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Original Article

Frequency and Determinants of Delay in Diagnosis of Pulmonary Tuberculosis

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ABSTRACT

Delays in diagnosis of TB can lead to more severe illnesses, complications, and higher rates of morbidity and mortality. **Objective:** To identify the frequency and reasons of delay in diagnosis of pulmonary tuberculosis. **Methods:** The study was conducted at the TB & Chest ward of Jinnah Hospital, Lahore. Well-systemized questionnaire was being used to collect the data. A sample of n=150 was recruited through convenient sampling. **Results:** Out of total 150 applicants, 101(65.6%) were male and 49(31.8%) were female. Out of total 150 respondents, 51(33.1%) responded yes they have medical knowledge and 99(64.3%) responded no, 106(68.8%) responded yes they take self-treatment and 44(28.6%) responded no, 92 (59.7%) responded yes they take anti TB treatment and 58(37.7%) responded no, 45(29.2%) responded positively to question about health facility near home and 105(68.2%) responded no, 103(66.9%) responded yes they were satisfied with health care system and 47(30.5%) responded no, 61(39.6%) responded yes they have knowledge regarding TB and 89(57.8%) responded no, 71(46.1%) responded yes they had previous history of TB and 79(51.3%) responded no, and 77(50%) responded yes they have fear in expressing TB among society and 73(47.4%) responded no they have no fear in expressing TB among society. **Conclusions:** The study concluded that the most significant part of the delay in diagnosing TB is associated with the time between the first medical visit and diagnosis, which often leads to misdiagnosis. The authors recommend frequent health education and support programs for high-risk patients.

INTRODUCTION

Tuberculosis (TB) is known to be a significant general medical condition around the world. Pakistan is one of the greatest weight TB nations on the planet, with a yearly case occurrence of 500,000, which makes it one of the significant reasons for bleakness and mortality. Besides, Pakistan contributes about 44% of the TB trouble in the Eastern Mediterranean Region (EMR) and represented 80% of the World Health Organization EMRs Multi-drug safe tuberculosis trouble[1, 2]. Pulmonary tuberculosis (PTB) is one of the world's most significant wellbeing issues, influencing 33% populace inactively. World Health Organization (WHO) reported ten million new TB cases in the year 2017 which included 5.8 million men, 3.2 million ladies, and 1,000,000 kids. Pakistan positioned among eight driving nations from which 66.6% instances were of new PTB which were accounted for. Human Immunodeficiency Virus (HIV) is a main danger factor detailed by WHO, that causes 11% of recently analyzed PTB [3]. Treatment delay is a vital obstructing factor in the control of TB. A solitary TB patient who stays untreated can taint from10 to 15 individuals consistently. In addition, delay in TB treatment might bring about additional difficulties and chronic weakness, hence expanding the danger of mortality. In addition, delays in the diagnosis and treatment could worsen the condition, professional results, and transmission of TB in the surrounding [4]. Prevention of

