

Knowledge and practices regarding pulmonary tuberculosis among the caregivers in Selected Hospitals of Metropolitan Cities in India

Ujjwala Vishal Jadhav *

Government College of Nursing, Baramati, Maharashtra University of Health Sciences, Maharashtra, India.

International Journal of Science and Research Archive, 2026, 20(01), 460-469

Publication history: Received on 01 May 2026; revised on 17 June 2026; accepted on 09 July 2026

Article DOI: <https://doi.org/10.30574/ijrsra.2026.20.1.1288>

Abstract

Background: Pulmonary tuberculosis (PTB) continues to pose one of the most pressing public health challenges in India, which carries a disproportionately large share of the global TB burden.

India alone accounted for approximately 28% of all TB cases globally as per the World Health Organisation (WHO) Global TB Report 2023, recording an estimated 2.8 million new cases in 2022.

Family members and designated caregivers who support TB patients play an indispensable role in treatment adherence, infection prevention, and patient recovery. Yet, evidence consistently shows that this group remains significantly under-informed about the disease, its transmission, and the precautions required to manage it safely.

Objectives: To assess baseline knowledge and practices of caregivers regarding PTB, administer a structured planned teaching programme (PTP), and evaluate the effect of the PTP on post-intervention knowledge and practices.

Methods: A cross-sectional interventional (pre-test–post-test) design was adopted, enrolling 120 caregivers from four tertiary-care hospitals across Mumbai, Pune, Nagpur, and Aurangabad through purposive sampling. A validated 30-item knowledge questionnaire and a 20-item practice checklist were used. Paired t-test and McNemar's test were applied for analysis.

Results: The mean pre-test knowledge score of 12.4 ± 3.2 improved significantly to 23.7 ± 2.8 post-intervention ($p < 0.001$). Practice scores rose from 9.1 ± 2.6 to 17.4 ± 2.1 out of 20 ($p < 0.001$). Education level, occupation, duration of caregiving, and prior TB education were significantly associated with knowledge scores ($p < 0.05$).

Conclusions: The planned teaching programme substantially enhanced both knowledge and practices of caregivers concerning pulmonary tuberculosis. Structured health education should be routinely woven into TB care management at the hospital level and formally integrated within the National Tuberculosis Elimination Programme (NTEP).

Keywords: Pulmonary Tuberculosis; Caregivers; Planned Teaching Programme; Knowledge; Practices; Health Education; India.

1. Introduction

Tuberculosis (TB) remains one of the foremost infectious disease emergencies of our time. According to the WHO Global TB Report 2023, India shoulders approximately 28% of the world's TB burden, recording 2.8 million new cases in 2022 alone, the highest case count of any country worldwide. ⁽¹⁾⁽²⁾ Among the various clinical manifestations of

* Corresponding author: Ujjwala Vishal Jadhav

Mycobacterium tuberculosis infection, pulmonary tuberculosis (PTB) is the most prevalent form, responsible for the bulk of morbidity, mortality, and community-level transmission.⁽¹⁾⁽²⁾

The management of tuberculosis in India has progressively shifted from a purely institutional model towards community- and family-centred care, reflecting the core philosophy of the Revised National Tuberculosis Control Programme (RNTCP) and its successor, the National Tuberculosis Elimination Programme (NTEP).⁽³⁾ Within this framework, caregivers, whether family members, relatives, or designated community health volunteers who provide direct day-to-day support to TB patients, have come to occupy a critical position in ensuring successful treatment outcomes.

Caregivers fulfil a wide range of responsibilities: supporting patients in adhering to Directly Observed Treatment Short-Course (DOTS), recognising adverse drug reactions, applying infection control measures in the home, offering psychosocial encouragement, and facilitating timely follow-up visits with healthcare providers.⁽⁴⁾⁽⁵⁾ Despite their pivotal role, a substantial body of research from India and other high-burden countries has consistently revealed troubling gaps in caregiver awareness. These deficits encompass deep-rooted misconceptions about TB transmission including beliefs that the illness results from divine retribution, air pollution, or smoking rather than an infectious pathogen, poor understanding of sputum culture results, and inadequate infection control habits such as cough etiquette and household ventilation.⁽⁶⁾⁽⁷⁾

