

## Original Research Article

# Knowledge, attitude and awareness of tuberculosis among caregivers in Mullana, Ambala, India

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**Received:** 11 February 2026

**Revised:** 19 August 2026

**Accepted:** 20 August 2026

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### ABSTRACT

**Background:** Caregivers play a vital role in supporting tuberculosis (TB) patients through treatment adherence, emotional support, and access to care, yet their knowledge, attitude, and awareness (KAB) regarding TB remain understudied. This study assessed the KAB of caregivers of TB patients admitted to the TB and Chest Ward at MMIMSR, Mullana, Ambala, Haryana, India, and examined relationships between KAB domains and selected sociodemographic variables.

**Methods:** A quantitative, cross-sectional study was conducted among 100 caregivers of TB patients admitted to the TB and chest ward at MMIMSR during November 2023, recruited using convenience sampling. Data were collected through a validated, self-administered questionnaire assessing sociodemographic characteristics and structured knowledge, attitude, and awareness domains. Descriptive statistics summarized the findings, and correlation analysis examined relationships between KAB domains and sociodemographic variables, with  $p < 0.05$  considered significant.

**Results:** Slightly more than half of caregivers (53%) had average knowledge of TB, 45% had good knowledge, and 2% had poor knowledge. Attitudes were largely positive, with 85% rated good, and awareness was high, with 90% rated high. Significant positive correlations were found between knowledge and attitude, attitude and awareness, and knowledge and awareness. No significant association emerged between sociodemographic factors and knowledge, although attending a health education program was significantly associated with higher awareness.

**Conclusions:** Caregivers demonstrated average knowledge, positive attitudes, and high awareness of TB. Persistent knowledge gaps indicate a need for targeted educational interventions, particularly for caregivers who have not attended health education programs, to strengthen overall KAB and support TB management and control efforts.

**Keywords:** Attitude, Awareness, Caregivers, Cross-sectional study, Knowledge, Tuberculosis

### INTRODUCTION

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains a significant global public health threat, with India bearing a particularly heavy burden. Despite ongoing efforts, TB continues to affect millions of lives in India, including a high prevalence of both drug-susceptible and drug-resistant strains.<sup>1</sup> The disease disproportionately impacts vulnerable and marginalized

populations, exacerbating health inequalities and posing challenges to national TB control programs.<sup>4</sup>

Caregivers play an essential role in supporting TB patients throughout their treatment journey. Their involvement is critical in ensuring medication adherence, providing emotional support, and facilitating access to timely healthcare interventions. The knowledge, attitude, and awareness (KAB) of caregivers regarding TB are pivotal in influencing patient outcomes, as these factors

directly impact their ability to assist with treatment regimens and motivate adherence. While existing studies have explored the KAB of TB patients and healthcare providers, there is a notable gap in understanding these factors specifically among caregivers of TB patients.<sup>16</sup>

This study aimed to address this gap by investigating the KAB of caregivers towards TB and its treatment in the context of MMIMSR, Mullana, Ambala, Haryana, India. By examining these factors, the research seeks to identify areas for targeted educational interventions, thereby improving caregivers' knowledge and enhancing treatment adherence and outcomes for TB patients.

## Background

TB has plagued humanity for millennia, leaving its mark on Indian history and folklore.<sup>3</sup> Despite advancements in medicine, TB remains a formidable public health challenge in India, fueled by factors like poverty, malnutrition, overcrowding, and limited healthcare access.<sup>4</sup> Understanding the epidemiology of *M. tuberculosis* is essential for effective control efforts.<sup>5</sup> While the global incidence of TB has shown a slow decline, India reports the highest number of cases worldwide, further complicated by the presence of drug-resistant variants.<sup>1</sup> The Revised National Tuberculosis Control Program (RNTCP) represents a key government initiative aimed at TB control, but achieving successful outcomes hinges on multiple factors, including patient adherence to treatment regimens.<sup>4</sup>

## Rationale

Caregivers play a pivotal role in ensuring adherence to TB treatment programs, particularly the directly observed treatment, short-course (DOTS) regimen. Their KAB regarding TB directly impacts patient outcomes and treatment success.<sup>16</sup> Existing research has primarily focused on TB patients and healthcare providers, neglecting the crucial perspective of caregivers. Understanding their experiences and perspectives is essential for developing a holistic approach to TB care and control.<sup>17</sup>

