly asymptomatic disease because the bacterium grows and multiplies in the Macrophages, thus the avoiding Natural protection system in the patient's blood serum [9]. More than 1.5 million people worldwide die from the slowly fatal illness tuberculosis each year. In both developing and wealthy nations, it has been shown that male screening and diagnosis rates for TB are higher than female rates (1.96+0.6). This gender disparity is so stark that it has been suggested that men are at an increased risk of developing TB. This gender bias is attributed to a multitude of biological, social, cultural, and economic variables, with socio-cultural factors reportedly playing a key part in the delays in TB diagnosis and treatment in the female population. Many factors, including cultural barriers to accessing healthcare, health belief systems, treatment from non-professional healthcare providers, fear of stigmatization, and self-medication, have been found to delay the diagnosis and treatment of both male and female patients in various countries. Doctors may sometimes delay the diagnosis of women's illnesses by overlooking feminine symptoms, leading to delays in diagnosis and treatment [10]. In spite of the fact that there is evidence to suggest that patients of reproductive age who are female are less likely to seek early medical assistance, the disease is said to proceed more quickly in these people. Because the hormonal and psychological makeup of each sexes differs, certain study may clearly show that biological variables may also contribute to the gender gap in TB. It is impossible to ignore the notion that the difference between male and female ratios may not be caused only by health inequalities [11]. The analysis of probable respiratory tuberculosis needs an encouraging nucleic acid intensification test results or a positive smear and radiological findings suggestive of pulmonary tuberculosis, it can affect all organs of the body.it has a wide spectrum of clinical performance depending on the anatomical site involved and environmental characteristics such as crowding and social factors counting poverty and imprisonment, are related with amplified risk of tuberculosis [12]. A prevalence survey is important to know why the adults infected with *Mycobacterium tuberculosis* is not diagnosed and hence treated by the national TB control programs [13]. Tuberculosis control involves preventing infection, halting the progression from infection to active disease, and treating active disease. Medications used in the treatment of TB include both specific drugs for TB and those with broad antimicrobial activity. Primary TB drugs include pyrazinamide, isoniazid and ethambutol, usually used as a fourth drug in initial regimens [14]. Tuberculosis drugs with other indications includes rifabutin, rifabutin and rifapentine [15]. The primary objective of our study was to ascertain the prevalence of tuberculosis, in peoples of different ages, check the ratio of TB in urban and Rural

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areas. This study also checked the Economic wise prevalence, Educational wise prevalence of TB. Our study also assesses the level of awareness regarding Mycobacterium detection in Bajaur Agency, Pakistan.

METHODS

In the Current study, research data were collected from Bajaur agency. It is a part of Federally Administered Tribal Areas (FATA), Pakistan. It is situated between the North-west of Pak-Afghan border, near the south-west of Mohmand agency to the North-East of District Dir and its south-East lies of Malakand. The Bajaur agency is divided into 7 Tehsils, the headquarter is Khar and the sub division is Nawagai. The total area of Bajaur Agency is about 1,290 Square kilometers and its population is 595,227 in 1998 [16]. Samples were collected within the duration of 6 months from November 2022 to April 2023. The study was conducted at the Agency Headquarter Hospital (AHQ), Khar, as it is easily accessible to most patients in Bajaur and has well-equipped wards, qualified staff, and diagnostic laboratories. Data were collected from the hospital's outpatient department (OPD) based on parameters such as age, gender, location, economic status, marital status, and education level. Permission was obtained from the hospital administration to access patients, and written consent was obtained from each patient before conducting the interview. Patients were briefed about the study and its Importance. Those patients, who were willing to answer, were considered in present study. During the study, all patients of tuberculosis were interviewed personally, that were diagnosed and examined by doctors in the OPD. Only those patients were interviewed who belong to Bajaur Agency and came to OPD for diagnosis and treatment.

