Assessing the knowledge, attitude, and practice measures against tuberculosis in patients in ambulatory department facilities in Pakistan: a cross-sectional analysis

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Abstract

Tuberculosis (TB), at present, is the leading infectious etiology of death globally. In Pakistan, there are approximately 510,000 new cases annually, with more than 15,000 of them developing into drug-resistant TB, making the nation the fifth-leading country in TB prevalence in the world. Due to the ongoing COVID-19 pandemic, the focus has drifted away from TB screening, diagnostic and health awareness campaigns, and therapeutic measures endangering knowledge, attitude, and practices (KAP) towards TB in our population. We conducted a cross-sectional descriptive study in Pakistan to assess the KAP of Pakistani residents attending the adult outpatient departments of public hospitals for any health-related concerns. Our sample size was 856 participants, with a median age of 22 years. Occupation-wise, those who were employed had better knowledge of TB than those who were unemployed [odds ratio (OR): 1.011; 95% confidence interval (CI): 1.005-1.8005]. No differences were observed in TB knowledge between those adherents to common preventive practices *versus* those not adherent (OR: 0.875; 95% CI: 0.757-1.403). More than 90% of participants agreed that TB is dangerous for the community, and the majority opted against stigmatizing TB patients (79.1%). People who could read and write were 3.5 times more likely to have a good attitude towards TB compared to

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those who could not (OR: 3.596; 95% CI: 1.821-70.230; p=0.037). Similarly, employed subjects had better attitudes compared to unemployed ones (OR: 1.125; 95% CI: 0.498-1.852; p=0.024) and those with better knowledge of TB had a better attitude grade (OR: 1.749; 95% CI: 0.832-12.350; p=0.020). Age, occupation, and educational status were statistically significant among the two groups (p=0.038, p=0.023, p=0.000). Literate subjects had three times better practice towards TB than illiterate subjects (OR: 3.081; 95% CI: 1.869-4.164; p=0.000). Future education and awareness programs should target specific groups, such as the unemployed and illiterate, with practice-focused approaches. Our study outcomes can enable the concerned officials and authorities to take appropriate evidence-based steps to direct the efforts efficiently to curtail the burden of TB in Pakistan and to limit its progression, which could potentially lead our nation to become a multi drug-resistant TB endemic territory.

Introduction

Tuberculosis (TB) is a highly contagious disease caused by *Mycobacterium tuberculosis*, which can affect the lungs (pulmonary TB) or other parts of the body (extra-pulmonary TB). It spreads through the air when an infected person coughs or sneezes. Those with weakened immune systems, such as HIV patients, are more susceptible [1]. Latent TB is when the mycobacteria inside the body are dormant and do not cause symptoms, while active TB causes coughing or breathing, weight loss, loss of appetite, fever, night sweats, chills, and fatigue [2].

TB is a leading infectious cause of death worldwide. In the year 2020, around 10 million people were infected with TB worldwide, and around 1.5 million people lost their lives from TB, according to the World Health Organization [3]. The same organization places TB as a major economic and health burden for countries. Nations like Bangladesh, China, India, Indonesia, and Pakistan have been reported to have the highest incidence rate of TB [4]. Approximately 510,000 new cases of TB arise each year in Pakistan, and around 15,000 develop into multi drug-resistant TB (MDR-TB). As a result of that, Pakistan is ranked fifth among high-TB-burden countries worldwide. Pakistan is estimated to have the fourth-highest prevalence of MDR-TB globally [5]. In addition, Pakistan has shown a marked gender difference in the incidence and prevalence of TB, with females surpassing by 20-30% that of males [6].

There are multiple factors associated with this high burden of TB, including poor socio-economic conditions, alcohol and tobacco use, overcrowded living conditions, and indoor air pollution due to poorly ventilated homes, that lead to the buildup and spread of disease [7]. Furthermore, illiteracy, lack of awareness, social stigmas, and inadequate diagnostic and healthcare facilities nurture the increased incidence of TB in Pakistan. On average, a single untreated TB patient can pass the disease on to 10-15 more people [8]. The recent COVID-19 pandemic, which caused disturbances in the healthcare system worldwide, also affected TB patients. Inequitable distribution of healthcare provisions and diagnostic and treatment facilities during COVID-19 led to the further burdening of the health services provided to TB patients [9].