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new infections of Mycobacterium tuberculosis and early diagnosis and treatment are crucial for reducing the burden of TB. Ensuring widespread access to quick diagnostic testing and timely treatment is necessary to effectively control TB. In areas with high TB prevalence, early diagnosis should be carried out within two to three weeks of the onset of clinical symptoms and late diagnosis should be performed a month later, as delay in diagnosis is not recommended for effective TB control[5]. In countries like Pakistan, which have a high prevalence, incidence, and transmission rate of TB, studies and surveys on the delay in treatment for TB patients, particularly for pulmonary TB patients, are limited. This study aims to examine the delay in treatment for TB and identify the key factors associated with it [1]. According to the World Health Organization (WHO), it is estimated that 33% of the global population is infected with Mycobacterium tuberculosis. In 2009, there were reported 8.8 million new cases and 1.45 million deaths worldwide. However, the majority of TB cases and deaths occur in agricultural nations where resources are limited [6]. To gain a comprehensive understanding of the duration of overall delay and the key factors contributing to delay is necessary, which can aid in designing and developing alternative diagnostic and treatment strategies in Pakistan. TB is a significant problem due to the fact that many cases remain undiagnosed worldwide. This can be attributed to various factors, primarily within the categories of patients delaying seeking healthcare or healthcare systems failing to diagnose patients promptly. Delayed diagnosis can result in more severe illness, more complications, and ultimately a higher mortality rate. Tuberculosis(TB)is a major health issue that affects people worldwide. According to the most recent global TB survey, 10.4 million individuals became infected with this disease in 2016 and 1.7 million deaths were reported, putting a significant economic strain on families and society. China is among the thirty countries with a high prevalence of TB, with the third-highest rate in the world[7]. The burden of TB is primarily borne by developing countries, with over 95% of the estimated 1.8 million TB deaths in 2015 occurring in low- and middle-income countries. Africa has the highest prevalence of TB, with almost three-quarters of the estimated 1.2 million new HIV-positive TB cases worldwide in 2014 and 71% of the estimated 1.2 million new cases of TB among HIV-positive people in 2015 occurring in Africa[8]. Patients' failure to seek medical help may cause delays in diagnosis and treatment of tuberculosis patients. There is emerging evidence that a huge number of tuberculosis cases are still unable to receive treatment. It also prolongs the infectivity time in the community. Delays in receiving proper TB treatment are an issue in the fight against tuberculosis. Despite several TB control measures, the research area still has a low case detection rate, resulting in delayed diagnosis and treatment commencement. Little or no work has been done to address the claimed problem, or some work has been done but gaps exist, necessitating the study [9]. When one considers the high prevalence of tuberculosis in children, this notion becomes clear. In 2018, 11 percent of children aged 0-14 years were infected with tuberculosis, out of 7 million new cases worldwide[10]. The situation is similar in Indonesia, which has a relatively high incidence rate of tuberculosis(TB)in children, according to the 2017 Indonesian Health Profile, which revealed that 36,348 children in Indonesia are infected with the disease, despite the fact that the Case Notification Rate (CNR) or case finding in children is only 9%, compared to the national target of 10-15%. These figures help to characterize the status of tuberculosis in children, as well as the significant number of cases that remain untreated in this age range[11]. We aimed to identify the frequency and reasons of delay in diagnosis of pulmonary tuberculosis. TB is a significant problem, largely due to the fact that many cases go undiagnosed around the world. This may be due to a variety of factors, including patients who delay seeking medical help and healthcare systems that fail to diagnose patients in a timely manner. Delays in diagnosis can lead to more severe illnesses, complications, and higher rates of morbidity and mortality.

METHODS

The current study is a cross-sectional study conducted in the TB & Chest ward of Jinnah Hospital Lahore. The study population consisted of pulmonary tuberculosis patients in the TB & Chest ward of Jinnah Hospital Lahore. A sample of n=150 was recruited through convenient sampling. In this research, a self-administered questionnaire was adopted from an article to collect data. Ethical approval was taken from The University of Lahore under the name: Frequency and determinants of delay in diagnosis of pulmonary tuberculosis. Reference Number was: IRB-UOL-FAHS/838/2021. Inclusion criteria for the current study include: Patients diagnosed with pulmonary tuberculosis and admitted in the TB & Chest ward of Jinnah Hospital Lahore. Patients who are able to understand and provide informed consent. Patients who are able to complete the self-administered questionnaire. Patients who are willing to participate in the study and Patients who are 18 years of age or older. Exclusion criteria includes: Patients who are not diagnosed with pulmonary tuberculosis. Patients who are unable to understand and provide informed consent. Patients who are unable to complete the self-administered questionnaire. Patients who are unwilling to participate in the study. Patients who are under 18 years of age. A well-structured questionnaire was used for collecting the data from the participants. After taking informed consent, data