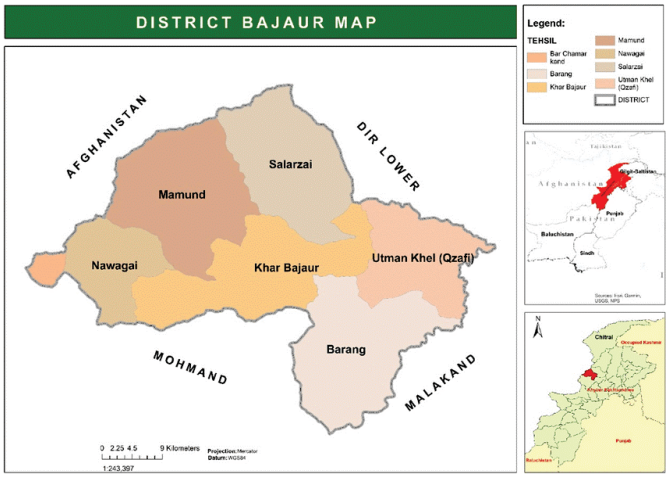

Figure 1: Map of District Bajaur, Fata, Pakistan

Microscopic examination is very important test for detection of *Mycobacterium tuberculosis*. In Microscopic examination. Slides were prepared from the Sputum with standard protocol, Stained and then examined under the Microscope (100X). TB was identified in the Stained Slides as red rods [10]. Ziehl–Neelson staining was performed. First place slides on the staining box having carbol Fuchsin for 5-10 minutes. Give a heat through a spirit lamp for fixing. Remove the slides and make them air dry. Put a few drops of decolorizing agent as per protocol. Wash the with simple's tape water. Again, dip the slide in 2nd box having methylene blue for 5-10 minutes. Remove the slides and make them air dry and washed. View the smear under oil immersion. See the slides under microscope at 10x, 40x and 100x and identified with the standard images, those slides having fine, red rods against the blue background. The red rods show the presence of *Mycobacterium* (TB) positive [13]. X-Ray is an important method to detect TB the infected Person on which germ has attacked and caused inflammation in the lungs, an abnormal shadow may be visible on the Chest X-rays. The Gene Xpert MTB rifampicin (RIF) Mycobacterium *tuberculosis* is a fully automated, cartridge-based nucleic amplification assay for the simultaneous detection of TB and rifampicin resistance. Although test is used for the diagnosis of tuberculosis in directly from sputum samples. The test was carried out on the GeneXpert test device platform, which simplifies molecular testing by fully integrating and automating sample preparation, amplification, and detection. A bacterial buffer was added to the clinical specimens before a defined volume was transferred to a cartridge containing all reagents. The plastic cartridge was then introduced to the GeneXpert device, which provided results in less than two hours.

RESULTS

A total of 200 sample were collected randomly from the Agency Headquarter Hospital Khar, Bajaur Agency. Questioner were developed that contained all the necessary information like age, location, gender, education, marital status and occupation etc. of the person under observation. Table 1 prevalence of TB in population of Bajaur Agency showed that out of 200 samples 68 (34%) individuals both male and female were infected with TB infection.

Table 1: Prevalence of tuberculosis in Bajaur Agency

Total sample	Positive n (%)
200	68(34)

The table 2 illustrate that out of 200 individuals there were total 116 males out of which 36 (31.03%) were infected with TB. Out of 200 there were 84 females in whom 32(38.09%) were infected with TB. Analysis showed that prevalence of TB is high in female as compare to male.

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Table 2: Gender-specific Prevalence of Tuberculosis

Gender	Total number of patients	Positive for TB
Male	116	36(31.03)
Female	84	32(38.09)

The table 3 illustrate the prevalence of TB in different age group of the subject. In 1-10 age group of the subject the prevalence of TB was 26.66% 11-20 are 69.64%, 21-30 were 52.08%, 31-40 were 30.76%,41-50 were 55.55%, 51-60 were 66.66%, 61-70, 45.45% were and 71-80 where 40% individuals were infected with TB. The highest prevalence is in age group of 11-20.

Table 3: Age wise TB Prevalence

Age Group	Total number of patients	Positive for TB
1-10	30	8(26.66)
11-20	56	39(69.64)
21-30	48	25(52.08)
31-40	26	8(30.76)
41-50	18	10(55.55)
51-60	6	4(66.66)
61-70	11	5(45.45)
71-80	5	2(40)

The table 4 illustrate that out of 200 individuals there were total 55 people who belong to lower class out of which 41 (74.54%) were infected with TB. There was total 106 individuals out of 200 how belong to middle class in which 68 (64.15%) were infected with TB. while out of these 200 there were total 39 people how belong to high class out of which 17(43.58%) were infected with TB.