## Significance of the study

This study holds significant public health implications. Enhanced caregiver knowledge can lead to more effective support for TB patients, reduced stigma associated with the disease, and ultimately contribute to improved TB control efforts in the region. Identifying knowledge gaps and misconceptions among caregivers will enable healthcare providers to design targeted educational interventions to address these issues, ultimately leading to better TB-related awareness and knowledge among caregivers.<sup>17</sup> Previous studies by Peltzer et al and Balasubramaniam et al have highlighted the importance of including caregivers in TB control programs and the

impact of their knowledge and attitudes on patient adherence.<sup>18</sup>

Building upon this existing research, this study addresses the specific context of MMIMSR, Mullana, Ambala, Haryana, investigating the KAB of caregivers of TB patients admitted to the TB and Chest Ward. By exploring these aspects, the study aims to contribute valuable insights to inform the development of more effective strategies and interventions for TB control and patient support within the community.

Tuberculosis (TB) remains a significant public health concern in India, despite being a curable infectious disease. Caregivers of TB patients play a crucial role in treatment adherence and patient outcomes. This study investigated the knowledge, attitude, and awareness (KAB) of caregivers of TB patients admitted to the TB and Chest ward at MMIMSR, Mullana, Ambala, Haryana, India.

## Objectives

To assess the level of knowledge, attitude, and awareness regarding TB and its treatment among caregivers of TB patients. To explore potential relationships between KAB levels. To examine associations between selected sociodemographic variables and KAB levels.

## Hypotheses

There is a positive correlation between knowledge, attitude, and awareness regarding TB and its treatment among caregivers.

The study assumed that adequate participant availability and willingness to participate, honest and truthful responses from participants, caregiver willingness to share KAB information and relative stability of the healthcare environment during data collection. The study is limited to caregivers of TB patients admitted to the specific ward at MMIMSR during the data collection period and a specific timeframe, excluding any changes beyond that period.

## METHODS

### Study design

A quantitative, cross-sectional study design was employed to assess the knowledge, attitude, and awareness of caregivers of tuberculosis patients.

### Study setting and period

The study was conducted in the TB and chest ward at Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana, Ambala, Haryana, India. Data were collected over the period from November 2023 to November 2023.

### Study population and sample size

A total of 100 caregivers of TB patients admitted to the TB and Chest ward were recruited using convenience sampling during the study period.

### Inclusion criteria

Caregivers of TB patients admitted to the TB and chest ward at MMIMSR. Aged 18 years or older. Willing to provide informed consent and to share KAB information.

### Exclusion criteria

Caregivers below 18 years of age. Caregivers unwilling to provide informed consent or to participate. Caregivers unable to respond due to illness or other incapacity.

### Study tool and procedure

Data were collected using a self-administered questionnaire comprising four sections: (i) sociodemographic variables capturing age, gender, education, and related characteristics (12 items); (ii) a structured knowledge questionnaire assessing knowledge about TB (23 items developed through clinical experience, literature review, and expert consultation); (iii) a Likert scale measuring attitudes towards TB and TB patients (10 items); and (iv) a structured awareness questionnaire evaluating awareness of TB (10 items). Content validity was ensured by obtaining feedback from seven nursing experts who assessed the tool's relevance, clarity, and appropriateness. Reliability was established through pilot testing with 10 caregivers using a test-retest method, with Cronbach's alpha coefficients confirming acceptable reliability for all instruments (structured knowledge questionnaire: 0.72; Likert Scale: 0.90; structured awareness questionnaire: 0.90). Following administrative approval, eligible caregivers were approached, informed consent was obtained, and the questionnaire was administered.

### Ethical approval

Ethical approval for the study was obtained from the institutional ethics committee of MMIMSR (ethical approval number 2724) prior to data collection. Informed consent was obtained from all participants, and confidentiality of the collected information was maintained throughout the study.

### Statistical analysis

Descriptive statistics (frequencies and percentages) were used to summarize sociodemographic data and KAB scores. Correlation analysis was performed to explore relationships between knowledge, attitude, and awareness. A p value of <0.05 was considered statistically significant.

## RESULTS

A total of 100 caregivers participated in the study. The majority of caregivers were aged 18-30 years (52%), male (57%), and from rural areas (67%). Regarding education, 39% had completed matriculation and 8% were illiterate. Most participants identified as Hindu (84%). A large majority (94%) had not participated in any TB-related health education program, and 70% of the corresponding patients had been diagnosed within the previous three months. The detailed sociodemographic profile is presented in Table 1.