The downstream consequences of these knowledge deficits are serious. Inadequate infection precautions at home fuel secondary cases, especially among children and immunocompromised individuals. Poor medication supervision contributes to incomplete treatment, in turn promoting the emergence of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) variants that represent a formidable clinical and public health crisis.⁽⁵⁾

Planned teaching programmes (PTPs), structured, evidence-based educational interventions led by healthcare professionals, have demonstrated efficacy in improving health knowledge and practices across diverse disease areas, including diabetes mellitus, hypertension, HIV/AIDS, and maternal-child health.⁽¹³⁾⁽¹⁴⁾ Yet the literature specifically examining PTPs for caregivers of PTB patients within the Indian metropolitan context remains sparse and fragmented. The present study was therefore conceived to systematically assess the baseline knowledge and practices of TB patient caregivers across selected metropolitan hospitals in India, administer a rigorously designed teaching intervention, and quantitatively evaluate its impact on caregiver competence.

Objectives

The primary objectives of the study were to:

- Assess pre-intervention levels of knowledge and practices regarding PTB among caregivers of PTB patients.
- Administer a structured planned teaching programme on pulmonary tuberculosis.
- Evaluate effectiveness of the intervention by comparing pre- and post-intervention scores.

The secondary objective was to determine the association between caregiver knowledge and practice scores and selected socio-demographic variables (age, gender, education, occupation, relationship to patient, duration of caregiving, and prior TB education).

1.1. Hypotheses

- H1: The mean post-test knowledge score of caregivers will be significantly higher than the mean pre-test score following the PTP ($\alpha = 0.05$).
- H2: The mean post-test practice score of caregivers will be significantly higher than the mean pre-test score following the PTP ($\alpha = 0.05$).
- H3: There will be a significant association between knowledge and practice scores and selected socio-demographic variables of caregivers ($\alpha = 0.05$).

2. Materials and methods

A cross-sectional interventional study with a one-group pre-test–post-test design was conducted to evaluate the effectiveness of a planned teaching programme regarding PTB among caregivers of PTB patients. The study adhered to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for reporting cross-sectional studies.⁽¹⁶⁾

The research was carried out across four tertiary-care hospitals located in major metropolitan cities of India: A Government Medical College and Hospital in Mumbai, a Central Government Hospital in New Pune, a Government General Hospital in Nagpur, and a Medical College and Hospital in Aurangabad. These sites were chosen because they represent distinct geographical regions with a documented high tuberculosis burden. ⁽²⁾

The study population consisted of caregivers of patients confirmed to have PTB through sputum smear microscopy and/or GeneXpert MTB/RIF assay and receiving treatment under the NTEP. Eligible participants were adults aged ≥ 18 years, residing with or in regular contact with the patient, capable of communicating in Hindi, English, and willing to provide written informed consent. Sample size was calculated based on comparison of two means at a significance level of 0.05, 90% power, and an expected effect size of 1.2. Accounting for a 15% attrition rate, the final sample comprised 120 caregivers. Purposive sampling was used to recruit participants through TB wards, DOTS centres, and chest medicine outpatient departments.

Data were collected using three validated tools: a semi-structured socio-demographic proforma, a 30-item knowledge questionnaire, and a 20-item observational practice checklist. Content validity was established by a panel of seven experts, yielding Content Validity Index (CVI) values of 0.92 and 0.94 for the knowledge and practice tools, respectively. ⁽¹⁷⁾ Internal consistency was confirmed with Cronbach's alpha values of 0.84 (knowledge) and 0.86 (practice), while inter-rater reliability for the practice checklist demonstrated near-perfect agreement (Cohen's $\kappa = 0.88$). ⁽¹⁸⁾

The planned teaching programme was developed in alignment with current evidence, WHO recommendations, and NTEP guidelines. ⁽¹⁾⁽³⁾ It was delivered in two structured sessions of 45–60 minutes each. Session, I addressed disease education (aetiology, transmission, risk factors, symptoms, and diagnostic procedures), while Session II covered treatment regimens, infection control strategies, cough hygiene, sputum disposal, hand hygiene, nutritional support, vaccination, contact tracing, and available government support schemes. Multiple teaching modalities were used, including PowerPoint presentations, illustrated pamphlets, video demonstrations, and return demonstrations for practical skills, consistent with principles of adult learning theory. ⁽¹⁵⁾