Currently, TB is one of the major challenges faced by Pakistan. Strengthening the healthcare system, proper implementation of TB control measures in healthcare facilities, addressing stigmas, creating awareness, and educating people regarding TB can be useful in tumbling the prevalence of TB in Pakistan [10]. Therefore, this study aims to assess the knowledge, attitude, and practices (KAP) of hospitals and ambulatory patients towards TB in Pakistan to provide accurate evidence to the concerned authorities regarding the TB burden in the country, encouraging them to take appropriate TB control measures within Pakistan. In addition, we attempt to provide insight for future researchers to study this subject more in depth.

Materials and Methods

Study setting and design

A cross-sectional descriptive study was undertaken on Pakistani citizens who went to adult outpatient departments of public health institutions for a range of medical treatments, such as but not just attendance for follow-up on a confirmed case of TB. Data were gathered between April 1, 2022, and August 30, 2022, from public health facilities, including basic healthcare units and tertiary hospitals.

Selection criteria

All patients who were 18 years of age or older and who were referred by outpatient departments met the inclusion and exclusion criteria for this study.

Data collection

The survey's questionnaire was modified from one used in an Ethiopian study of a similar nature [11]. The questionnaire was somewhat altered considering the situation. Here, inquiries were made in person, and information was logged on paper forms.

Sociodemographic questions

Basic sociodemographic information was gathered for the study, including age, gender, marital status, level of education, occupation, and average monthly income (in Pakistani rupee), which was divided into three groups: 1000, 1000-3000, and >3000.

Knowledge questions

We inquired about TB symptoms, TB prevention, and TB mechanisms of transmission. By providing a rating for each knowledge area (a correct answer gets a score of 1 and a wrong answer gets a score of 0), the maximum score was 9, and the lowest score was 0 because we had nine points (0-9). Poor knowledge (0-5) and good knowledge (6-9) are the categories we used to group the knowledge. This rating scheme was developed using data from a related Ethiopian study. The knowledge's results for the area under the receiver operator characteristic (ROC) curve (AUC) were good and stood at 0.86.

Attitude questions

We inquired about the participants' perceptions of TB as an illness that poses a threat to the community, TB transmission from person to person, and the stigma associated with TB sufferers. The attitude grade was determined using the formula (correct response=0; true answer=1). Since we had three points, the range of possible scores was 3 to 0 (0-3). Positive attitude (2-3) and negative attitude (0-1) are the categories we used to classify attitudes. The attitude results' area under the ROC curve was 0.801, which was regarded as good.

Practice questions

We inquired about the participant's awareness of effective TB control measures, such as routine window cleaning, window open-

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ing while driving, TB screening, receiving TB health education, contracting TB, and taking appropriate action. True answers received a grade of 1, while incorrect answers received a score of 0. Since we had eight points, the range of possible scores was 0 to 8 (0-8). The practice was divided into two categories: good preventive practice *versus* poor preventive practice; poor practice (0-4) and good practice (5-8). The practice's area under the ROC curve scores came out to 0.998 and were considered excellent.

Sample size and sampling type

All candidates who met the requirements for inclusion received an invitation to take part. Using Epi-Info, the sample size was estimated. A Raosoft calculator was used to calculate the minimum sample size, which was about 384 with a confidence interval (CI) of 95%. Non-probability convenient sampling is the sampling technique chosen for data collection.

Pilot study

A small sample of participants (70 individuals) pre-tested the questionnaire to ensure its viability and clarity. The questionnaire was examined by qualified researchers for content validity, and their feedback was considered. Every questionnaire section's Cronbach's a score for reliability was 0.753, which is a respectable level of consistency. The final analysis did not incorporate the pilot study's observations.

Statistical analysis

The three knowledge questions served as the foundation for the knowledge scoring. The retrieved data was displayed in an Excel sheet (Microsoft, Redmond, WA, USA) and SPSS version 28 (IBM, Armonk, NY, USA) was used to analyze the data. The ROC curve was used to assess the best cut-off point. The histogram and Kolmogorov-Smirnov test were used to assess normality. The Mann-Whitney test was employed to compare continuous, non-normally distributed data, and the median and interquartile range were used. For categorical data, the results were reported using counts (n) and percentages (%), with comparisons done using the Chi-square or Fisher extract test. Statistical significance was defined as p=0.05. Spearman correlations were used to examine the relationship between KAP and TB. To interpret the binary logistic regression model, odds ratios (OR) and 95% CI were used.

