Indian Journal of Nursing Sciences

International Peer Reviewed Journal

Original Article

A cross-sectional study to assess the factors influencing adherence to directly observed treatment short course among tuberculosis patients in Udupi district

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Abstract

Background: Tuberculosis (TB) is a major global health problem and continues to be endemic in certain parts of India. This study was conducted to find the sociodemographic factors and lifestyle-related factors influencing adherence to directly observed treatment short course (DOTS) and the side effects of antitubercular (ATT) drugs among TB patient on DOTS in Udupi district, Karnataka. **Materials and Methods:** A total of 158 TB-registered patients taking DOTS treatment in Udupi district were recruited using a convenience sampling technique. Morisky Medication Adherence Scale was adopted to assess the adherence level of treatment. **Results:** About 59.5% of the respondents were having adherence and 40.5% had no adherence to the treatment. Around 26% were alcoholic. Majority of them (86.7%) experienced at least one of the side effects of the ATT drugs. On multivariate analysis, primary education ($P = 0.047$), pre-university and above ($P = 0.025$), daily wage workers ($P = 0.013$), salaried persons ($P = 0.015$), and traveling cost ($P = 0.016$) were associated with DOTS adherence. However, predisposing factors such as addictions and the side effects of the ATT drugs did not show any significant association. **Conclusion:** The greater proportion of the TB patients was adhering to DOTS. Factors such as education, employment status, and traveling cost had a significant association with DOTS adherence. Factors such as discrimination and side effects of ATT were barriers to DOTS adherence.

Key words: Adherence, directly observed treatment short, tuberculosis patients

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Introduction

Tuberculosis (TB) is an infectious disease and is considered to be as a major global health problem.[1] The Southeast Asian region of the WHO contributes to 38% of the global incidence of TB. In 2013, there were around 3.4 million new TB cases and 440,000 deaths due to TB.[2] India accounts for nearly one-fourth of the global burden of TB every year. In 2013, the incidence of TB accounted to be around 2.2 million, with the prevalence of 2.8 million TB cases and 0.27 lakhs mortality due to TB.[3] The WHO recommended directly observed treatment short course (DOTS) strategy, which is a part of the Revised National TB Control Program in India in 1997 to address the problem of TB. DOTS comprises of five components, namely political commitment, diagnosis by quality microscopy, adequate supply of right drugs, directly observed treatment, and accountability.[3] The DOTS strategy includes treating TB patients with the standardized drugs, rifampicin, isoniazid, pyrazinamide, and ethambutol-based regimens of 6 months' duration for new TB cases and 8 months for retreatment cases with the addition of streptomycin.[4] Patient compliance is monitored by DOTS providers by ensuring that every dose of the medicines is consumed by the patients under their direct supervision. DOTS provider may be a health worker,

Access this article online	
Website:http://www.innovationalpublishers.com/Journal/ijns	e-ISSN: 2581-463X
DOI: https://doi.org/10.31690/ijns/31	

How to cite this article: Shylla B, Narayanan P, Rao PA. A cross-sectional study to assess the factors influencing adherence to directly observed treatment short course among tuberculosis patients in Udupi district. Indian Journal of Nursing Sciences 2019;4(1):19-23.

Anganwadi worker, Accredited Social Health Activist (ASHA) workers, community volunteers, teacher, private practitioners, etc., who are accessible, acceptable to the patient, and accountable to health system.[5] Non-adherence to TB treatment has been recognized as a major problem for cure of TB and is associated with various factors such as side effects of the medication, improvement and relief in TB symptoms, lack of awareness about TB, long distance to clinics, unsuitable clinic time and long waiting time, and substance use particularly alcohol and tobacco use.[6]

Very few studies have been conducted on adherence to DOTS among TB patients in Udupi district. The present study was planned with the aim to identify and understand the various factors that influence adherence among TB patients in Udupi district. Based on the findings of this study, recommendations may be provided for developing appropriate strategies, which could help reduce non-adherence among TB patients under the Revised National Tuberculosis Program (RNTCP) of Udupi district.