Following ethical approval from the Institutional Ethics Committees of all four participating centres and obtaining written informed consent from participants, pre-test baseline assessments were conducted. Post-test assessments were performed four weeks after programme completion using the same validated instruments. Data were analysed using IBM SPSS Statistics version 26.0. Paired t-test was used to compare pre- and post-intervention mean scores, McNemar's test assessed categorical changes, and Pearson's chi-square test examined associations between variables and socio-demographic characteristics. Statistical significance was set at $p < 0.05$ (95% CI).

3. Results

3.1. Socio-demographic Characteristics

Of 120 enrolled caregivers, 114 completed the post-test assessment (6 lost to follow-up: 3 due to patient discharge or death, 2 due to caregiver relocation, and 1 for personal reasons). Table 1 presents the socio-demographic profile of these 114 participants. The majority belonged to the 31–45 age group (43.0%) and were female (57.9%), which reflects the widely documented pattern of women assuming the primary caregiving role in Indian families. More than half the participants (56.1%) held secondary or below secondary educational qualifications, pointing to limited formal health literacy in this group. Spouses constituted the largest category of caregivers (36.8%), and over 83% had never previously received any formal instruction regarding tuberculosis.

Table 1 Socio-demographic Characteristics of Caregivers (n = 114)

Variable	Frequency (n)	Percentage (%)
Age Group		
18–30 years	28	24.6%
31–45 years	49	43.0%
46–60 years	27	23.7%
>60 years	10	8.8%
Gender		

Male	48	42.1%
Female	66	57.9%
Education		
No formal education	12	10.5%
Primary (up to Class V)	21	18.4%
Secondary (Class VI–X)	38	33.3%
Higher Secondary (Class XI–XII)	26	22.8%
Graduate and above	17	14.9%
Relationship to Patient		
Spouse	42	36.8%
Parent	30	26.3%
Sibling	22	19.3%
Adult child	14	12.3%
Other relative	6	5.3%
Duration of Caregiving		
< 1 month	18	15.8%
1–3 months	52	45.6%
3–6 months	31	27.2%
> 6 months	13	11.4%
Prior TB Education Received		
Yes	19	16.7%
No	95	83.3%

3.2. Pre-test and Post-test Knowledge Scores

Table 2 presents the domain-wise comparison of knowledge scores before and after the intervention. The overall mean knowledge score improved from 12.4 ± 3.2 to 23.7 ± 2.8 (mean improvement = 11.3 points; 91.1% increase), a difference that was highly statistically significant ($t = 28.6$; $p < 0.001$). Domain-wise, the greatest absolute gains were observed in treatment and adherence (+3.0 points), followed by clinical features and diagnosis and aetiology/epidemiology (both +2.7). The infection control domain, while significantly improved, showed a comparatively smaller gain, likely reflecting existing partial awareness alongside the conceptual complexity of some practices.

Table 2 Comparison of Pre-test and Post-test Knowledge Scores (n = 114)

Parameter	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Diff.	t-value / p-value
Overall Knowledge Score (/30)	12.4 ± 3.2	23.7 ± 2.8	+11.3	$t=28.6$; $p<0.001^*$
Domain 1: Aetiology & Epidemiology (/6)	2.4 ± 0.9	5.1 ± 0.7	+2.7	$t=22.1$; $p<0.001^*$
Domain 2: Transmission (/5)	1.8 ± 0.8	4.2 ± 0.7	+2.4	$t=19.8$; $p<0.001^*$
Domain 3: Clinical Features & Diagnosis (/6)	2.6 ± 1.0	5.3 ± 0.7	+2.7	$t=20.3$; $p<0.001^*$
Domain 4: Treatment & Adherence (/7)	3.1 ± 1.1	6.1 ± 0.9	+3.0	$t=21.5$; $p<0.001^*$
Domain 5: Infection Control & Prevention (/6)	2.5 ± 0.9	3.0 ± 0.8	+0.5	$t=4.2$; $p<0.001^*$