Results

Baseline characters of participants

There were 856 participants, and the median age was 22 years (interquartile range 10 to 80 years). Regarding the relationship status, 23.8% were single, while 69.6% were married. There was no difference between employed and unemployed participants (49.3% *versus* 50.7%). There was great variability in the monthly income of participants, ranging from 0 to 300,000 (mean 30,000) (Table 1). The results of the area under the ROC curve were deemed to be successful for AUC values between 0.9 and 1, excellent for AUC values between 0.8 and 0.9, good for AUC values between 0.7 and 0.8, fair for AUC values between 0.7 and 0.8, poor for AUC values between 0.6 and 0.7, and failed for AUC values between 0.5 and 0.6 [12].

The extent of tuberculosis knowledge and knowledge predictors

Regarding knowledge of TB, more than 80% of participants correctly answered the transmission route of TB (84.0%). Pertaining to the symptoms, more than half of the participants correctly identified that cough lasting for more than 3 months, fever, and loss of appetite were the common symptoms of TB (90.4%, 80.8%, and 62.3%, respectively). Additionally, more than 50% of participants were considered to have a good knowledge of TB (64.0%), with a mean response of 6 out of 9 (Table 2).

Age, occupation, and attitude were found to be significant predictors of good TB knowledge. Occupation-wise, those who were employed had better knowledge of TB than those who were unemployed (OR: 1.011; 95% CI: 1.005-1.8005). Additionally, participants who had a good attitude grading were four times more likely to have good knowledge compared to those who had a poor attitude (OR: 4.080; 95% CI: 1.385-19.056; p=0.031). There were no significant differences observed in TB knowledge between those with good practice and those with poor practice (OR: 0.875; 95% CI: 0.757-1.403), as shown in Table 3.

Attitude towards tuberculosis and attitude predictors

Regarding the attitude towards TB, more than 90% of participants agreed that TB is dangerous for the community, and the major-

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Table 1. Baseline characters of participants (n=856).

Variables		Total	
		n	%
Age	Median; IQR (range)	22	20 (10-80)
Marital status	Single	204	23.8
	Married	596	69.6
	Widow	7	0.8
	Divorced	49	5.7
Educational status	Can read and write	659	77.0
	Cannot read and write	197	23.0
Occupation	Employed	422	49.3
	Unemployed	434	50.7
Monthly income	Median; IQR (range)	30,000	30,000 (0-500,000)

IQR, interquartile range; n, number.

ity opted for the statement that it is wrong to stigmatize TB patients (79.1%). 95% of participants had a good attitude towards TB. Educational status, occupation, and knowledge of TB proved to be strong predictors of TB. For instance, people who could read and write were 3.5 times more likely to have a good attitude towards TB compared to those who could not read and write (OR: 3.596; 95% CI: 1.821-70.230; p=0.037), as shown in Table 4. Similarly, those who were employed had better attitudes compared to those who

Table 2. Knowledge, attitude, and practices towards tuberculosis among hospital outpatients in Pakistan (n=856).

Variables		Total	
		n	%
Knowledge			
What is the TB mode of transmission? Inhalation droplets	No	137	16.0
	Yes	719	84.0
What is the TB mode of transmission? Heredity	Yes	446	52.1
	No	410	47.9
What is the TB mode of transmission? Shaking someone's hand	Yes	409	47.8
	No	446	52.1
What is the TB mode of transmission? Sharing the food/drink	Yes	638	74.5
	No	217	25.4
Is TB preventable?	No	827	96.6
	Yes	29	3.4
What are the main symptoms of TB? Cough that lasts more than three weeks	No	82	9.4
	Yes	774	90.4
What are the main symptoms of TB? Fever	No	164	19.2
	Yes	692	80.8
What are the main symptoms of TB? Loss of appetite	No	323	37.7
	Yes	533	62.3
What are the main symptoms of TB? Night sweats	No	448	52.3
	Yes	408	47.7
Knowledge score	Median; IQR (range)	6	2 (0-9)
Knowledge grading	Poor knowledge	308	36.0
	Good knowledge	548	64.0
Attitude			
Is TB a dangerous disease for the community?	No	61	7.1
	Yes	795	92.9
Does TB transmit from human to human?	No	95	11.1
	Yes	761	88.9
Should TB patients get stigmatized?	Yes	197	20.9
	No	677	79.1
Attitude score	Median; IQR (range)	3	1(0-3)
Attitude grading	Negative attitude	43	5.0
	Positive attitude	813	95.0
Practice			
Does your house have a window?	No	63	7.4
	Yes	793	92.6
Do you open your home window regularly?	No	94	11.0
	Yes	762	89.0
Do you open car windows while traveling?	No	119	13.9
	Yes	737	86.1
Have you ever screened for TB?	No	711	83.1
	Yes	145	16.9
Have you ever got health education about TB?	No	711	83.1
	Yes	145	16.9
If you have TB, what do you do?	Consult traditional healers	71	8.3
	Consult health worker	785	91.7
If you have TB, what measures would you take for the family and community?	Cover my mouth and nose during coughing and sneezing	746	87.1
Practice score	Median; IQR (range)	5	1 (0-7)
Practice grading	Poor practice	244	28.5
	Good practice	612	71.5

