Monaldi Archives for Chest Disease

eISSN 2532-5264 https://www.monaldi-archives.org/

Monaldi Arch Chest Dis 2024 [Online ahead of print]

To cite this Article:
Gaur R, Sharma SK, Kumar S, et al. **Knowledge, attitude and perceived barriers related to directly observed treatment, short-course among patients and caregivers attending tuberculosis clinics: a cross-sectional survey.** *Monaldi Arch Chest Dis* doi: 10.4081/monaldi.2024.3154

Knowledge, attitude and perceived barriers related to directly observed treatment, short-course among patients and caregivers attending tuberculosis clinics: a cross-sectional survey

Rakhi Gaur,[1] Suresh Kumar Sharma,[2] Suman Kumar,[3]
Shiv Kumar Mudgal,[1] Vipin Patidar,[1] Ayesha Juhi[4]

[1]College of Nursing, All India Institute of Medical Sciences, Deoghar, Jharkhand; [2]College of Nursing, All India Institute of Medical Sciences, Jodhpur, Rajasthan; [3]Department of Microbiology, All India Institute of Medical Sciences, Deoghar, Jharkhand; [4]Department of Physiology, All India Institute of Medical Sciences, Deoghar, Jharkhand, India

Correspondence: Vipin Patidar, College of Nursing, All India Institute of Medical Sciences, Deoghar, Jharkhand, India-814152. Tel.: +919028709152. E-mail: patidar_vipin@yahoo.in

Contributions: all of the authors were involved in the study's inception, as well as the preparation and finalization of the research article. RG, SKS, conception, design, draft writing, critical review; SK, AJ, supervision, data collection; SKM, VP, analysis and interpretation, literature review. All the authors have read and approved the final version of the manuscript and agreed to be accountable for all aspect of the work.

Conflict of interest: the authors state that there are no competing interests, and all authors certify accuracy.

Ethics approval and consent to participate: the Institute Ethics Committee approved the study (AIIMS-DEO/RC-IEC-Full committee/2023-Jan/61).

Informed consent: participants were informed about the study's goal and given a participant information brochure. They were informed about the study in the local language and given the opportunity to ask any questions about it. Every participant provided informed consent. Participants were also informed that they were able to withdraw consent and quit participation at any moment during the course of the study. Throughout the method, the privacy and confidentiality of the information acquired were maintained.

Funding: none.

Availability of data and materials: data and resources are available upon reasonable request from the corresponding author.

Abstract

Tuberculosis (TB) is a major worldwide health problem, particularly in India, where it accounts for a quarter of infections. Adherence to the directly observed treatment, short-course (DOTS), which is necessary for TB treatment, is difficult in resource-limited circumstances. This study addressed the knowledge, attitude, and perceived barriers related to TB and DOTS adherence among patients and caregivers. A cross-sectional survey was undertaken at the selected TB clinics between November 2023 and March 2024. Purposive sample yielded 180 patients and 217 caregivers. Data were obtained using validated, self-structured questionnaires that assessed knowledge, attitude, and perceived barriers to TB and DOTS adherence. Statistical analysis was carried out with IBM SPSS version 23.0. The study found that caregivers had considerably greater TB knowledge than patients ($p<0.05$). Many patients misunderstood the cause of TB (50.6%) and embraced various misconceptions about the disease, such as TB spreading by shaking hands or sharing food, swimming in a holy river to cure diseases, and TB being the result of sin or karmic retribution. Distance to treatment facilities (95.6%), the necessity to take time off from work (91.7%), and social stigma (65.0%) were identified as the top three barriers to DOTS adherence. The study highlighted considerable gaps in knowledge, distant healthcare facilities, busy work schedules, and social stigma as barriers to TB treatment adherence in Deoghar, Jharkhand. Addressing these challenges via focused education and support activities is essential for enhancing DOTS adherence and TB treatment outcomes.

Key words: attitude, DOTS, knowledge, perceived barriers, tuberculosis.

Introduction

Tuberculosis (TB) is one of humanity's oldest illnesses, and it continues to pose a major worldwide health concern, particularly in developing nations such as India [1]. Despite breakthroughs in treatment, tuberculosis continues to cause significant morbidity and mortality, with 10.6 million cases and 1.4 million deaths worldwide in 2022 [2]. India has the largest burden of tuberculosis, accounting for one-quarter of all cases worldwide [3]. The WHO-endorsed Directly Observed Treatment, Short-Course (DOTS) strategy has been a cornerstone in the global battle against tuberculosis (TB) Since its implementation in the 1990s [4]. DOTS guarantees that TB patients follow their treatment plans by having healthcare providers actively observe drug consumption. This method greatly increases treatment success rates, lowers the likelihood of medication resistance, and slows TB transmission [5].