Material and Methods

A cross-sectional study was conducted in Udupi district, Karnataka, which includes three taluks, namely Udupi, Kundapura, and Karkala, between January 2016 and June 2016. A total of 158 TB patients who are registered under RNTCP and are receiving DOTS treatment in Udupi District were recruited for the study. Patients <18 years and extrapulmonary cases were excluded from the study.

A structured questionnaire was developed and validated by subject experts from the Departments of Public Health, Pulmonary Medicine, and Pharmacology. The questionnaire comprised four sections, namely sociodemographic characteristics, addictions/habits, adherence level, and side effect, to antitubercular (ATT) drugs. Morisky Medication Adherence Scale was adopted to assess the DOTS adherence among TB patients. The tool consisted of 8 items, which were scored as 0's and 1's. The highest possible total score is eight, and the lowest score was zero. According to this scale, adherence is classified as low (if total score>2), moderate (if total score was 1 or 2), and high adherence (if total score was 0).

The questionnaire is translated into local language, Kannada. A person who is fluent in both English and local language was hired as a translator for the purpose of data collection. Ethical approval was obtained from the institutional ethics committee. The permissions were gathered from the State TB Office, District Health Office, District TB Office, and Medical Officers of the respective Primary Health Centers and Community Health Centers. The interviews were held in the health centers or at their houses as per the convenience of the patients in the presence of RNTCP staffs (Senior Treatment Supervisor).

The quantitative data were analyzed using Statistical Package of the Social Sciences v 15.0. Continuous variables were expressed in mean and standard deviation, and the categorical variables were expressed in frequency and percentages. Logistic regression was performed to find the factors associated with adherence to DOTS. For qualitative analysis, themes were identified and analyzed manually. Qualitative in-depth interviews were conducted using a semi-structured interview guide with eight patients using purposive sampling method. While conducting quantitative interview, patients who were willing to share additional information were chosen for the qualitative interview. The participants were explained about the purpose of interview, and confidentiality was assured. The interviews were recorded whenever the participants were willing or were taken manually when permission was denied. Each in-depth interview took around 30 min.

Results

A total of 158 TB patients were enrolled in the study. Of the 158 respondents, 113 (71.5%) were males with the mean age of 47.77 (± 16.83) years. Most of the respondents were married (78.5%) and 89.2% followed Hindu religion. Almost half (50%) of the respondents were daily wage workers and having primary level of education (43.7%). The distribution of the respondents according to the availability of health services and accessibility to DOTS centers is shown in Table 1.

Table 1: Distribution of the respondents according to the availability of health services and accessibility to DOTS centers (*n*=158)

Variables	Frequency (%)
Time spend in DOTS center (h)	
<1	155 (98.1)
1–2	3 (1.9)
Supervision	
Family member	8 (5.1)
Health worker	143 (90.5)
Community member	7 (4.4)
Attitude of the staff	
Very friendly	134 (84.4)
Friendly	24 (15.2)
Availability of medicines	
Always available	158 (100)
Distance of travel (km)	
<5	113 (71.5)
5–10	27 (17.1)
11–15	13 (8.2)
16–20	5 (3.2)
Travelling cost (Rs)	
No cost	55 (34.8)
<10	12 (7.6)
10–15	9 (5.7)
>20	82 (51.9)

DOTS: Directly observed treatment short course

Of 158 respondents, 28 (18%) faced discrimination and 114 (72%) informed their family and friends about the TB treatment. Maximum 77 (48.7%) were on substance use, namely alcohol (25.9%), smoking (22.2%), and paan chewing (17.7%). Majority (86.7%) of respondents have experienced at least one of the side effects of the ATT drugs. Cough was the main side effect as reported by majority (60.1%) of the respondents, followed by orange-colored urine (50%) and tiredness feeling (46%) after taking the ATT drugs.

The level of adherence to DOTS according to the Morisky Medication Adherence Scale is shown in Table 2. It is noted that about three-fifth (59.5%) of respondents were having high adherence and one-fifth (21%) had low adherence to treatment.

