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Article

Knowledge, Attitudes, and Practices of Healthcare Workers Toward Tuberculosis at Arif Memorial Teaching Hospital, Lahore

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ABSTRACT

Background: Tuberculosis (TB) remains a leading cause of morbidity and mortality globally, especially in high-burden countries like Pakistan. Healthcare workers (HCWs) play a pivotal role in TB control, yet their knowledge gaps, attitudes, and inconsistent practices can hinder early diagnosis and effective management. Existing literature highlights the prevalence of misconceptions even among trained professionals, but localized data from private tertiary care settings in Pakistan remains limited. **Objective**: To assess the knowledge, attitudes, and practices (KAP) of healthcare workers regarding tuberculosis at Arif Memorial Teaching Hospital, Lahore, and to explore correlations among these variables to inform targeted interventions. **Methods**: This descriptive cross-sectional study was conducted from November 2023 to April 2024 among 117 healthcare workers recruited through convenience sampling. Inclusion criteria were HCWs aged ≥25 years employed at the hospital; those unwilling to consent were excluded. Data were collected via a validated 29-item structured questionnaire covering sociodemographics, knowledge (13 items), attitude (7), and practice (3), with internal consistency confirmed (Cronbach's α = 0.801–0.806). Scores were categorized as good (≥80%), moderate (60–79%), or poor (<60%). Ethical approval was obtained from the Rashid Latif Nursing College Ethics Committee, and informed consent adhered to the Helsinki Declaration. Data were analyzed using SPSS v27, applying descriptive statistics and Pearson correlation tests ($p < 0.01$). **Results**: The majority of participants were aged 25–35 (94.9%) and married (92.3%). Good knowledge, attitude, and practice were observed in 83.8%, 84.6%, and 80.3% of participants, respectively. However, 52.1% incorrectly believed cold air causes TB, and 41.9% thought TB spreads via sexual contact. While 89.7% correctly identified cough as a transmission route, only 54.7% knew treatment is free in Pakistan. Clinically relevant behaviors were evident, as 80.3% would seek medical help if symptomatic. Strong positive correlations were found between knowledge-attitude ($r = 0.581$), attitude-practice ($r = 0.461$), and knowledge-practice ($r = 0.294$), all statistically significant ($p < 0.01$), underscoring the interdependence of these domains. **Conclusion**: Despite high overall awareness, critical misconceptions and stigma-related attitudes persist among HCWs, highlighting the need for continuous, targeted education and behavioral reinforcement. Improving KAP among HCWs is vital for enhancing early TB detection, reducing stigma, and strengthening infection control in clinical settings.

Keywords: Tuberculosis, Health Personnel, Knowledge, Attitudes, Health Practices, Cross-Sectional Studies, Infection Control

INTRODUCTION

Tuberculosis (TB) remains a major global health threat despite being a preventable and curable disease. Caused by the Mycobacterium tuberculosis bacillus, TB is primarily transmitted via airborne particles, usually affecting the lungs but also capable of impacting other body parts such as the brain, kidneys, and spine. Globally, TB has surpassed HIV/AIDS as the leading cause of death from a single infectious agent, claiming approximately 1.6 million lives in 2021 and infecting over 10.6 million individuals (4). In countries like Pakistan, the burden is particularly severe; the World Health Organization (WHO) attributes 61% of TB cases in the Eastern Mediterranean region to Pakistan alone, with an estimated 510,000 new cases annually and 15,000 drug-resistant strains (1). While WHO-initiated strategies such as DOTS, Stop TB, and End TB have demonstrated epidemiological success, widespread

knowledge gaps and stigma continue to hinder their effectiveness (5).

Healthcare workers (HCWs) are uniquely positioned at the frontline of TB control efforts due to their critical role in early identification, treatment, and education. However, despite their professional proximity to the disease, misconceptions, stigma, and limited practice adherence persist within this group, undermining broader TB control objectives. Studies conducted across various regions, including Karachi (1), Jordan (2), and Afghanistan (5), have consistently highlighted the presence of misinformation among HCWs regarding TB transmission and treatment protocols. Misconceptions such as TB being caused by cold air or being treatable solely by home remedies or herbal solutions have been documented in multiple settings (8, 14), suggesting a global trend that compromises the delivery of informed and empathetic care. Furthermore, stigmatizing attitudes—such as a preference for secrecy regarding family members' TB status—can influence HCWs' interpersonal communication with patients, discouraging help-seeking behaviors and reinforcing societal marginalization (9, 12).