However, adherence to DOTS remains a key issue, especially in resource-constrained environments [6]. Noncompliance with TB treatment can have major consequences, including extended infectiousness, increased death rates, and the formation of multidrug-resistant TB (MDR-TB) [7]. Non-adherence can be caused by a variety of circumstances, including socioeconomic hurdles as well as psychological and health-care system issues. Economic challenges, such as the expense of transportation to healthcare facilities and lost income due to illness, are substantial impediments. Furthermore, a lack of information and comprehension of tuberculosis and its treatment among patients and caregivers might impede adherence [7-9].

These challenges are frequently heightened in rural and semi-urban area of Deoghar district in the Indian state of Jharkhand, due to poor healthcare facilities, poverty, and low literacy levels [10]. Deoghar, which is renowned for its religious significance and attracts millions of pilgrims each year, also challenges public health issues, such as a high TB load [11,12]. Understanding the extent of awareness of tuberculosis and perceived barriers to adherence among patients and caregivers in this location is essential for establishing customized strategies that enhance treatment outcome.

So, this study aimed to determine tuberculosis (TB) knowledge and adherence barriers to the treatment (DOTS) among patients and caregivers. Understanding this information, will aid in the development of successful educational and support programs for this demographic.

Materials and Methods

This cross-sectional survey research was conducted at selected TB clinics with a focus on patients and caregivers who attended OPD services. Researchers contacted 203 patients and 262 care givers through purposive sampling who were reported to selected TB Clinics between

November, 2023 and March, 2024, seeking them to participate in the study. Out of these, 180 (88.6%) patients and 217 (82.8%) caregivers completed the tools.

Sample size

The sample size determined by Raosoft was 377, based on a response rate of 50%, a 95% confidence interval, a Z-value of 1.96, and a margin of error of 5%. To account for potential errors in questionnaire completion, an additional 5% (19 participants) was added, leading to a total sample size of 396.

The study included both male and female individuals over the age of 18. Individuals who refused to participate, had a cognitive problem (mental retardation, stroke, or an untreated psychiatric illness), or were seriously sick were excluded from the study.

Measures

Data collection included baseline information such as age, gender, educational level, occupation, and place of residence, income, and source of basic knowledge about tuberculosis. After registration, individuals were provided with a self-structured questionnaire designed to assess their knowledge of tuberculosis (TB) and identify perceived barriers to treatment adherence.

A validated, self-structured instrument comprising 21 multiple-choice questions was employed to assess participants' knowledge of tuberculosis. Knowledge levels were categorized as poor (score < 7), good (score 8-14), and excellent (score > 15). Additionally, another validated self-structured tool with 25 statements (responses: Agree = 1, Disagree = 2) was used to evaluate the attitude and perceived barrier regarding treatment regimens. All the items of attitude questionnaire were answered by both patients and caregivers but the items under perceived barrier were attended by patients only. Researchers developed and subsequently validated these instruments with input from nursing experts. The reliability of the research instruments was assessed using Cronbach's alpha, yielding scores of 0.84 for the knowledge questionnaire and 0.87 for the attitude and perceived barrier tool, indicating robust internal consistency and reliability.

Analysis

The data gathered from the questionnaire were entered into Excel. After data coding, the cleaned dataset was being transferred to IBM SPSS (version 23.0) for analysis. The socio-demographic factors were examined using descriptive statistics such as frequencies and percentages for the both groups. For inferential analysis statistical tests such as chi-square tests

and t-tests were applied to examine relationships and correlations in the data. All statistical analyses were conducted using a two-sided significance threshold of 0.05.

Ethical approval and informed consent

The Institute Ethics Committee approved the study with letter no. AIIMS-DEO/RC-IEC-Full committee/2023-Jan/61 proving that it followed the ethical standards specified in the Declaration of Helsinki (2013) and good clinical practice recommendations and does not raise any ethical problems since it does not include interventions, obtains consent in writing before data collection, maintains participants' total anonymity, and safeguards their privacy throughout the research process. Each participant provided written consent. Participants were also informed that they can withdraw consent and discontinue participation at any moment throughout the course of the study.