Table 3 presents the logistic regression between DOTS adherence and the selected variables. Univariate analysis shows the crude odds ratio (OR) for 95% confidence interval (CI) for respondents with pre-university and above OR 7.74 (1.57–38.24), daily wage workers OR 0.25 (0.10–0.58), respondents staying in rent house OR 0.42 (0.22–0.82), those who were diagnosed with TB for 6–12 months OR 0.42 (0.22–0.82), smokers OR 2.39 (1.12–5.14), and traveling cost of <10 rupees OR 0.21 (0.50–0.78). On performing multivariate analysis, three factors were found to be statistically significant, namely educational status, employment status, and traveling cost to reach the nearest DOTS center with DOTS adherence. As compared to uneducated person, those with primary education (adjusted OR [AOR]: 2.46, 95% CI: 1.01–5.96, $P = 0.047$) and with pre-university and above (AOR: 9.57, 95% CI: 1.34–68.52, $P = 0.025$) were more adherent to DOTS. Daily wage workers (AOR: 0.29, 95% CI: 0.11–0.77, $P = 0.013$) and salaried persons (AOR: 0.19, 95% CI: 0.05–0.73, $P = 0.015$) were less adherent to DOTS as compared to those who are unemployed (housewives and students). Patients who spend on travelling (AOR: 0.16, 95% CI: 0.04–0.72, $P = 0.016$) were less likely to adhere to DOTS as compared to those who do not spend on traveling.

Table 2: Levels of adherence to DOTS of the respondents (*n*=158)

Types of adherence	Frequency (%)
High adherence	94 (59.50)
Medium adherence	31 (19.6)
Low adherence	33 (20.9)

DOTS: Directly observed treatment short course

In-depth interview results

Qualitative results highlighted that several factors were interplaying for patient adherence to DOTS treatment. The factors emerged during in-depth interviews with patients that influenced positively treatment adherence were mainly self-motivation, awareness about the disease, and accessibility to the DOTS center. Factors such as side effects of the ATT drugs and discrimination faced by the patients had a negative influence on the treatment adherence.

Self-motivation

During the interviews, all participants were self-motivated to take the drugs and to complete the treatment course.

"No one forces me to take medicine. I want to get cured" - Male patient/36 years.

Awareness about the disease and treatment

Majority of the participants believed that TB is curable disease and they should complete the full course of treatment.

Table 3: Multiple logistic regression between DOTS adherence and the selected variables (*n*=158)

Variables	Adherence *n*=94 (%)	Non-adherence *n*=64 (%)	Unadjusted OR (95% CI)	AOR (95% CI)
Educational status				
No education	21 (45.7)	25 (54.3)	1	1
Primary	44 (63.8)	25 (36.2)	2.10 (0.98–4.48)	2.46 (1.01–5.96)*
Secondary	16 (57.1)	12 (42.9)	1.59 (0.61–4.09)	2.11 (0.68–6.54)
Pre university and above	13 (86.7)	2 (13.3)	7.74 (1.57–38.24)*	9.57 (1.34–68.52)*
Occupation				
Unemployed	34 (79.1)	9 (20.9)	1	1
Daily wages	38 (48.1)	41 (51.9)	0.25 (0.10–0.58)*	0.289 (0.11–0.77)*
Self employed	7 (63.6)	4 (36.4)	0.46 (0.11–1.94)	0.27 (0.53–1.34)
Salaried	15 (60)	10 (40)	0.40 (0.13–1.18)	0.19 (0.05–0.73)*
Traveling cost				
No cost	39 (70.9)	16 (29.1)	1	1
<Rs. 10	4 (33.3)	8 (66.7)	0.21 (0.50–0.78)*	0.16 (0.034–0.72)*
Rs. 10–15	5 (55.6)	4 (44.4)	0.51 (0.12–2.16)	0.36 (0.07–1.92)
Rs. >20	46 (56.1)	36 (43.9)	0.52 (0.25–1.09)	0.49 (0.21–1.13)

*$P<0.05$=significant, DOTS: Directly observed treatment short course, AOR: Adjusted odds ratio, CI: Confidence interval

They have seen many other TB patients getting cured of TB by taking DOTS treatment and adhering to the treatment.

"Taking regular medicine is the only solution of getting cured from TB. I am not willing to leave the hospital without getting cured" - Male/30 years.