TB-related stigma has far-reaching consequences that extend beyond delayed diagnosis and poor treatment adherence. It negatively affects patients' social integration, emotional well-being, and financial stability (9). As patients hesitate to seek medical attention for fear of discrimination, the disease proliferates unchecked, especially in socioeconomically vulnerable populations where misinformation and healthcare inaccessibility coexist. HCWs, if not adequately trained and sensitized, may inadvertently perpetuate these patterns. Evidence from cross-sectional studies conducted among university students and healthcare personnel in countries like Nigeria, Saudi Arabia, and Indonesia reflects a correlation between poor TB-related knowledge and stigmatizing attitudes (2, 10, 11). These attitudes can significantly affect treatment outcomes and the effectiveness of community-level TB interventions.

Pakistan, identified as one of the 30 high-burden countries for TB, faces a dual challenge of high disease prevalence and workforce shortages in healthcare (1). In this context, understanding the knowledge, attitudes, and practices (KAP) of healthcare workers becomes not just a matter of academic inquiry, but a public health priority. Although previous studies have evaluated KAP among university students and medical professionals, literature specific to the private tertiary care setting in Lahore, especially involving nurses and allied staff, remains sparse. This knowledge gap presents a crucial area for investigation, as HCWs in these settings often operate with limited resources and receive minimal structured TB-related training.

The present study was designed to assess the current levels of knowledge, attitudes, and practices regarding TB among healthcare workers at Arif Memorial Teaching Hospital, Lahore. It aims to identify prevailing misconceptions, measure the impact of knowledge on behavior and attitudes, and evaluate whether HCWs are adequately prepared to combat TB within clinical and community settings. By focusing on this specific population, the study seeks to provide context-specific insights that can inform tailored educational interventions and policy development. Ultimately, this research addresses the critical question: To what extent do healthcare workers at a tertiary care hospital in Lahore possess the knowledge, attitudes, and practices necessary for effective TB prevention, management, and stigma reduction?

MATERIAL AND METHODS

This study employed a descriptive cross-sectional design to assess the knowledge, attitudes, and practices (KAP) related to tuberculosis among healthcare workers at Arif Memorial Teaching Hospital, Lahore. Participants included healthcare professionals of various designations working in the hospital, recruited through a convenience sampling technique. Individuals aged 25 years and older who were actively working at the hospital during the study period and willing to provide informed consent were included. No specific exclusion criteria were applied. The total sample comprised 117 healthcare workers, and participation was entirely voluntary. All participants were informed about the purpose of the study, assured of the confidentiality of their responses, and provided written informed consent before data collection began.

Data were collected between November 2023 and April 2024 using a structured, pre-tested, and adapted questionnaire. The questionnaire was disseminated via Google Forms and shared electronically through email, social media, and messaging platforms accessible to the hospital staff. The tool comprised 29 items divided into five sections: demographic characteristics (5 items), knowledge (13 items), attitude (7 items), practice (3 items), and sources of information (1 item). Knowledge questions were answered with "Yes," "No," or "Don't Know" responses and scored accordingly, with one point for each correct response and zero for incorrect or uncertain responses. Attitudes were measured using a Likert-type format (agree/disagree) or specific choices, while practice items assessed intended behavior related to TB symptoms and care-seeking. The scoring categorized responses into good (≥80%), moderate (60–79%), or poor (<60%) levels for each KAP component, based on percentage scores.

The primary outcome of interest was the overall level of knowledge, attitude, and practice regarding tuberculosis. Secondary outcomes included correlations between knowledge, attitude, and practice domains. The reliability of the adapted instrument was confirmed through Cronbach's alpha, which yielded coefficients of 0.801 and 0.806 for internal consistency, indicating strong reliability.

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Ethical approval was obtained from the Ethical Committee of Rashid Latif Nursing College, Lahore. Anonymity of responses was preserved throughout the data collection process, and no personally identifiable information was linked to the dataset.

Data were exported from Google Forms to Microsoft Excel and subsequently analyzed using the Statistical Package for the Social Sciences (SPSS), version 27. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant demographics and KAP responses. Pearson correlation analysis was conducted to explore relationships among knowledge, attitude, and practice scores. Statistical significance was set at $p < 0.01$.

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RESULTS

A total of 117 healthcare workers participated in this study. The demographic characteristics revealed a predominantly younger population, with 94.9% of respondents aged between 25 and 35 years. Only 4.3% were aged 35–45 years, and a mere 0.9% fell within the 45–55 age range. The sample was overwhelmingly composed of married individuals (92.3%), while 7.7% were single. Employment status was nearly evenly distributed, with 49.6% employed and 50.4% unemployed. In terms of educational attainment, 80.3% of the respondents had completed undergraduate degrees, 11.1% held postgraduate qualifications, and 8.5% had only completed secondary school. Socioeconomically, the majority of participants identified as middle class (85.5%), followed by upper class (8.5%) and lower class (6%).