* Statistically significant at $p < 0.05$ level

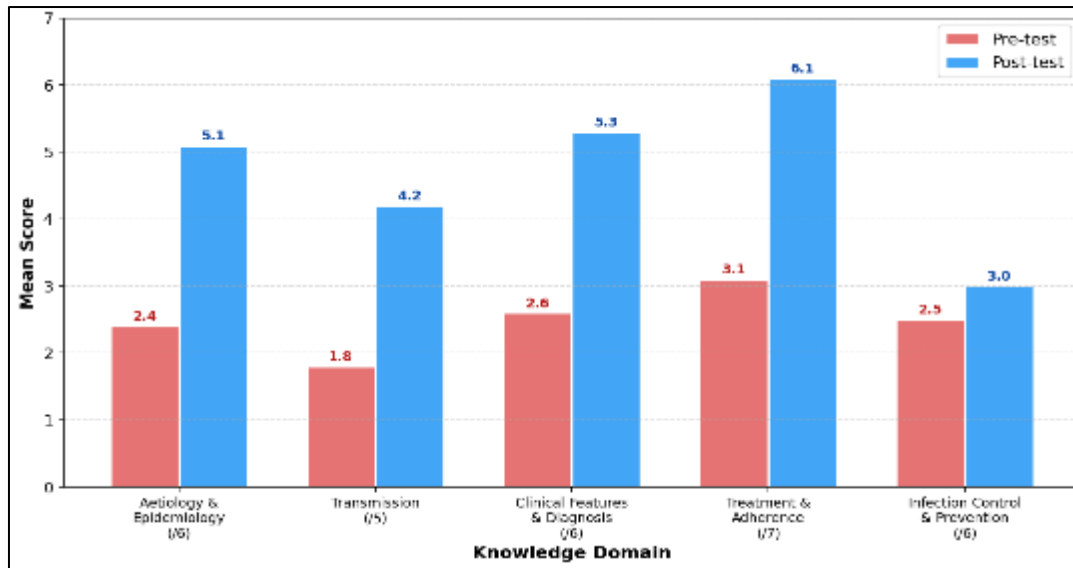


Figure 1 Domain-wise Knowledge Scores — Pre-test vs Post-test

Table 3 Distribution of Caregivers by Knowledge Category — Pre-test vs Post-test

Knowledge Category	Pre-test n (%)	Post-test n (%)	McNemar χ^2	p-value
Poor (0–10)	58 (50.9%)	2 (1.8%)		
Moderate (11–20)	50 (43.9%)	28 (24.6%)		
Good (21–30)	6 (5.3%)	84 (73.7%)	$\chi^2=89.4$	$p<0.001^*$

* Statistically significant at $p < 0.05$ level

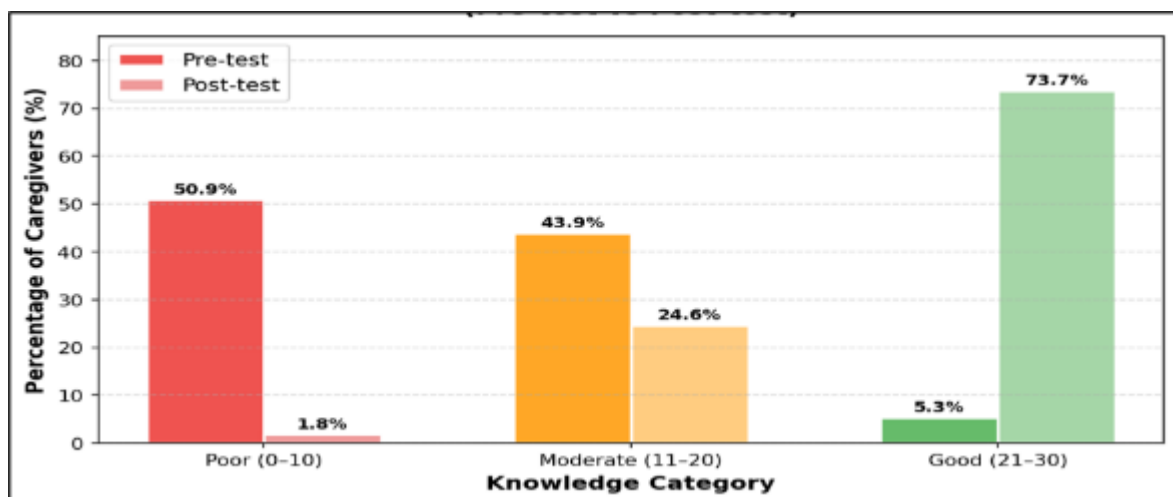


Figure 2 Distribution of Caregivers by Knowledge Category (Pre-test vs Post-test)