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were collected from tuberculosis patients through a research instrument/tool (questionnaire), according to the variable of the study. The quantitative data were measured by SPPS Statistical Package of Social Sciences (SPSS) software version 23.0 as mean, ± standard deviation. The qualitative data were measure by frequency. Chi-square test was used for statistical analysis. p-value less than or equal to 0.05 were taken as significant. All participants were asked to sign a written ethical approval. All information and data gathered was kept private. Throughout the research, respondents were stayed confidential. The subjects were informed that the study have no drawbacks. They were also notified that they are free to withdraw at any moment during the study's course, and that their information will be kept private. There are no known dangers linked with this study. We will do everything possible to keep your information private. Your personal information will be kept private. Your identity will not be exposed in any study-related publications.

RESULTS

Table 1 shows the demographic data of participant's, age of the total 150 participants in which 16-30 years of age were 46(29.9%), 31-45 years 54(35.1%), 46-60 years 36(23.4%) and more than 60 years were 14(9.1%). With respect to gender, 101(65.6%) were male and 49(31.8%) were female. With respect to education, 13 had primary education, 39 middle, 38 matric, 30 intermediate, 11 bachelors or master's education and 19 were illiterate. According to the frequency distribution of residency status of the participants, 49(31.8%) were urban and 100(64.9%) were rural. 46(29.9%) were living in less than 10 Km distance of the health care facility while 103(66.9%) were living within more than 10 Km distance.

Table 1: Demographic data of the participants

Variables		Frequency (%)
Age	16-30 years	46 (29.9)
	31-45 years	54 (35.1)
	46-60 years	36 (23.4)
	>60 years	14 (9.1)
	Total	150 (100)
Gender	Male	101 (65.6)
	Female	49 (31,8)
	Total	150 (100)
Education	Primary	13 (8.4)
	Middle	39 (25.3)
	Metric	38 (24.7)
	Intermediate	30 (19.5)
	Bachelorl	11 (7.1)
	Illiterate	18 (12.3)
	Total	150 (100)
Residency	Urban	49 (31.8)
	Rural	100 (64.9)
	Total	150 (96.8)
Distance from Health care facility	<10km	46 (29.9)
	Total	149 (96.8)

For question, "Do you take self-treatment?" 106(68.8%) responded yes and 44(28.6%) responded no (Figure 1).

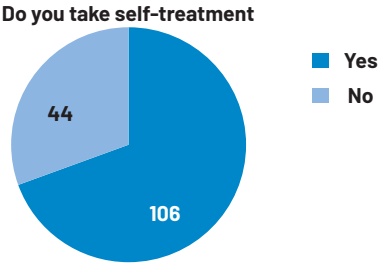

Figure 1: Response of participants regarding self-treatment

For question, "Do you take anti TB treatment?", 92(59.7%) responded yes and 58(37.7%) responded no (Figure 2).

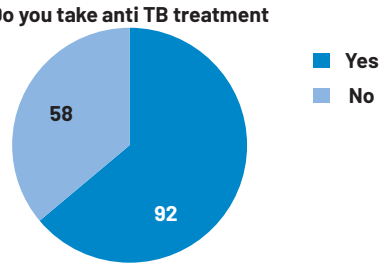

Figure 2: Response of participants regarding anti-TB treatment

For question, "Do you have knowledge about TB?", 61(39.6%) responded yes and 89(57.8%) responded no (Figure 3).

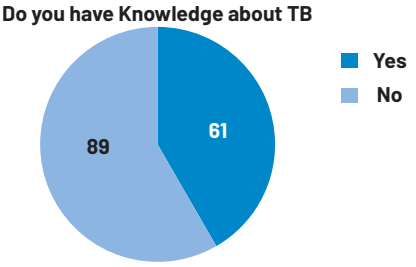

Figure 3: Response of participants regarding knowledge about TB

Tables 2 represents the Questions asked from the participants to assess the knowledge of participants regarding health and TB. Majority of participants showed lack of knowledge about TB and other diseases. Majority of them was taking self-medication, and majority were afraid of showing TB among society.