Knowledge of Tuberculosis

Overall, the healthcare workers demonstrated a high level of knowledge about TB, with 83.8% having heard of the disease and 84.6% correctly identifying it as both preventable and curable. However, significant misconceptions were also observed. Only 61.5% recognized that TB can affect parts of the body beyond the lungs, and 52.1% incorrectly believed that exposure to cold air could cause TB. Furthermore, 41.9% of respondents believed TB could be transmitted through sexual contact. Awareness of airborne transmission via coughing was high (89.7%), and 70.9% understood the importance of treatment adherence to prevent drug resistance. However, confusion persisted regarding the availability of free TB treatment in Pakistan, with only 54.7% answering this correctly.

Table 1. Knowledge Regarding Tuberculosis Among Healthcare Workers (N = 117)

Sr. No	Knowledge Question	Yes n (%)	No n (%)	Don't Know n (%)
1	Have you ever heard of an illness called TB?	98 (83.8)	17 (14.5)	2 (1.7)
2	TB can occur anywhere in the body	72 (61.5)	42 (35.0)	4 (3.4)
3	Cold air causes TB	61 (52.1)	39 (33.3)	17 (14.5)
4	TB can be transmitted via cough	105 (89.7)	10 (8.5)	2 (1.7)
5	TB can be transmitted via sexual contact	49 (41.9)	55 (47.0)	13 (11.1)
6	TB is a preventable disease	98 (83.8)	12 (10.3)	7 (6.0)
7	Covering the mouth while coughing can prevent TB	99 (84.6)	12 (10.3)	6 (5.1)
8	TB can be cured	99 (84.6)	11 (9.4)	7 (6.0)
9	Herbal remedies can cure TB	37 (31.6)	49 (41.9)	31 (26.5)
10	Home rest without treatment can cure TB	33 (28.2)	77 (65.8)	7 (6.0)
11	TB treatment is only necessary with visible symptoms	77 (65.8)	28 (23.9)	12 (10.3)
12	Irregular anti-TB drug use leads to drug resistance	83 (70.9)	16 (13.7)	18 (15.4)
13	TB treatment is free in Pakistan	64 (54.7)	40 (34.2)	13 (11.1)

Participants expressed generally positive attitudes towards TB prevention and patient care. A majority (65.8%) reported willingness to work with individuals previously treated for TB. While 65.8% rejected the notion of keeping a family member's TB status a secret, 29.1% supported secrecy, indicating residual stigma. Only 41.9% believed they could personally contract TB, reflecting a potential underestimation of occupational exposure risk. Emotional reactions to hypothetical TB diagnosis varied: 41.0% expressed fear, 37.6% reported acceptance, and 21.4% reported sadness. Notably, 84.6% strongly agreed that TB education is necessary, and 77.8% strongly agreed they would encourage patients to seek treatment.

Table 2. Attitudes Toward Tuberculosis Among Healthcare Workers (N = 117)

Sr. No	Attitude Question	Agree n (%)	Disagree n (%)	Neutral n (%)
1	Willing to work with a previously treated TB patient	77 (65.8)	32 (27.4)	8 (6.8)
2	Would keep a family member's TB status secret	34 (29.1)	77 (65.8)	6 (5.1)
3	Belief in personal susceptibility to TB	49 (41.9)	56 (47.9)	12 (10.3)
4	Reaction to TB diagnosis: Fear	48 (41.0)	—	—
	Reaction to TB diagnosis: Sadness	25 (21.4)	—	—
	Reaction to TB diagnosis: Acceptance	44 (37.6)	—	—
5	Interested in learning more about TB	86 (73.5)	23 (19.7)	8 (6.8)
6	Education about TB is important	99 (84.6)	9 (7.7)	9 (7.7)
7	Would encourage TB patients to seek treatment	91 (77.8)	17 (14.5)	9 (7.7)

Reported practices were largely appropriate and aligned with national TB control guidelines. A majority of participants (80.3%) indicated they would go to a health facility upon experiencing TB symptoms, while a smaller proportion preferred pharmacies (10.3%), traditional healers (6.8%), or self-treatment (2.6%). When asked about timing, 54.7% said they would seek help as soon as symptoms emerged, whereas 29.9% would wait for symptoms to persist and 14.5% would delay until self-treatment failed. Among the 45.3% who identified barriers to visiting a healthcare facility, the main reasons were cost (34.2%), inability to leave work (12.0%), and mistrust of healthcare workers (8.5%). Mean scores were highest for attitude (10.24 ± 2.59), followed by knowledge (20.14 ±

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4.23), and practice (7.23 ± 1.60). Using the established scoring thresholds, 83.8% of participants demonstrated good knowledge (≥80%), 84.6% had good attitudes, and 80.3% demonstrated good practices. However, variation within each domain was notable, as shown by the standard deviations, particularly in knowledge (SD = 4.23).