Results

Socio-demographic characteristics

Table 1 showed the socio-demographics of patients and caregivers. Patients (N=180), were primarily younger, with 37.8% under 30 years old, whereas caregivers (N=217), were older, with 77.9% over 30 years. Significant gender differences were observed, with 67.2% of patients and 45.6% of caregivers being men. Marital status found that higher proportion of married individuals among patients (84.4%) compared to caregivers (63.6%). Educational qualifications differed substantially, with caregivers having a greater level of secondary education (50.2%) than patients (44.4%). Occupation patterns differed markedly, with caregivers more often engaged in business and other professions (66.4%) compared to patients (35.0%). Residence locations also varied significantly, with a higher rural representation among patients (93.3%) versus caregivers (83.4%). Basic knowledge of tuberculosis was higher among caregivers (88.5%) than patients (76.1%).

Knowledge regarding tuberculosis

The knowledge questionnaire findings indicate significant differences in patients' and caregivers' knowledge of tuberculosis (TB) which is highlighted in Table 2. Patients have more misunderstandings than caregivers about many elements of tuberculosis knowledge. Specifically, patients often misunderstood the etiology of tuberculosis, with 50.6% giving inaccurate answers compared to 27.6% of caregivers. Similarly, patients (72.2%) had beliefs that tuberculosis was inherited (caretakers 62.2%) and affected people of all ages (patients 82.8%, caregivers 63.6%). Furthermore, patients were less aware regarding the impact of tuberculosis on mortality in India (62.2% inaccurate) than caregivers (43.3% incorrect). Other

notable differences include the association between tuberculosis and infertility, organ-specific effects, diagnostic procedures, treatment duration, and preventative measures including immunizations as shown in Table 2.

The diagram (Figure 1) shows that caregivers are typically more knowledgeable about tuberculosis than patients. Specifically, 28.33% of patients have poor knowledge against 14.28% of caretakers, and only 30% had Excellent knowledge versus 51.61% of caregivers. This suggests that caregivers are more knowledgeable about tuberculosis, with a much larger proportion having excellent knowledge levels than patients.

Awareness related to direct observation treatment short-course

The findings of the diagram (Figure 2) comparing awareness of Direct Observation Treatment Short Course (DOTS) across patients and caregivers show that caregivers are typically more aware than patients about many components of DOTS.

Attitude and perceived barriers

Table 3 displayed varied attitudes and perceived barriers related to tuberculosis and adherence for DOTs treatment among patients and caregivers. A substantial proportion of patients (83.3%) and caregivers (71.0%) believed that tuberculosis is a life-threatening condition (p=0.004). The majority of patients (89.4%) and caregivers (83.9%) felt it is impossible to live a normal life with tuberculosis, however this difference is not statistically significant (p=0.107). More than half of both groups believed TB would spread to all family members if one is affected, and that all TB patients are contagious, although these differences are not significant (p=0.221 and p=0.237, respectively). A similar trend appeared for myths such as TB spreading by shaking hands or sharing food (patients: 57.8%, caregivers: 51.2%; p=0.187) and the belief that swimming in a holy river will cure diseases like TB and cancer (patients: 63.9%, caregivers: 61.3%; p=0.595). It was surprising to know that, 100% of both the groups thought that tuberculosis is the result of sin or karmic retribution.

Barriers to treatment regimen were also considerable (shown in Table 4), with many patients (95.6%) feeling the centre was too far away and 91.7% having to take time from work to acquire medicine. 52.8% reported financial problems, and 73.9% said the therapy was expensive and long-term. Many people were concerned about stigma, with 65% anticipating stigmatization from neighbours and 56.7% questioning the DOTS effectiveness.

Discussion

The findings of this research study provide useful insights about the awareness and knowledge on tuberculosis (TB) along with this, it also reveals the attitude, and perceived barriers related

to adherence to DOTS treatment among patients and caregivers visiting TB clinics in Deoghar. The statistics shows large knowledge gaps and a number of barriers to treatment adherence.

The findings revealed a significant disparity in TB knowledge between patients and caregivers. Caregivers are often more aware of and understand tuberculosis (TB). This discrepancy is demonstrated by the large variations in accurate replies to several tuberculosis knowledge questions. Such as, caregivers were more likely to understand the etiology of tuberculosis, the disease's non-hereditary nature, and the impact of tuberculosis on mortality in India. There was no previous research evidence that compared TB knowledge among patients and caregivers, but comparable study was identified on different populations, which is consistent with the findings of this research [13-16]. The higher knowledge levels among caregivers may be attributed to their proactive involvement in managing and supporting TB patients, which may prompt them to seek further information about the disease. Patients, on the other hand, revealed a greater percentage of myths, such as TB being inherited or affecting all age groups equally. Similar studies were found, which supports the findings of this research. Significant knowledge gaps among patients underline the importance of focused educational initiatives [17,18]. Educating patients on the nature of tuberculosis, its transmission, and the need of completing the treatment regimen is vital for increasing adherence and treatment success.