Table 2: Questionnaire to assess the knowledge of participants regarding health and TB

Questions	Yes	No
	Frequency (%)	Frequency (%)
Do you have medical knowledge?	51(33.3)	99(64.1)
Do you take self-treatment?	106(68.8)	44(28.6)
Do you ever drink alcohol?	9(5.8)	141(91.6)
Do you ever smoke cigarette?	31(20.1)	119(77.3)
Do you have HIV infection or AIDS?	3(1.9)	147(95.5)
Do you take anti TB treatment?	92(59.7)	58(37.7)
Is there any health facility near to your home?	45(29.2)	105(68)
Are you satisfied with the health care system?	103(66.9)	47(30.5)

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Questions	Yes	No
	Frequency (%)	Frequency (%)
Do you have knowledge about TB?	61(39.6)	89(57.8)
Is there any presence of previous history of TB?	71(46.1)	79(51.3)
Is there any Antibiotic Rx because of illness before diagnosis made?	95(61.7)	55(35.7)
Do you take any immunosuppressive drugs?	18(11.7)	132(85.7)
Do you be afraid in expressing TB among society?	77(50)	73(47.4)

DISCUSSION

Socio-cultural factors, such as gender norms, play a significant role in determining the time between the onset of symptoms and when a patient seeks medical care. Gender refers to the behaviors, expectations, and roles associated with being male or female in a social, economic, and cultural setting. The evidence suggests that the social construction of gender has a significant impact on health behaviors [12]. Masculinity was found to be a significant source of delay. Male and female patients confirmed that, in comparison to female patients, male patients delayed seeking treatment at a healthcare center. Males had a longer delay time, which is consistent with findings from another research conducted in Uganda and Malawi[13, 14]. This could explain why males have a higher TB burden than females. This research supports our study's findings regarding the gender of the 150 participants, of which 101 (65.6%) were male and 49 (31.8%) were female. A recent TB survey conducted in Kenya found that males had a higher prevalence of tuberculosis (809 per 100,000 population) compared to females (359 per 100,000 population) [15]. Furthermore, empirical evidence suggests that males bear a disproportionate burden of tuberculosis, which may be a result of both a genuine higher frequency of the infection and their lower utilization of healthcare services and longer delays in seeking treatment for various diseases, including tuberculosis [16]. According to the World Health Organization (WHO), males are twice as likely as females to contract tuberculosis[17]. A recent investigation suggests that this sex bias in tuberculosis may be linked to biological differences between the sexes [18]. Our findings support this study, revealing that out of the total 150 participants, 101 (65.6%) were male and 49 (31.8%) were female, which is in contrast to earlier studies that found a nearly equal proportion of male and female patients. This is consistent with a study conducted in Iran, which noted that the disease pattern in high-epidemic areas is not uniform and that variations may occur[19]. Finally, structural problems such as insufficient diagnostic capability, remote facilities, and financial constraints contributed to the delay in diagnosis. Similarly, our study's findings indicated that of the total 150 participants, 89 (57.8 percent) had less than $35,000 in income and 61 (39.6 percent) had more than $35,000 in income. The effect of fundamental demographic variables on tuberculosis-related delays differed significantly among social and cultural groups. This study discovered that women were more likely to encounter diagnostic delays. Women in China have a lower economic standing than men, which may explain why women are more likely to encounter delays in diagnosis and treatment. This finding revealed that women's health care requirements may be overlooked in rural China, and that equity in health care service utilization should be improved [20]. In comparison, our study found that 49 (31.8%) of respondents were female and 25 (16.2%) were housewives, all of whom had pulmonary tuberculosis. Age, on the other hand, was not substantially connected with tuberculosis-related delays, in contrast to the findings of a study conducted in Myanmar, which indicated that age greater than 30 years was a risk factor for treatment delays. The present study found that patients with a high educational level were more likely to have treatment delays, which contradicted previous data and necessitates additional research [21]. In comparison, our study's 150 participants had an average of 13(8.4%) primary education, 39(25.3%) middle education, 38(24.7%) metric education, 30(19.5%) intermediate education, 11(7.1%) bachelor's or master's education, and 19(12.3%) were illiterate. The age distribution of the 150 participants was as follows: 16-30 years were 46 (29.9%), 31-45 years were 54 (35.1%), 46-60 years were 36 (23.4%), and over 60 years were 14. (9.1%). Our study's findings regarding the response of 150 participants to the question "Do you have medical knowledge?" indicate that 51 (33.1%) responded yes and 99 (64.3%) responded no, correlating with other study findings. Similarly, 305 (20.5%) possible tuberculosis cases were delayed in diagnosis due to a lack of understanding about the source, mode of transmission, prevention, and treatment of PTB. HLs is consistent with prior research in Ethiopia and Pakistan[22, 23]. Khan *et al.*, stated that a lack of knowledge about the etiology of tuberculosis disease may have a negative effect on patient attitudes toward health seeking behavior and preventive strategies, as the majority of people with such beliefs will avoid visiting health facilities [24]. Another study's findings corroborate those of previous research, as indicated by the response to the question "Is there a health facility near your home?" in which 45 (29.2%) responded yes and 105 (68.2%) responded no. Inadequate diagnostic capacity resulted in misdiagnosis, delaying quick diagnosis. This could be because the standard diagnostic methods for tuberculosis in the country Kenya are sputum which are exanimated and cultured, that are sensitive in detecting disease at its early stage. Sputum microscopy remained the gold standard for tuberculosis detection in both nations low- and middle-income. since the disease's