IQR, interquartile range; n, number; TB, tuberculosis.

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were unemployed (OR: 1.125; 95% CI: 0.498-1.852; p=0.024), and those who had better knowledge of TB had a better attitude grade (OR:1.749; 95% CI: 0.832-12.350; p=0.020) (Table 4).

Practice towards tuberculosis and practice predictors

Participants generally had a good practice towards TB, with 71.5% falling under the category of good practice compared to 28.5%, which was poor practice. The median response was five out of nine. Age, occupation, and educational status were statistically significant among the two groups (p=0.038, p=0.023, p=0.000, respectively). Educational status and occupation were significant predictors of practice, while knowledge and attitude were not. Participants who knew how to read and write were three times more likely to have good practice towards TB compared to those who did not (OR: 3.081; 95% CI: 1.869-4.164; p=0.000) (Table 5).

Correlations between knowledge, attitude, and practices toward tuberculosis

A strong positive correlation was found between knowledge grading and knowledge score (Rho=0.855 and p=0.000) and practice grading and practice score (Rho=0.833 and p=0.000). A weak positive

Table 3. Knowledge and associated factors (n=856).

Variables		Knowledge grading				Binary logistic regression				
		Poor knowledge		Good knowledge		*Overall p value	p value	Odds ratio	95% confidence interval	
		n	%	n	%				Lower	Upper
Age	Median; IQR (range)	35	25 (13-80)	32	20 (15-77)	0.059	0.025	1.987	0.975	0.998
Marital status	Single	70	34.3	134	65.7	0.620	0.677	0.032	0.319	0.677
	Married	215	36.1	381	63.9		1.969	0.287	0.400	8.584
	Widow	4	38.8	3	42.9			Ref		
	Divorced	19	57.1	30	61.2					
Educational status	Can read and write	232	35.2	427	64.8	0.387	0.430	1.003	0.676	1.488
	Cannot read and write	76	38.6	121	61.4			Ref		
Occupation	Employed	138	31.2	304	68.8	0.049	0.047	1.011	1.005	1.8005
	Unemployed	170	41.1	244	58.9			Ref		
Monthly income	Median; IQR (range)	17000	30,000 (0-500,000)	15000	30,000 (0-500,000)	0.979	0.763	1.000	1.000	1.000
Attitude score	Median; IQR (range)	3	1 (0-3)	3	1 (0-3)	0.414	0.161	1.054	0.787	1.453
Attitude grading	Positive attitude	287	40.4	422	59.5	0.031	0.019	4.080	1.385	19.056
	Negative attitude	21	8.86	126	85.7			Ref		
Practice score	Median; IQR (range)	5	1 (1-7)	5	2 (1-7)	0.148	0.151	1.107	0.964	1.270
Practice grading	Poor practice	89	36.4	155	63.6	0.875	0.849	1.030	0.757	1.403
	Good practice	219	35.8	393	64.2					

IQR, interquartile range; Ref, reference; *overall p value of Mann-Whitney test and Chi-square or Fisher extract test.

Table 4. Attitude and associated factors (n=856).