Table 4: Economic wise prevalence

Economic Status	Total number of patients	Positive for TB
Lower Class	55	41(75.54)
Middle Class	106	68(64.15)
High Class	39	17(43.58)

Table 5 illustrate that out of 200 individuals there were total 142 married out of which 101(71.12%) were infected with TB. Out of 200 individuals 58 were unmarried out of 19(32.75%) were infected with TB.

Table 5: Prevalence of TB on the Basis of Marital Status

Marital Status	Total number of patients	Positive for TB
Married	142	101(71.12)
Unmarried	58	19(32.75)

Table 6 showed that out of 200 individuals there were total 140 individuals belong to urban area out of which 94(67.14%) were infected with TB. Out of 200 individuals 60 belongs to rural area out of which 44(73.33.11%) were infected with prevalence of TB is more on urban areas as compare to rural areas.

Table 6: Prevalence of TB on the basis location

Prevalence of TB on the Basis location	Total number of patients	Positive for TB
Urban	140	94(67.14)
Rural	60	44(73.33)

Table 7 illustrated that out of 200 individuals there were total 75 educated of which 25 (33.33%) are infected with TB out of 200 there are 125 uneducated in whom 97(77.6%) are infected, with TB. prevalence of TB is more than uneducated peoples compare to Educated people.

Table 7: Prevalence of TB on the basis education

Prevalence of TB on the Basis Education	Total number of patients	Positive for TB
Educated	75	25(33.33)
Uneducated	125	97(77.6)

DISCUSSION

A total of 200 people visited the Agency headquarter Hospital Khar Bajaur Agency during the study period. Out of 200, 68 were diagnosed positive for TB. The results were analyzed for the studies parameters which have been discussed as; The present study showed the prevalence rate of TB in female (38.09%) and as compared to males (31.03%). The reason might be that these females are restricted to houses, expose to smoke during cooking, having poor immunity and their long nails, therefore they are at more risk of getting TB. According to previous research, some factors affect the relapse of pulmonary tuberculosis, such as male gender, age under 60 years, contact with TB patients, low income and failure of DOTS implementation during a previous ATT course. These factors were found in over 50% of patients. However, the present study's results differ from previous findings as it suggests that females often are unaware of symptoms such as blood in the sputum. Inner-city, overcrowded residences and a lack of DOTS implementation were noted more frequently as factors contributing to TB relapse in patients [17, 18]. Present results were also analyzed for the age wise occurrence of TB in different age groups. The results showed that a high number of patients were recorded in the age group of 11-20 years. The people at this age group are at more risk to TB as compare to the rest of age groups. Tuberculosis was high in the group of 16 to 30 year i.e., 46.2% (35 cases). The reason might be the high exposure of these people to environmental risk factors that contributes in TB Infection [15-18]. The present survey showed high prevalence (71.12) of TB in married couples compared with the unmarried having 1/3rd reported cases. The result might be due to close contact, which may be risk factors of getting TB. The current study's results contradict the previous findings suggesting that married men and single women received more family support for completing treatment. In contrast, married women often concealed their disease to avoid being deserted, rejected, or blamed for bringing the disease into the family [19]. Present results are also agreed with the findings of Glaziou *et al.*, that studied TB and its impact on social

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stigmatization, treatment cost and pregnancy on defaulting. Efforts are required to enhance doctors' knowledge and develop effective treatment protocols in support of the National TB Control Program. Educational improvement, better health facilities, and increasing awareness in the population are essential [20]. From present result it was concluded that TB was high in illiterate people as compare to literate. The result might be the unawareness about the TB, its transmission, Management treatment and prevention. Same result has also mentioned in literature that examined how gender and literacy influence TB diagnosis and treatment. Moreover, Illiterate patients had a longer diagnostic delay than literate patients [21-25].

CONCLUSIONS

Tuberculosis is the most common infectious disease of the world including Pakistan, causing morbidity and mortality. TB is a very serious health problem of human being in all over the world. Our research base evidence concluded that the prevalence of TB is higher in female than in male. The people who were in the mid age have high risk of infection as compare to the rest of the ages. TB prevalence was probably high in Married than unmarried people. The prevalence of TB in uneducated was high due to unawareness. The people of rural area were highly affected as compare to urban area. The highest TB was recorded in the individuals of economically lower class. It is crucial to focus on enhancing health facilities, educational improvement and increasing awareness among the population.

Authors Contribution

Conceptualization: MJ
Methodology: SK
Formal Analysis: MR
Writing-review and editing: AB, SK, MJ

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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