Accessibility to DOTS center

Of eight participants, seven participants said that they had easy accessibility to the DOTS center. According to them, the DOTS center is very close from their house. For some, health workers such as the ASHA workers go to their house to give the TB drugs. Since most of the DOTS center was close to their house, hence they do not have to spend their money and time in traveling. Most of the participants go by walking to the health center and it takes them approximately 15–20 min to reach the center.

"My house is close to the primary health care, so it is easy for me to come and collect the medicine" - Male/41 years.

Side effects of the ATT

Most of the participants experienced the adverse effect of ATT drugs. Seven of eight participants reported that they had nausea, vomiting, body ache, weakness, headache, giddiness, chest pain, cough, and burning sensation of hands and feet after taking ATT drugs. Six participants said that, after taking rifampicin, they experience orange color urine while urination. Two patients experienced neuropsychiatric manifestations such as hallucinations, self-smiling, and fear. Few participants reported that they do not feel like working after taking the ATT drugs.

"I don't feel like working after taking the medicines and it makes me weak and I get body ache, vomiting, headache and pain in the ribs" - Male/41 years.

Fear of stigmatization

Five of eight participants faced stigma during their treatment phase. As a result, they did not disclose their TB status to anyone apart from their own family members as they have the fear of being rejected by friends, neighbor, and relatives.

"If Asha worker comes to my house to give medicine to me, then everyone in the locality will suspect that i am having TB that is why I prefer to go on my own to the hospital to collect my medicine." - Male/29 years.

Discussion

The adherence to DOTS among the patients in Coastal Karnataka was 60%. Level of education of the patients had a positive association with adherence. However traveling cost and employment status of the patients hinders adherence to DOTS treatment. However, the adherence observed in this study is lesser than that found in the studies by Pandit and Choudhary[7] carried out in Anand district, Gujarat, India. Of 156 patients, 128 were adhering to treatment.

Patients with primary education and with pre-university and above were more adherent to DOTS as compared to those who are uneducated, which is supported by the study conducted by Xu *et al*.[8] where it was seen that illiteracy (OR: 2.42; 95% CI: 1.25–4.67) was associated with non-adherence to the treatment.

Daily wage workers and salaried persons were less likely to adhere to DOTS as compared to those who are unemployed (housewives and students), respectively. Similarly, in the study conducted by Paudel,[9] 50% of the housewives and students were adhering to the treatment. Patients who spend money for traveling to avail the treatment were less likely to adhere to DOTS as compared to those patients who do not spend on travelling. It is evident from the study conducted by Nezenega *et al*.[10] and Gopi *et al*.[11] that non-adherence to DOTS treatment is associated with difficulty in accessing to health center (57%).

It is also seen that, nearly, one-fourth of the patients were addicted to substances such as alcohol (25.9%) and smoking (22.2%). According to the study conducted by Thapa *et al*.[12] around 20.3% of the participants were alcoholic and in the study conducted by Dujaili *et al*.,[13] the prevalence of smoking was very high among TB patients (53.4%).There was no significant association between DOTS adherence and substance use in this study. This is in contrast with the study conducted by Roy *et al*.[14] where smoking and alcohol were associated with defaulting in the treatment.

It can be concluded that a greater proportion of the TB patients were adhering to DOTS. The study also highlights that there is a significant association between DOTS adherence and factors such as education, employment status, and traveling cost to reach the nearest DOTS center.

Based on the analysis of the results, this study has identified different factors that influence adherence DOTS treatment. In certain situation, initiatives should be taken to improve the adherence to DOTS among TB patients. Traveling incentives can be initiated for patients on DOTS and health education, and counseling must be given to all patients regarding the importance of DOTS compliance. This study is in contrast with the study conducted by Deshmukh *et al*.[15] at seven districts of Maharashtra where multiple factors influenced patient's decision to adhere to multidrug-resistant TB treatment.

Acknowledgment

The researchers are thankful to Dr. G. N. Rajani (DTO, Udupi district) for allowing us to conduct the study, state TB cell, Karnataka, for providing funds for the project. We also acknowledge Mr. Sandeep (STS, Udupi taluk), Mr. Hari Prasad (STS, Karkala taluk), and Mr. Gurudas

(STS, Kundapura taluk) for accompanying with us for every interview.

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