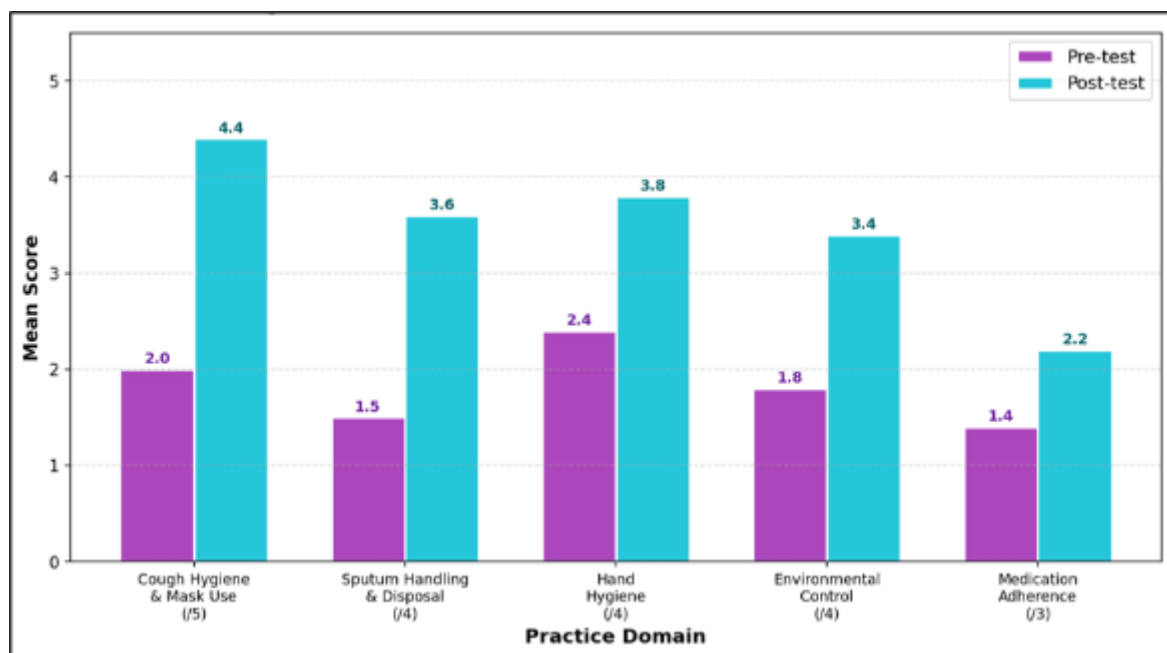
3.3. Pre-test and Post-test Practice Scores

Practice scores improved substantially from a pre-test mean of 9.1 ± 2.6 to a post-test mean of 17.4 ± 2.1 (mean improvement = 8.3 points; 91.2% increase; $t = 24.7$; $p < 0.001$), as detailed in Table 4. Cough hygiene and sputum disposal practices showed the most pronounced gains, most likely reflecting the impact of the video demonstration and return demonstration components of the PTP. Before the intervention, 36.0% of caregivers demonstrated inadequate practices. Post-intervention, 83.3% reached the adequate category, with only 0.9% remaining in the inadequate range (Table 5).