Variables		Attitude grading				Binary logistic regression				
		Positive attitude		Negative attitude		*Overall p value	p value	Odds ratio	95% confidence interval	
		n	%	n	%				Lower	Upper
Age	Median; IQR (range)	34	22 (15-70)	26	13 (13-62)	0.001	0.342	1.017	0.982	1.055
Marital status	Single	184	90.2	20	9.8	0.002	0.857	1.000	1.000	1.000
	Married	573	96.1	23	3.9					
	Widow	7	100	0	0					
	Divorced	49	100	0	0					
Educational status	Can read and write	616	96.9	20	3.1	0.000	0.037	3.596	1.821	70.230
	Cannot read and write	197	89.5	23	10.4					
Occupation	Employed	402	95.2	20	4.8	0.023	0.024	1.125	0.498	1.852
	Unemployed	411	94.7	23	5.3					
Monthly income	Median; IQR (range)	16,500	30,000 (0-500,000)	50,000	30,000 (0-300,000)	0.526	0.827	0.756	1.267	0.402
Knowledge score	Median; IQR (range)	6	2 (1-9)	6	2 (3-8)	0.113	0.329	2.850	0.347	23.382
Knowledge grading	Poor knowledge	287	93.1	21	6.9	0.072	0.020	1.749	0.832	12.350
	Good knowledge	526	96.0	22	4.0					
Practice score	Median; IQR (range)	5	1 (1-7)	5	1 (1-7)	0.989	0.925	1.702	0.413	7.017
Practice grading	Poor practice	232	95.1	12	4.9	0.929				
	Good practice	581	94.9	31	5.1					

IQR, interquartile range; n, number; *overall p value of Mann-Whitney test and Chi-square or Fisher extract test.

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correlation was found between attitude grading and attitude score (Rho=0.459 and p=0.000) (Table 6).

Discussion

Knowledge, self-reported attitudes, and behaviors towards TB are included in this study. This finding indicates a significant gap in TB infection control and preventive practices.

It is widely known that compliance and awareness can affect how people approach prevention [13]. In contrast to a study conducted in Ethiopia, which found that 46% of respondents had a low level of knowledge about TB [14], the current study found that total knowledge about TB was 64% lower. The current finding, however, was superior to a study conducted in Afghanistan [12], where nearly 88% of individuals had a good awareness of TB. The latter study's score was substantially correlated with attitude assessment, age, and gender. Two-thirds of the participants in a research study done in Gambia had reasonable or appropriate knowledge, suggesting that socioeconomic, cultural, and environmental disparities also exist. Age, marital status, education, employment, and a positive attitude and practice toward TB were all associated with having strong TB knowledge [15]. In our study, age, employment position, and attitude grading were all significant predictors of good TB knowledge in the research described above and were likewise linked with good TB knowledge. Education was not found to be as significant, which might indicate the effectiveness of awareness programs in approaching the less educated classes in Pakistan.

The majority of participants (95%) had positive attitudes toward TB. Age, marital status, and employment position were reliable indicators of participants' general attitudes regarding TB. It is distinct from studies of a similar nature conducted in Ethiopia [16], and Afghanistan [12], where the individuals' gender simply predicted higher scores; 44% of participants in another study in Ethiopia's North Mecha area were judged to have good practice, while 68% of the participants reported having a good attitude [14]. Similar findings were seen in a Thai study, where 47.9% of subjects

Table 5. Practice and associated factors (n=856).

Variables		Practice grading				Binary logistic regression				
		Positive practice		Negative practice		*Overall p value	p value	Odds ratio	95% confidence interval	
		n	%	n	%				Lower	Upper
Age	Median; IQR (range)	32	23 (13-82)	37	22 (15-70)	0.003	0.038	1.014	1.001	1.027
Marital status	Single	175	85.8	29	14.2	0.053	0.067	1.098	1.028	1.074
	Married	408	68.5	188	31.5					
	Widow	4	57.1	3	42.9					
	Divorced	25	51.0	24	49					
Educational status	Can read and write	507	76.9	152	23.1	0.000	0.000	3.081	1.869	4.164
	Cannot read and write	105	53.3	92	46.7					
Occupation	Employed	303	71.8	119	28.2	0.000	0.023	1.030	1.651	9.014
	Unemployed	309	71.2	125	28.8					
Monthly income	Median; IQR (range)	18500	37,000 (0-500,000)	12000	27,000 (0-400,000)	0.845	0.859	1.000	1.000	1.000
Knowledge score	Median; IQR (range)	6	7 (2-9)	6	2 (1-9)	0.859	0.456	0.231	1.232	1.348
Knowledge grading	Poor knowledge	219	71.1	89	28.9	0.849	0.502	1.207	0.698	2.086
	Good knowledge	155	28.3	393	71.7					
Attitude score	Median; IQR (range)	3	1 (0-3)	3	1 (0-3)	0.931	0.931	0.984	0.686	1.412
Attitude grading	Poor practice	31	72.1	12	27.9	0.929				
	Good practice	581	71.5	232	28.5					