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identification in 1882 [25]. While sputum microscopy is convenient, and inexpensive, it is insensitive and catches only those with a high bacterial load or severe disease. Chest X-rays are a rapid and sensitive method of diagnosing tuberculosis. It does, however, require specialist personnel, which is not accessible in essential medical care offices. More touchy diagnostics, radiography and molecular testing, are prohibitively expensive and insufficient for detecting tuberculosis patients early enough [26]. The study discovered that tuberculosis patients postponed seeking health treatment in health facilities in favor casual medical services suppliers. Comparative discoveries have been made in the country Ethiopia [27]. The study participants' residential status, with 49 (31.8%) being urban and 100 (64.9%) being rural. They sought therapy from quacks in the area. The beliefs surrounding cultural explanations for tuberculosis prompted people to seek alternative therapies like customary healers and botanists rather than seek the modern medicine. This is consistent with the findings of the study of Nyasulu *et al.*, who established that social and conventional practices, just as convictions in black magic as a reason for disease all contribute significantly to the delay in diagnosing tuberculosis [27]. In comparison, our survey discovered that some people were illiterate and lived in rural areas at a rate of 100% (64.9 percent), which meant they sought treatment from quacks and other practitioners.

CONCLUSIONS

Although a large portion of the delay in diagnosing tuberculosis is due to the period between the development of symptoms and the patient's first medical visit, the majority is due to the time between the initial medical visit and diagnosis, which is connected with diagnostic errors. As with other diagnostic errors, a combination of cognitive and system errors results in a delayed or missed diagnosis in tuberculosis patients, resulting in severe harm to the patient and community. According to the findings of this study, uncommon or unique presentation of tuberculosis did not play a significant role in diagnostic errors; rather, the most frequent errors occurred during hypothesis development, followed by failures during history taking and physical examination. In closing, we stressed the critical nature of efforts to organize and strengthen our country's health referral system.

Authors Contribution

Conceptualization: MAA, MAS, AH
Methodology: IS, MAA
Formal Analysis: MAA, AH
Writing-review and editing: MAA, RS, AH

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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