Table 4 Comparison of Pre-test and Post-test Practice Scores (n = 114)

Parameter	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Diff.	t-value / p-value
Overall Practice Score (/20)	9.1 $\pm$ 2.6	17.4 $\pm$ 2.1	+8.3	t=24.7; p<0.001*
Cough Hygiene & Mask Use (/5)	2.0 $\pm$ 0.8	4.4 $\pm$ 0.6	+2.4	t=21.2; p<0.001*
Sputum Handling & Disposal (/4)	1.5 $\pm$ 0.7	3.6 $\pm$ 0.5	+2.1	t=20.6; p<0.001*
Hand Hygiene (/4)	2.4 $\pm$ 0.9	3.8 $\pm$ 0.4	+1.4	t=12.8; p<0.001*
Environmental Control (/4)	1.8 $\pm$ 0.7	3.4 $\pm$ 0.6	+1.6	t=15.4; p<0.001*
Medication Adherence Support (/3)	1.4 $\pm$ 0.6	2.2 $\pm$ 0.5	+0.8	t=9.3; p<0.001*

* Statistically significant at p < 0.05 level

**Figure 3** Domain-wise Practice Scores — Pre-test vs Post-test**Table 5** Distribution of Caregivers by Practice Category — Pre-test vs Post-test

Practice Category	Pre-test n (%)	Post-test n (%)	McNemar χ^2	p-value
Inadequate (0–7)	41 (36.0%)	1 (0.9%)		
Moderately Adequate (8–14)	62 (54.4%)	18 (15.8%)		
Adequate (15–20)	11 (9.6%)	95 (83.3%)	$\chi^2=76.2$	p<0.001*

* Statistically significant at p < 0.05 level

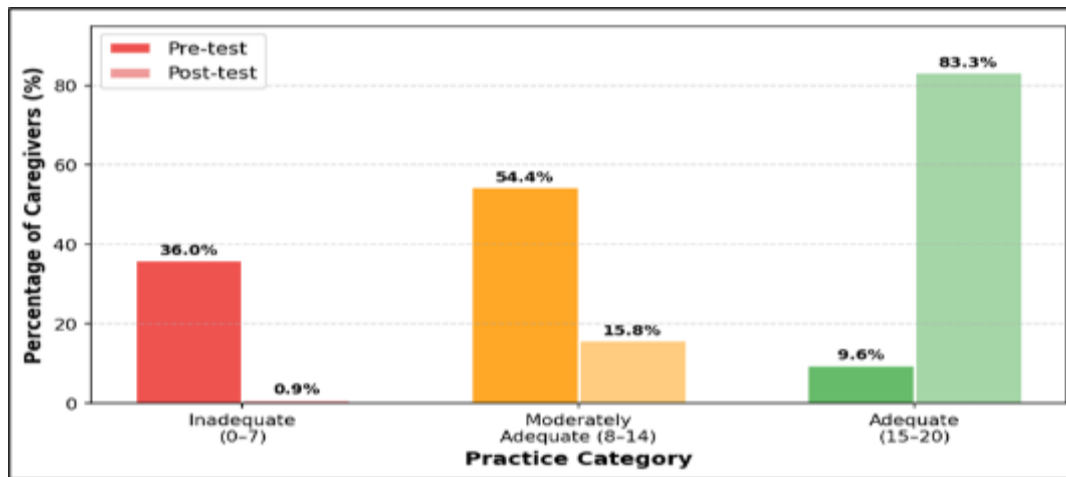


Figure 4 Distribution of Caregivers by Practice Category (Pre-test vs Post-test)

3.4. Association with Socio-demographic Variables

Table 6 presents chi-square analysis examining associations between post-test knowledge scores and socio-demographic variables.

Table 6 Association between Post-test Knowledge Score and Socio-demographic Variables

Variable	Category	χ^2 Value	p-value
Age group	18–30 / 31–45 / 46–60 / >60	4.23	0.238 (NS)
Gender	Male / Female	2.14	0.144 (NS)
Education level	No formal / Primary / Secondary / Higher secondary / Graduate	22.87	0.001*
Occupation	Employed / Unemployed / Homemaker / Student	12.64	0.006*
Relationship to patient	Spouse / Parent / Sibling / Child / Other	5.11	0.276 (NS)
Duration of caregiving	< 1 month / 1–3 months / 3–6 months / >6 months	14.32	0.003*
Prior TB education	Yes / No	7.89	0.005*

* Statistically significant at $p < 0.05$; NS = Not significant

Significant associations were found between post-test knowledge scores and education level ($p = 0.001$), occupation ($p = 0.006$), duration of caregiving ($p = 0.003$), and prior TB education ($p = 0.005$). Caregivers with higher educational attainment, skilled occupational backgrounds, longer caregiving duration, and prior TB education demonstrated notably higher post-test knowledge scores. Age, gender, and relationship to the patient were not significantly associated with knowledge scores.