Table 3. TB-Related Practices Among Healthcare Workers (N = 117)

Practice Item	Most Frequent Response	%	Other Responses	%
Action if TB symptoms appear	Go to health facility	80.3%	Pharmacy	10.3%
			Traditional healer	6.8%
			Self-treatment	2.6%
Timing of seeking medical help	As soon as TB is realized	54.7%	After 2+ weeks	29.9%
			When treatment fails	14.5%
Reason for not visiting a health facility	Not applicable	45.3%	Cost of services	34.2%
			Can't leave work	12.0%
			Mistrust in healthcare workers	8.5%

Table 4. Summary of KAP Scores Among Healthcare Workers

Variable	Good (%)	Moderate (%)	Poor (%)	Mean ± SD
Knowledge	83.8	61.1	55.6	20.14 ± 4.23
Attitude	84.6	65.8	77.8	10.24 ± 2.59
Practice	80.3	54.7	14.5	7.23 ± 1.60

Pearson correlation analysis revealed statistically significant positive relationships among all KAP domains. Knowledge was strongly associated with attitude ($r = 0.581$, $p < 0.01$) and moderately correlated with practice ($r = 0.294$, $p < 0.01$). A similarly strong correlation was found between attitude and practice ($r = 0.461$, $p < 0.01$), indicating that enhanced knowledge and attitudes were both predictive of better health-related practices. These results suggest a linear association wherein improving knowledge can indirectly enhance practical engagement through attitude reinforcement.

Table 5. Correlations Among Knowledge, Attitude, and Practice Scores (N = 116–117)

Variables	Knowledge	Attitude	Practice
Knowledge	1	0.581**	0.294**
Attitude	0.581**	1	0.461**
Practice	0.294**	0.461**	1

Note: $p < 0.01$ (2-tailed)

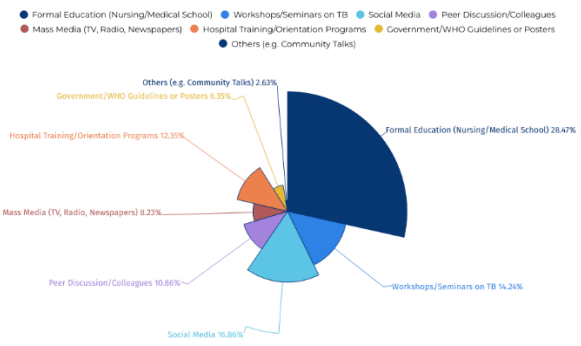

Figure 1 Primary Sources of Tuberculosis Information Among Healthcare Workers

These statistically significant associations underscore the interdependent nature of KAP components and reinforce the importance of multifaceted educational and behavioral interventions aimed at healthcare workers for effective TB control and management.

DISCUSSION

The present study offers valuable insights into the knowledge, attitudes, and practices (KAP) regarding tuberculosis (TB) among healthcare workers (HCWs) in a private tertiary care hospital in Lahore, Pakistan. The findings indicate a generally high level of TB-related knowledge and positive attitudes, though notable misconceptions and inconsistencies in practices persist. These results hold clinical significance, as HCWs serve not only as frontline caregivers but also as influential agents in public health education and disease control. Despite their relatively high awareness of TB's preventability and curability, nearly half of the respondents retained incorrect beliefs about its transmission routes, such as sexual contact or cold air exposure, reflecting enduring gaps in understanding that can compromise infection control strategies and patient counseling. Comparable studies conducted in similar healthcare settings reinforce these findings. For instance, research from Karachi revealed similar levels of knowledge among HCWs but also highlighted widespread myths about TB transmission and treatment (1). In Jordan and Bangladesh, healthcare professionals and students demonstrated comparable inconsistencies, where correct biomedical knowledge coexisted with traditional beliefs, stigma, and inadequate treatment practices (2, 14). The current study's high scores for attitude and practice align with findings from Gabon and Ethiopia, where HCWs expressed willingness to work with TB patients and recognized the importance of early treatment, but remained influenced by cultural beliefs and emotional responses such as fear and secrecy (5, 6). These overlaps underscore a recurring

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issue: that theoretical knowledge may not always translate into consistent clinical or preventive behaviors, especially when sociocultural factors like stigma and perceived vulnerability are involved.