Patients and caregivers have different attitudes regarding tuberculosis and its treatment. A significant proportion of both groups considered tuberculosis as a life-threatening disease and thought it was difficult to live a normal life with it. Numerous comparable studies were identified, which supports the outcomes of the present study [17,19]. This may be because considering tuberculosis as a life-threatening sickness and feeling that it substantially limits one's capacity to live a normal life can instil anxiety and social isolation. As a result, individuals may avoid admitting their condition or postpone seeking medical attention in order to avoid being stigmatized. Surprisingly, several assumptions were common among both groups. For example, it was common to believe that tuberculosis could be transferred by shaking hands or sharing food, as well as that soaking in a sacred river might cure TB. Such beliefs might divert patients' attention away from scientifically approved treatment procedures, compromising the DOTS regimen's effectiveness and potentially leading to poor health outcomes.

The study found significant challenges to adherence to the DOTS protocol among patients. The distance to the DOTS facility, the inconvenience of regular visits, and the financial implications of commuting and taking time off work all posed substantial challenges. These challenges may be significant in Deoghar, where healthcare infrastructure is lacking and many patients are from rural or low-income families. Additionally, societal stigma came out as a significant barrier. This outcome is in line with other studies [20-22]. Patients reported anxiety

about being stigmatized by neighbours and society, which might deter them from attending DOTS clinics and following their treatment plan. The worry of being shunned or losing their job exacerbates the situation, emphasizing the importance of community-based initiatives to minimize stigma and support them.

The study's strength lies in raising community awareness about TB with special focus on barriers to access DOTS services, which is crucial for TB elimination. However, some limitations were unavoidable, such as restricting the study to only few TB clinics and a small sample size, which limits the generalizability of the findings. Our survey data was not connected to the patients' medical records, which prevents us from examining how patient knowledge correlates with the type of TB, other comorbidities, and treatment outcomes. Furthermore, our survey did not assess the level of interest individual patients and caregivers had in learning about TB and preventive behaviors.

Implications

1. There is a clear need for extensive training initiatives aimed at both patients and caregivers to overcome information gaps and misconceptions regarding tuberculosis. These initiatives should highlight the significance of completing the DOTS protocol and dispelling misunderstandings regarding tuberculosis spread and treatment.
2. Improving access to DOTS centre's is essential. This might include locating more DOTS centre's closer to rural areas or offering transportation assistance to patients. Furthermore, combining TB treatment services with other healthcare services may alleviate the strain of frequent trips to DOTS clinics.
3. Efforts to decrease the stigma associated with tuberculosis are also important. Community awareness campaigns and education programs can help change public attitudes about tuberculosis and prevent prejudice against patients. Involving community leaders and influencers in these efforts can boost their efficacy and reach.

Conclusions

This study focuses on the significant Tuberculosis knowledge gaps and numerous barriers to DOTS adherence among patients and caregivers such as distant healthcare facilities, busy work schedules, and social stigma. Addressing these barriers through focused educational programs, increased access to treatment facilities, financial assistance, and stigma reduction activities is vital for improving TB treatment outcomes. Implementing these techniques allows health care workers to better serve TB patients and caregivers, eventually contributing to the worldwide battle against tuberculosis.

References

1. Bloom BR, Atun R, Cohen T, et al. Tuberculosis. In: Holmes KK, Bertozzi S, Bloom BR, et al., eds. Major Infectious Diseases. 3rd ed. Washington (DC): The International Bank for Reconstruction and Development/The World Bank; 2017.
2. WHO. Tuberculosis. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/tuberculosis. Accessed on: 7/07/2024.
3. Central Tuberculosis Division, Government of India. Leading the way- India TB report 2023. Available from: https://tbcindia.mohfw.gov.in/wp-content/uploads/2023/06/5646719104TB_AR_2023_04-04-2023_LRP_final.pdf. Accessed on: 7/07/2024.
4. Zimmer AJ, Heitkamp P, Malar J, et al. Facility-based directly observed therapy (DOT) for tuberculosis during COVID-19: a community perspective. J Clin Tuberc Other Mycobact Dis 2021;24:100248.
5. Out AA. Is the directly observed therapy short course (DOTS) an effective strategy for tuberculosis control in a developing country? Asian Pac J Trop Dis 2013;3:227-31.
6. Taati SI, Kalemeera F, Kibuule D. Quality of DOTS adherence counselling among hospitalized tuberculosis patients. J Tuberc Res 2019;7:77-94.
7. Xi Y, Zhang W, Qiao RJ, Tang J. Risk factors for multidrug-resistant tuberculosis: a worldwide systematic review and meta-analysis. PLoS One 2022;17:e0270003.
8. Kvarnström K, Westerholm A, Airaksinen M, Liira H. Factors contributing to medication adherence in patients with a chronic condition: a scoping review of qualitative research. Pharmaceutics 2021;13:1100.
9. Aljofan M, Oshibayeva A, Moldaliyev I, et al. The rate of medication nonadherence and influencing factors: a systematic review. Electron J Gen Med 2023;20:em471.
10. Singh KM, Singh R, Meena M, et al. Rural poverty in Jharkhand: an empirical exploration of socio-economic determinants using high frequency panel data. Available from: https://ssrn.com/abstract=2330844.
11. Bäckdahl T, Sharma M. Knowledge and transmission risk awareness of tuberculosis among the pilgrims attending a religious mass gathering in India: a cross-sectional study. BMC Public Health 2021;21:2141.
12. National Health Mission. Action oriented monitoring report deoghar district jharkhand Available from: https://nhm.gov.in/images/pdf/nrhm-in-state/state-wise-information/jharkhand/district-tour-report/deoghar_report.pdf. Accessed on: 7/07/2024.
13. Zeladita-Huaman J, Yuen CM, Zegarra-Chapoñan R, et al. Caregivers' knowledge and perceptions are associated with children's TB preventive treatment completion. Public Health Action 2021;11:85-90.