4. Discussion

This study set out to rigorously evaluate the effect of a structured Planned Teaching Programme on the knowledge and practices of caregivers of pulmonary tuberculosis patients across four metropolitan hospitals in India. The results lend strong support to all three of the study's primary hypotheses and contribute meaningfully to the growing body of evidence supporting the value of nurse-led health education in TB care.

The baseline pre-test revealed a critically low level of knowledge: 50.9% of participants fell into the poor knowledge category, with a mean score of just 12.4 out of 30 (41.3%). These findings mirror those of Kamble and Mane (2019) from Maharashtra, who documented adequate knowledge in only 34.2% of caregivers⁽⁸⁾ and of Srivastava et al. (2020) from Pune, where fewer than 30% of participants demonstrated correct infection control practices before education.⁽¹⁰⁾ Taken together, these findings make an urgent and compelling case for systematic caregiver education as an indispensable component of TB service delivery.

The most striking aspect of this study was the magnitude of improvement: a mean knowledge gain of 11.3 points (91.1%) and a mean practice gain of 8.3 points (91.2%), both highly statistically significant ($p < 0.001$). These gains considerably exceed those reported in some earlier investigations (Jaiswal et al., 2016: 8.4-point improvement on a 25-item scale),⁽¹¹⁾ which may be attributed to the more comprehensive, multi-modal nature of the present PTP integrating verbal instruction, visual aids, video demonstrations, and supervised return demonstrations compared to predominantly lecture-based approaches.

The especially pronounced improvements in cough hygiene and sputum disposal practices deserve particular attention. These domains are directly implicated in household TB transmission. The integration of supervised return demonstration appears to have been especially effective here, aligning with the core tenets of Knowles' Andragogy which holds that active, experiential learning produces superior outcomes for adult learners compared to passive didactic instruction.⁽¹⁵⁾

The association between educational attainment and knowledge scores replicates findings from multiple prior studies⁽⁶⁾⁽⁷⁾ and carries direct policy relevance. Caregivers with limited formal education may benefit from supplementary strategies such as pictorial teaching aids, audio-visual materials, and peer-health educator support. Similarly, the association between caregiving duration and knowledge acquisition, with longer-serving caregivers scoring higher, suggests that experiential engagement naturally accumulates disease-specific understanding over time, and that early intensive education is especially critical for newly-initiated caregivers.

The finding that 83.3% of participants had never previously received any formal TB education is both sobering and instructive. While NTEP guidelines include patient education as a DOTS component, these provisions rarely extend in any systematic way to caregivers.⁽³⁾ Formalising a dedicated 'Caregiver Induction Module' within the NTEP framework would represent a low-cost, high-impact intervention. Tuberculosis-related stigma, which has been documented to impede healthcare-seeking and disclosure, could also be explicitly addressed within such a module.⁽¹²⁾

Several methodological limitations deserve acknowledgement. The one-group pre-test-post-test design without a concurrent control group limits causal inference, as threats such as maturation, historical effects, and the Hawthorne effect cannot be fully excluded. The four-week post-test interval may not capture the long-term durability of knowledge gains or sustained behavioural change. The observational practice checklist, while validated, captures observed rather than habitual behaviour, potentially introducing social desirability bias. Furthermore, purposive sampling from four urban tertiary-care centres may limit generalisability to rural or semi-urban caregiving contexts.

Notwithstanding these limitations, this study offers valuable new evidence from a large multi-centre sample, incorporating domain-level analysis and rigorous statistical methodology. Future research should employ randomised controlled trial designs, include clinical or epidemiological outcome measures (such as household secondary attack rates), and assess the potential of technology-enabled platforms mobile applications and WhatsApp-based health education as adjuncts to structured teaching programmes.