The strong correlation observed between knowledge, attitude, and practice ($r = 0.581$, $r = 0.461$, $r = 0.294$; all $p < 0.01$) underscores the interdependent nature of these constructs, supporting the theoretical premise that improving one domain can indirectly influence the others. Similar correlations have been reported in studies from Afghanistan and Malaysia, where enhanced TB knowledge significantly predicted more empathetic attitudes and better infection prevention behaviors (5, 8). These associations suggest that targeted educational interventions may yield compound benefits—not only correcting misconceptions but also fostering behavior change through attitudinal shifts. However, it is essential to note that some participants, despite having adequate knowledge, delayed seeking care or preferred traditional or pharmacy-based treatments, which may reflect either systemic barriers (e.g., cost, access, time constraints) or underlying mistrust in healthcare systems—an issue that has been documented in TB-related stigma literature globally (9, 12).

An important clinical implication of this study is the recognition of latent stigma and emotional discomfort associated with TB, even among healthcare professionals. The finding that nearly one-third of participants preferred to keep a family member's TB status confidential and that 41% expressed fear upon imagining a personal TB diagnosis suggests that emotional and cultural factors remain influential. This mirrors the findings from Nigeria and India, where HCWs reported reluctance in disclosing TB status due to anticipated discrimination or social isolation (9, 17). Such sentiments can hinder contact tracing, delay diagnosis, and weaken community trust in healthcare systems. Therefore, integrating psychosocial support and anti-stigma training into TB-related CME programs could strengthen HCW resilience and foster a more supportive environment for TB patients.

This study is not without limitations. The use of a convenience sampling method may introduce selection bias, limiting the generalizability of the results beyond the specific hospital setting. Additionally, the cross-sectional design precludes causality and restricts longitudinal interpretation of knowledge-practice translation. The sample, although adequately powered for correlation analysis, was confined to a single institution, potentially limiting the diversity of participant backgrounds and institutional cultures. Moreover, the reliance on self-reported data via online surveys may be subject to social desirability bias, with participants overestimating their practices and attitudes.

Nevertheless, the study's strengths lie in its comprehensive, validated questionnaire and the use of robust statistical analysis, including internal consistency testing and correlation assessment, which enhance the reliability of its findings. By capturing KAP across a diverse group of HCWs—including interns, nurses, and faculty—it also offers a snapshot of varying levels of TB engagement within healthcare hierarchies. The findings call for structured and continuous TB education interventions that not only address clinical aspects but also emphasize psychosocial and behavioral training. Hospital administrators should consider mandatory training modules integrated into annual competency evaluations, particularly focused on correcting misconceptions and mitigating stigma.

Future research should explore qualitative dimensions to understand the emotional and cultural drivers behind TB-related stigma among HCWs and investigate whether educational interventions can sustainably alter both attitudes and long-term practices. Comparative studies across public and private healthcare settings could also clarify institutional influences on KAP disparities. Finally, multi-center longitudinal studies incorporating behavioral interventions and post-training evaluations are warranted to establish causality and gauge the real-world impact of such programs on TB control efforts.

While the findings affirm that healthcare workers at Arif Memorial Teaching Hospital possess foundational knowledge and largely positive attitudes towards TB, they also reveal crucial areas where misconceptions and variable practices persist. Bridging these gaps through comprehensive, behaviorally-informed educational programs is essential not only for individual professional development but also for enhancing institutional TB control strategies and achieving broader public health goals.

CONCLUSION

This study assessed the knowledge, attitudes, and practices of healthcare workers toward tuberculosis at Arif Memorial Teaching Hospital, Lahore, revealing high overall awareness and positive attitudes, yet notable misconceptions and inconsistencies in preventive practices. The significant correlations among knowledge, attitude, and practice emphasize the need for targeted, evidence-based educational interventions to bridge gaps in understanding and enhance consistency in clinical behavior. These findings underscore the critical role of healthcare workers in TB control efforts and highlight the necessity of continuous training to dispel myths, reduce stigma, and improve early diagnosis and patient management. Clinically, strengthening HCW competencies in TB care can improve patient outcomes and infection control within healthcare settings, while future research should explore scalable strategies for behavioral change and the long-term impact of training interventions across diverse institutional contexts.

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