14. Jani Y, Bhambhani G, Thakor N. Knowledge and awareness of tuberculosis in caregivers of paediatric tuberculosis patients of north Gujarat region, India: a cross sectional study. Int J Res Med Sci 2017;3:3572-5.
15. Rai A, Srivastava S, Singh SA, Srivastava A. study of awareness of caregivers about tuberculosis treatment and its compliance. J Cardiovasc Dis Res 2023;14:3432-42.
16. Sharma SK, Jelly P, Bhadoria AS, et al. Awareness and perception regarding tuberculosis among patients and their relatives attending a tertiary care hospital in Uttarakhand: a hospital-based exploratory survey. J Family Med Prim Care 2020;9:1555-61.
17. Matakanye H, Tshitangano TG, Mabunda JT, Maluleke TX. Knowledge, beliefs, and perceptions of TB and its treatment amongst TB patients in the Limpopo Province, South Africa. Int J Environ Res Public Health 2021;18:10404.
18. Almalki ME, Almuqati FS, Alasmari R, et al. A cross-sectional study of tuberculosis knowledge, attitude, and practice among the general population in the western region of Saudi Arabia. Cureus 2022;14:e29987.
19. Onyango PA, Ter Goon D, Rala NM. Knowledge, attitudes and health-seeking behaviour among patients with tuberculosis: a cross-sectional study. Open Public Health J 2020;13:739-47.
20. Courtwright A, Turner AN. Tuberculosis and stigmatization: pathways and interventions. Public Health Rep 2010;125 Suppl 4:34-42.
21. Dodor EA. The feelings and experiences of patients with tuberculosis in the Sekondi-Takoradi Metropolitan district: implications for TB control efforts. Ghana Med J 2012;46:211-8.
22. Viney KA, Johnson P, Tagaro M, et al. Tuberculosis patients' knowledge and beliefs about tuberculosis: a mixed methods study from the Pacific Island nation of Vanuatu. BMC Public Health 2014;14:467.

Table 1. Socio-demographic characteristics of patients (N=180) and caregivers (N=217).

Socio-demographic characteristics		Patient (N=180)	Caregiver (N=217)	Chi-square value	p-value
		N (%)	N (%)		
Age	<30 Years	68 (37.8)	169 (77.9)	69.454	**0.000**
	31-60 Years	94 (52.2)	46 (21.2)		
	>60 Years	18 (10.0)	2 (0.9)		
	Mean ± SD	38.21±15.775	26.82±7.651		
Gender	Male	121 (67.2)	99 (45.6)	18.580	**0.000**
	Female	59 (32.8)	118 (54.4)		
Marital status	Married	152 (84.4)	138 (63.6)	21.725	**0.000**
	Unmarried	28 (15.6)	79 (36.4)		
Educational qualification	Illiterate	31 (17.2)	14 (6.5)	38.150	**0.000**
	Primary	52 (28.9)	32 (14.7)		
	Secondary	80 (44.4)	109 (50.2)		
	Graduation & above	17 (9.4)	62 (28.6)		
Occupation	Home maker	57 (31.7)	51 (23.5)	117.67	**0.000**
	Private job	14 (7.8)	9 (4.1)		
	Govt. Job	46 (25.6)	12 (5.5)		
	Business and others	63 (35.0)	144 (66.4)		
Monthly income in rupees	Less than 10000	158 (87.8)	180 (82.9)	7.226	0.065
	10000 to 20000	14 (7.8)	13 (6.0)		
	20000 to 30000	5 (2.8)	9 (4.1)		
	More than 30000	3 (1.7)	15 (6.9)		
Residence	Rural	168 (93.3)	181 (83.4)	9.780	**0.008**
	Semi-urban	2 (1.1)	11 (5.1)		
	Urban	10 (5.6)	25 (11.5)		
Basic knowledge about Tuberculosis disease	Yes	137 (76.1)	192 (88.5)	10.603	**0.001**
	No	43 (23.9)	25 (11.5)		
Source of knowledge	Television/Radio	36 (20.0)	54 (24.9)	13.267	**0.021**
	Newspaper/magazine	37 (20.6)	56 (25.8)		
	Internet	3 (1.7)	9 (4.1)		
	Health workers	34 (18.9)	44 (20.3)		
	Relatives/Friends	27 (15.0)	29 (13.4)		