**Table 1: Sociodemographic characteristics of caregivers (n=100).**

| Variables                    | Category              | N (%)   |
|------------------------------|-----------------------|---------|
| Age (years)                  | 18–30                 | 52 (52) |
|                              | Above 30              | 48 (48) |
| Gender                       | Male                  | 57 (57) |
|                              | Female                | 43 (43) |
| Residence                    | Rural                 | 67 (67) |
|                              | Urban                 | 33 (33) |
| Education                    | Illiterate            | 8 (8)   |
|                              | Matriculation         | 39 (39) |
|                              | Other                 | 53 (53) |
| Religion                     | Hindu                 | 84 (84) |
|                              | Other                 | 16 (16) |
| Occupation                   | Full-time             | 43 (43) |
|                              | Part-time             | 26 (26) |
|                              | Other                 | 31 (31) |
| Monthly income (INR)         | No income             | 28 (28) |
|                              | 10,000-25,000         | 46 (46) |
|                              | Other                 | 26 (26) |
| Attended TB health education | No                    | 94 (94) |
|                              | Yes                   | 6 (6)   |
| Relationship with patient    | Son/daughter or other | 57 (57) |
|                              | Other relation        | 43 (43) |
| Duration of TB diagnosis     | Within 3 months       | 70 (70) |
|                              | More than 3 months    | 30 (30) |

**Table 2: Distribution of knowledge, attitude, and awareness levels among caregivers (n=100).**

| Domain    | Level    | N (%)   |
|-----------|----------|---------|
| Knowledge | Good     | 45 (45) |
|           | Average  | 53 (53) |
|           | Poor     | 2 (2)   |
| Attitude  | Good     | 85 (85) |
|           | Average  | 15 (15) |
|           | Poor     | 0 (0)   |
| Awareness | High     | 90 (90) |
|           | Moderate | 10 (10) |
|           | Low      | 0 (0)   |

Knowledge levels among caregivers were predominantly average. Slightly more than half (53%) had average

knowledge, 45% had good knowledge, and only 2% had poor knowledge. Attitudes were largely positive, with 85% of caregivers demonstrating a good attitude and 15% an average attitude. Awareness levels were high, with 90% classified as having high awareness and 10% as having moderate awareness. The distribution of KAB levels is summarized in Table 2.

**Table 3: Correlation between knowledge, attitude, and awareness domains.**

| Domains compared           | P value     | Significance |
|----------------------------|-------------|--------------|
| Knowledge versus attitude  | 0.04        | Significant  |
| Attitude versus awareness  | <0.001      | Significant  |
| Knowledge versus awareness | Significant | Significant  |

With respect to specific attitude items, 79% of caregivers believed that TB can be cured, 67% were willing to offer emotional support, and 72% felt comfortable supporting patients with everyday duties. Only 35% disagreed that TB patients are typically stigmatized. The majority (82%) believed that TB could be prevented with adequate hygiene and precautions, and 87% were confident about their relative's recovery from TB.

Correlation analysis revealed statistically significant positive relationships between the KAB domains. A significant association was observed between knowledge and attitude ( $p=0.04$ ) and between attitude and awareness ( $p<0.001$ ), as well as between knowledge and awareness. These findings indicate interdependence among the three domains. No significant associations were found between sociodemographic factors and knowledge levels; however, attending a health education program was significantly associated with awareness levels. The correlations between domains are presented in Table 3.

## DISCUSSION

Caregivers in our study demonstrated an average level of knowledge (53%) about TB and its treatment. These findings are somewhat lower than those reported by Sharma et al (61.8%) in a study of patients and relatives in India.<sup>1</sup> This discrepancy might be due to differences in the study populations, as our study focused solely on caregivers, who may have less medical background compared to patients and relatives. Our findings are, however, comparable to studies conducted in Nepal (59.9%) by Gautam et al and Lesotho (adequate knowledge in approximately 75% of participants) by Luba et al, suggesting a need for improved knowledge dissemination about TB across South Asia and sub-Saharan Africa.<sup>2,3</sup>

Despite average knowledge scores, caregivers in our study exhibited positive attitudes towards TB and TB patients (85%). This aligns with studies by Essar et al

(good attitude score in Ethiopia and Afghanistan) and Ikhwan et al (good attitude score in Indonesia), suggesting a generally positive perception of TB patients among caregivers.<sup>4,5</sup> Our findings contrast with Almalki et al. who reported a poor attitude towards TB in Saudi Arabia (89.9%).<sup>6</sup> Cultural and social factors likely influence these variations.