IQR, interquartile range; n, number; *overall p value of Mann-Whitney test and Chi-square or Fisher extract test.

Table 6. Spearman correlations between knowledge, attitude, and practices towards tuberculosis.

		Knowledge grading	Attitude grading	Practice grading	Knowledge score	Attitude score	Practice score
Knowledge grading	Correlation coefficient	1					
	p value	-					
Attitude grading	Correlation coefficient	0.054	1				
	p value	0.113	-				
Practice grading	Correlation coefficient	-0.001	-0.061	1			
	p value	0.986	0.075	-			
Knowledge score	Pearson correlation	0.855	0.028	0.049	1		
	p value	0.000	0.414	0.148	-		
Attitude score	Correlation coefficient	0.001	0.459	-0.001	0.062	1	
	p value	0.986	0.000	0.986	0.072	-	
Practice score	Correlation coefficient	0.040	-0.052	0.833	0.007	-0.003	1
	p value	0.248	0.131	0.000	0.849	0.929	-

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were classified as having a high level of attitude towards TB [17]. 71.5% of the individuals in this survey from Pakistan had positive attitudes toward TB. Only 30.5% of respondents reported bad TB practices. Additionally, individuals who were educated had better practice than those who were not. Hence, we weigh heavily on literacy as a deciding factor for good practice. It would be imperative to point out that having good knowledge is not always equal to having good practices. Differences may be a result of social dynamics, the environment, or perceived ease of access to medical facilities. The single largest group of participants were questioned in medical facilities in Karachi, a major Pakistani metropolis where TB drugs are available. This may not, however, apply to all rural and nationwide settings.

Despite extensive awareness campaigns and concerted efforts to control TB, 96.6% of the participants in this survey believed that TB could not be prevented. This result is consistent with that of a different study carried out in Tepi General Hospital in Ethiopia, where the majority of participants (70%) said that the spread of the illness could not be stopped, while 92 (22.4%) said that covering the mouth and nose while coughing or sneezing could help stop the spread [11]. The results, however, contrast with those from Kabul, where 98% of participants indicated that TB transmission could be prevented [12]. Cough was the primary symptom mentioned by the majority of individuals (90.4%), followed by fever (80.8%) and loss of appetite (62.3%). Similar symptoms were observed by other study participants [11,14,15]. In keeping with a study done in Khyber Pakhtunkhwa, Pakistan, where education level was connected with more excellent TB knowledge, status in terms of education was associated with a better attitude towards the practice of TB [18].

Limitations

Our study has several drawbacks, such as the fact that the metropolitan city of Karachi was the single largest constituent of the data set, which may act as a confounder of the results. The results may not have the confidence to represent the entire nation and mostly rural areas, which might need different studies. Additional investigations are required to provide a more thorough analysis of TB in the nation. Additionally, the investigation was conducted in a hospital. As a result, there can be variations among community members. Therefore, further research is needed to shed more clarity on this topic and to support our findings.

Conclusions

In conclusion, our study subjects had satisfactory knowledge and approach towards TB. Literacy and occupational status were established as the primary and most profound determinants favoring a desirable KAP outcome in our study. The awareness programs have proved beneficial, but the hospital administration, health department, and policymakers must notice the lag in practices and implement a better practice-focused approach in future programs to curtail the case incidence and the progression toward a drug-resistant endemic region where the nation is currently headed. Specific groups, such as the unemployed and the illiterate, should be targeted. Destigmatization may also serve as a cornerstone to help address the disease burden in Pakistan amidst the dynamic socio-cultural and socio-economic backdrop. Extensive research is needed to contribute further in the remaining parts of the country, thereby facilitating comparison to the various KAP varying per region or province.

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