SD, standard deviation; N, number of participants.

Table 2. Knowledge regarding tuberculosis among patients' (N=180) and caregivers (N=217).

Knowledge questionnaire		Patient		Caregiver		t test value	p-value
		N	%	N	%		
What is the cause of TB?	Wrong answer	91	50.6	60	27.6	4.803	**0.000**
	Right answer	89	49.4	157	72.4		
TB is a hereditary disease?	Wrong answer	130	72.2	135	62.2	2.114	**0.035**
	Right answer	50	27.8	82	37.8		
TB affects all ages?	Wrong answer	149	82.8	138	63.6	4.341	**0.000**
	Right answer	31	17.2	79	36.4		
TB is one of the leading causes of mortality in India	Wrong answer	112	62.2	94	43.3	3.812	**0.000**
	Right answer	68	37.8	123	56.7		
TB is one of the leading causes of infertility	Wrong answer	129	71.7	128	59.0	2.649	**0.008**
	Right answer	51	28.3	89	41.0		
Malnutrition predisposes to TB	Wrong answer	43	23.9	33	15.2	2.197	**0.029**
	Right answer	137	76.1	184	84.8		
Diabetes increases the risk to develop TB disease	Wrong answer	93	51.7	83	38.2	2.697	**0.007**
	Right answer	87	48.3	134	61.8		
Smoking can increase the risk of developing TB	Wrong answer	40	22.2	30	13.8	2.193	**0.029**
	Right answer	140	77.8	187	86.2		
Who is at more risk of developing TB?	Wrong answer	121	67.2	145	66.8	0.085	0.933
	Right answer	59	32.8	72	33.2		
Does excessive alcohol consumption contribute to risk for getting tuberculosis?	Wrong answer	36	20.0	46	21.2	0.293	0.770
	Right answer	144	80.0	171	78.8		
TB can affect any other organs (bone, uterus) in the body	Wrong answer	109	60.6	90	41.5	3.846	**0.000**
	Right answer	71	39.4	127	58.5		
TB primarily affects which organ?	Wrong answer	39	21.7	28	12.9	2.331	**0.020**
	Right answer	141	78.3	189	87.1		
TB patient is vulnerable to other diseases such as …?	Wrong answer	93	51.7	92	42.4	1.847	0.066
	Right answer	87	48.3	125	57.6		
Specimen used to diagnose TB	Wrong answer	55	30.6	28	12.9	4.399	**0.000**
	Right answer	125	69.4	189	87.1		
Duration of TB treatment	Wrong answer	83	46.1	57	26.3	4.200	**0.000**
	Right answer	97	53.9	160	73.7		
Is there any vaccine related to TB?	Wrong answer	52	28.9	34	15.7	3.217	**0.001**
	Right answer	128	71.1	183	84.3		
Name the TB vaccine	Wrong answer	43	23.9	32	14.7	2.327	**0.020**
	Right answer	137	76.1	185	85.3		
TB once treated cannot reoccur.	Wrong answer	121	67.2	130	59.9	1.505	0.133
	Right answer	59	32.8	87	40.1		
TB drugs should be continued after symptoms subside	Wrong answer	106	58.9	98	45.2	2.743	**0.006**
	Right answer	74	41.1	119	54.8		
Failure to complete regimen can lead to more severe TB infection	Wrong answer	99	55.0	90	41.5	2.704	**0.007**
	Right answer	81	45.0	127	58.5		
What is common mode of transmission of TB?	Wrong answer	61	33.9	43	19.8	3.208	**0.001**
	Right answer	119	66.1	174	80.2		

TB, tuberculosis; N, number of participants.