The majority of caregivers in our study (90%) had high awareness about TB. This is consistent with findings by Vijaykrishnan et al in India (good awareness score).<sup>7</sup> High awareness levels are encouraging, but knowledge gaps remain, as evidenced by the average knowledge scores.

Significant positive correlations were found between knowledge, attitude, and awareness in our study. This suggests that improved knowledge can lead to more positive attitudes and greater awareness about TB.

Interestingly, we found no significant associations between sociodemographic factors and knowledge levels. This is in contrast to Khadija et al who reported an association between education level and knowledge about TB in their study.<sup>8</sup> Further research is needed to explore these potential discrepancies. However, our study identified a significant association between attending a health education program and awareness levels. This highlights the importance of targeted educational interventions to improve TB awareness among caregivers.

The study's strengths include its emphasis on a hitherto understudied population- caregivers of tuberculosis patients- and the use of a validated, accurate questionnaire to assess KAB. The cross-sectional methodology allowed for data collection within a defined timeframe, resulting in a snapshot of caregivers' KAB. However, many constraints must be acknowledged:

The cross-sectional design limits the capacity to infer causation between KAB variables.

Data collection: convenience sampling may create bias since the sample is not entirely representative of the overall caregiver population.

Analysis and interpretation: although substantial connections were found, the study did not dive thoroughly into causal links or underlying processes.

### *Interpretation and implications in the context of the full body of evidence*

This study adds to the current body of data by emphasizing the critical role caregivers play in tuberculosis management and the need of focused educational interventions. Previous research has also underlined the role of caregiver knowledge and attitude on patient adherence and treatment results. For example, Peltzer et al and Balasubramaniam et al found that

caregiver engagement had a substantial influence on tuberculosis reduction efforts.

The high levels of awareness among caregivers are positive, but the average knowledge scores reveal gaps that must be filled. These findings imply that, while caregivers are typically aware of tuberculosis and its ramifications, educational activities might help them better comprehend specific elements of the disease and its treatment.

### ***Controversies raised by this study***

One possible point of contention is the disparity between high awareness and average knowledge levels. This raises concerns regarding the quality and depth of information that caregivers get. The study also discovered no significant relationships between sociodemographic characteristics and knowledge levels, in contrast to other studies (e.g., Khadija et al) that indicated substantial links. This contradiction emphasizes the need for more study to investigate these interactions in various situations and groups.

### ***Future research directions***

Future research in this area should expand to include a larger and more diverse sample of caregivers from various regions and healthcare settings to enhance the generalizability of findings. Additionally, longitudinal studies are essential to explore the causal relationships between caregivers' knowledge, attitude, and awareness (KAB) and patient outcomes over time. Such studies would provide deeper insights into how changes in caregiver KAB might influence TB treatment adherence and the long-term health of patients.

Interventional studies are also needed to develop and evaluate targeted educational programs aimed at improving caregiver understanding of TB. These interventions can be assessed for their effectiveness in enhancing caregivers' KAB and their subsequent impact on patient adherence to treatment and overall health outcomes.

Furthermore, systematic reviews should be conducted to synthesize the existing literature on the influence of caregiver KAB on TB management. These reviews could identify knowledge gaps and help shape future research priorities, particularly in terms of interventions and policy development.

Lastly, the exploration of underlying processes is crucial to understand how caregiver KAB influences patient outcomes. Future research should examine cultural factors, stigma, and access to healthcare services, as these elements may play a significant role in shaping caregivers' attitudes and the quality of care they provide. Understanding these processes will be vital for developing culturally sensitive and contextually relevant

interventions to improve TB management and care outcomes.

## **CONCLUSION**

In our study, caregivers exhibited average knowledge, positive attitudes, and high awareness regarding TB. However, notable knowledge gaps persist. Targeted educational interventions are essential, especially for caregivers who have not participated in health programs and those from specific religious backgrounds or without a family history of TB. These interventions will be crucial in improving overall KAB and play a significant role in enhancing TB management and control efforts.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana, Ambala (Approval No. 2724)*

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**Cite this article as:** Sarin J, Gulia S, Kumari A, Shavana, Kala S, Sharma K. Knowledge, attitude and awareness of tuberculosis among caregivers in Mullana, Ambala, India. Int J Community Med Public Health 2026;13:5709-15.