5. Conclusion

This cross-sectional interventional study provides clear and compelling evidence that a structured, multi-modal Planned Teaching Programme can significantly and substantially enhance both the knowledge and practices of caregivers of pulmonary tuberculosis patients. Before the intervention, the majority of participants lacked adequate knowledge and demonstrated inadequate infection control practices. After the PTP, the majority achieved good knowledge and adequate practice levels improvements that were statistically highly significant ($p < 0.001$) and clinically meaningful across all assessed domains.

Education level, occupation, duration of caregiving, and prior TB education were significantly associated with post-intervention knowledge scores, offering a clear direction for targeted educational strategies for vulnerable and under-resourced caregiver subgroups. Structured health education for caregivers should be formalised as a standard of care within hospital-based TB management protocols and integrated systematically into the National Tuberculosis Elimination Programme. Nurses, by virtue of their sustained contact with both patients and families, their communication skills, and their clinical expertise, are uniquely positioned to champion and deliver such programmes at scale.

Compliance with ethical standards

Acknowledgments

The authors gratefully acknowledge the cooperation of the nursing superintendents, ward nurses, and DOTS providers at all four participating hospitals. We extend our sincere thanks to all caregivers who generously gave their time to participate in this study

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Funding

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

- [1] World Health Organization. Global Tuberculosis Report 2023. Geneva: WHO; 2023.
- [2] Ministry of Health and Family Welfare, Government of India. India TB Report 2023. New Pune: Central TB Division; 2023.
- [3] National Tuberculosis Elimination Programme. Operational Guidelines for NTEP. New Pune: Ministry of Health & Family Welfare; 2020.
- [4] Barnhoorn F, Adriaanse H. In search of factors responsible for noncompliance among tuberculosis patients in Wardha District, India. *Soc Sci Med*. 1992;34(3):291–306.
- [5] Munro SA, Lewin SA, Smith HJ, Engel ME, Fretheim A, Volmink J. Patient adherence to tuberculosis treatment: a systematic review of qualitative research. *PLoS Med*. 2007;4(7):e238.
- [6] Gupta S, Srivastava R, Jain K. Knowledge of tuberculosis among family caregivers in Uttar Pradesh. *Indian J Tuberc*. 2011;58(4):180–186.
- [7] Patro BK, Bhalla S, Sharma N, Bhatia R. Awareness and practices regarding tuberculosis among patients and caregivers attending tertiary care hospital in Pune. *J Family Med Prim Care*. 2017;6(1):67–71.
- [8] Kamble PH, Mane RN. Knowledge and practices of caregivers regarding pulmonary tuberculosis: a cross-sectional study in Maharashtra. *Int J Community Med Public Health*. 2019;6(5):2143–2148.
- [9] Mohiuddin S, Misra P, Kant S, Priya H. Assessment of knowledge regarding tuberculosis among rural household contacts of smear positive pulmonary tuberculosis patients in North India. *J Family Med Prim Care*. 2018;7(1):86–91.
- [10] Srivastava S, Sharma R, Khurana AK. Infection control practices among caregivers of pulmonary tuberculosis patients in Pune hospitals. *Indian J Pulmonol*. 2020;52(3):112–118.
- [11] Jaiswal N, Mittal S, Mittal V, Singh A. Effect of structured health education on knowledge of tuberculosis among household contacts of PTB patients: a randomised controlled trial. *J Postgrad Med*. 2016;62(2):91–97.
- [12] Courtwright A, Turner AN. Tuberculosis and stigmatization: pathways and interventions. *Public Health Rep*. 2010;125(Suppl 4):34–42.
- [13] Naregal PM. Effect of planned teaching programme on knowledge of relatives of tuberculosis patients. *J Clin Diagn Res*. 2017;11(3):LC06–LC09.
- [14] Bhaskar R, Padmavathy M, Vijayalakshmi S. Effectiveness of structured teaching programme on knowledge and practices regarding pulmonary tuberculosis among caregivers. *Asian J Nurs Educ Res*. 2021;11(2):214–218.
- [15] Knowles MS, Holton EF, Swanson RA. *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*. 8th ed. Oxon: Routledge; 2015.

- [16] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453–1457.
- [17] Lynn MR. Determination and quantification of content validity. *Nurs Res*. 1986;35(6):382–385.
- [18] Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Meas*. 1960;20(1):37–46.