Table 3. Attitude related to tuberculosis and adherence for DOTs treatment among patients (N=180) and caregivers (N=217).

Attitude related statements		Patient		Caregiver		Chi-square value	p-value
		N	%	N	%		
TB is a life-threatening disease.	Agree	150	83.3	154	71.0	8.387	**0.004**
	Disagree	30	16.7	63	29.0		
It is not possible to live a normal life with TB.	Agree	161	89.4	182	83.9	2.601	0.107
	Disagree	19	10.6	35	16.1		
Once a family member gets TB infection, it will spread to all family members.	Agree	96	53.3	129	59.4	1.498	0.221
	Disagree	84	46.7	88	40.6		
All TB patients are infectious.	Agree	115	63.9	126	58.1	1.399	0.237
	Disagree	65	36.1	91	41.9		
TB infection spreads through shaking hands, sharing food or bed.	Agree	104	57.8	111	51.2	1.740	0.187
	Disagree	76	42.2	106	48.8		
Diseases like TB and Cancer can only be cured by bathing in holy river.	Agree	115	63.9	133	61.3	0.283	0.595
	Disagree	65	36.1	84	38.7		
Staying with TB patient is very dangerous.	Agree	95	52.8	106	48.8	0.608	0.436
	Disagree	85	47.2	111	51.2		
Only poor people will suffer with TB	Agree	118	65.6	129	59.4	1.562	0.211
	Disagree	62	34.4	88	40.6		
TB infection can be transmitted to baby from breast milk if mother is suffering with it.	Agree	103	57.2	121	55.8	0.860	0.770
	Disagree	77	42.8	96	44.2		
TB would not affect non-smokers as it is a disease of the lungs.	Agree	99	55.0	100	46.1	3.129	0.077
	Disagree	81	45.0	117	53.9		
People who are having herbal KADHA or steam daily, TB will not affect their lungs.	Agree	100	55.6	119	54.8	0.20	0.886
	Disagree	80	44.4	98	45.2		
TB infection is not preventable.	Agree	117	65.0	131	60.4	0.900	0.343
	Disagree	63	35.0	86	39.6		
TB patient should not sleep in same room with family members.	Agree	103	57.2	125	57.6	0.006	0.939
	Disagree	77	42.8	92	42.4		
Disease like TB is the result of sin/ karmic retributions committed by a person.	Agree	180	100.0	217	100.0	----	----
	Disagree	----		----			

TB, tuberculosis; N, number of participants.

Table 4. Perceived barrier related to tuberculosis and adherence for DOTS treatment among patients (N=180).

Perceived barrier related statements		Patient	
		N	%
DOTS Centre is very far from my residence.	Agree	172	95.6
	Disagree	8	4.4
It is inconvenient to go to DOTS Centre for taking medicines regularly.	Agree	140	77.8
	Disagree	40	22.2
I have to take off from my work to get medicines from DOTS Centre.	Agree	165	91.7
	Disagree	15	8.3
I do not have enough money for traveling, staying in hotel and for food.	Agree	95	52.8
	Disagree	85	47.2
DOTS treatment is very costly and lifelong.	Agree	133	73.9
	Disagree	47	26.1
I have to take lots of medication in a day which is irritating.	Agree	115	63.9
	Disagree	65	36.1
Health professionals show lack of support and compassion to patients suffering from TB.	Agree	109	60.6
	Disagree	71	39.4
Society people will not allow me to come in social gatherings if I will go to DOTS Centre.	Agree	105	58.3
	Disagree	75	41.7
Neighbours will stigmatize me due to fear of transmission and misconception.	Agree	117	65.0
	Disagree	63	35.0
I may be asked to leave the rented room/ asked to take a leave from the job.	Agree	109	60.6
	Disagree	71	39.4
DOTS therapy is not going to treat tuberculosis completely as TB is incurable.	Agree	102	56.7
	Disagree	78	43.3

TB, tuberculosis; DOTS, directly observed treatment, short-course; N, number of participants.

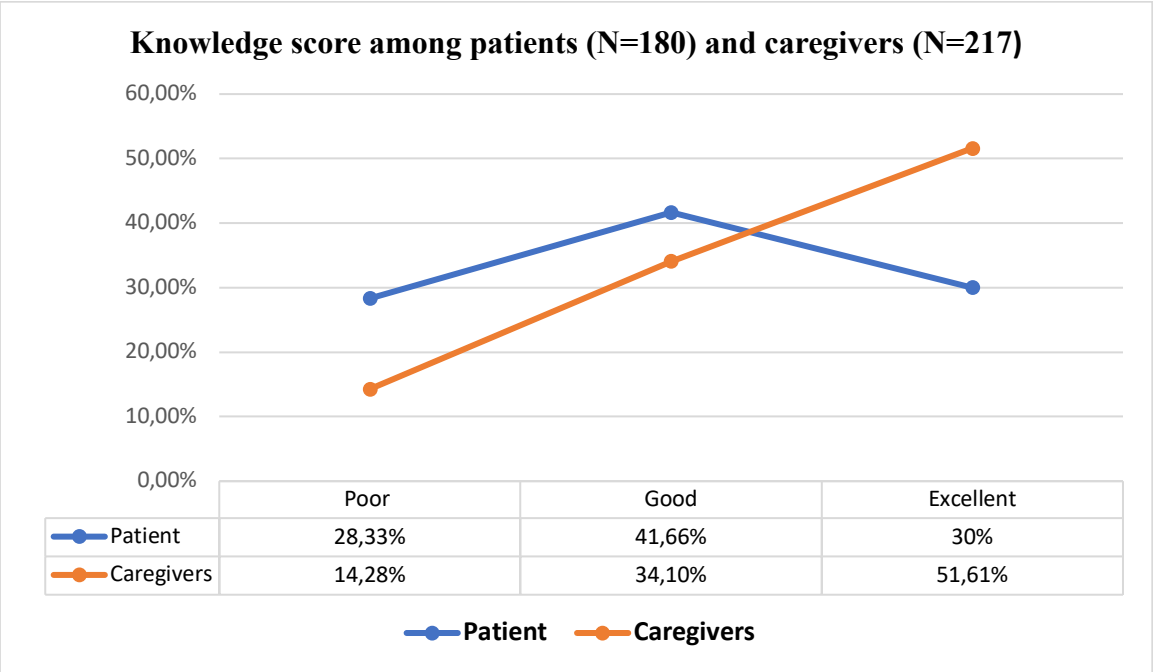

Figure 1. Knowledge regarding Tuberculosis among patients and caregivers.

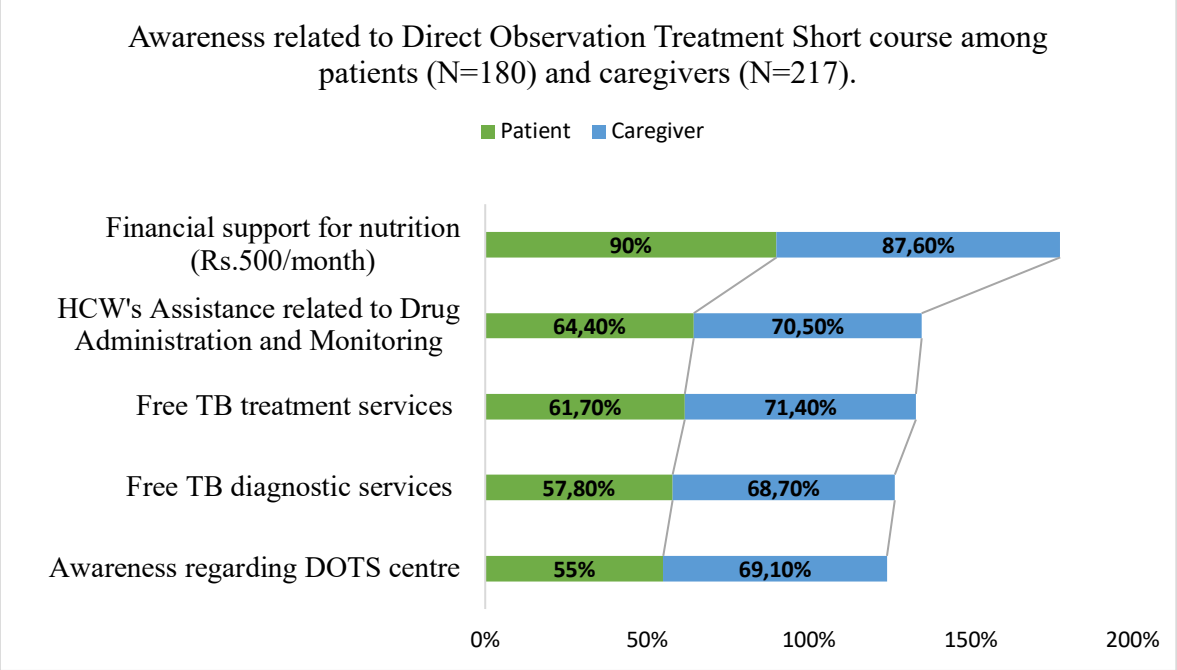

Figure 2. Awareness related to direct observation treatment short course.