

RESEARCH ARTICLE

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Knowledge of Tuberculosis and Influencing Factors among New Pulmonary Tuberculosis Patients in Yemen

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Abstract

Background: Tuberculosis (TB) remains a serious cause of illness in Yemen. Knowledge is believed to be associated with patients' willingness to seek treatment and adherence to treatment. **Objectives:** To assess patients' knowledge of TB and identify possible influencing factors. **Methods:** A cross-sectional study was conducted for a period of three months (October to December, 2013) to assess knowledge of TB among new TB patients in five Yemini regions. Descriptive results were presented as frequencies and percentage. Kolmogorov-Smirnov test (K-S test) was used for normality test. Chi-square (X^2) testing and Kruskal-Wallis H test were used to describe differences between groups. Multiple linear regression was performed to identify factors influencing the knowledge. Multicollinearity was considered before performing multiple linear regression. SPSS version 18 (Chicago, IL) was used for data analysis. **Results:** A total of 450 patients with a mean age (\pm SD) of 32.7 (\pm 13.6) years (range 15–80 years) were interviewed; 59.3% of respondents were males, 64.4% of respondents reported receiving TB information from the health staff. Slightly more than half (55.6%) of the patients' were aware about the method of TB transmission. The majority (82.2%) of the respondents knew that TB is a curable disease. About two thirds (71.8%) of the tuberculosis patients were found to be aware about duration of treatment. About 271 (60.2%) of the respondents were categorized as having a good level of knowledge about TB. The median knowledge score was 4.0. Kruskal-Wallis H test showed significant differences in the medians between groups with regard to gender, age, education status, marital status, living status, stigma and receiving health education. However, multiple linear regression analysis showed that age, education status, stigma and receiving health education at health centers were the only factors that significantly influencing the knowledge. About 44% of the patients expressed fear of being known as tuberculosis patients in the community. **Conclusion:** The knowledge of TB and its treatment was generally moderate with a median score of 4. Majority of the patients knew that TB is a curable disease with regular treatment and recommended duration. This will psychologically encourage them to adhere to treatment instructions.

Key words: Tuberculosis, Knowledge, Health education, Yemen.

INTRODUCTION

Tuberculosis is a contagious disease caused by an organism called *Mycobacterium tuberculosis*. These organisms are also known as Tubercle Bacilli. Strikingly, about one third of the world's population is infected with *M. tuberculosis* and at risk of developing the disease. In the meantime, more than eight million people develop active tuberculosis every year. In 2011, nine million cases of tuberculosis were reported globally which is equivalent to 131 cases per 100000 population. The mortality of this disease is as high as two million people every year worldwide. Among all of tuberculosis mortality cases reported globally, 98% of the death incidences are reported from developing countries which represented 25% of all avoidable deaths. About 95% of global TB cases occurred in developing countries, 75% of cases are in the most economically productive age group (15-50 years old).^[1-3]

According to the Yemen NTCP guideline, the latest estimated incidence of all forms of new TB cases was 14,400 with a rate of 60 per 100000 population.

The estimated incidence rate of new smear positive PTB was 25 per 100000 population with estimated 6,000 new smear positive cases in 2011. During 2011, a total of 3,135 new smear positive PTB cases were reported to NTCP with a notification rate of 15 per 100000 population. The case detection rate (CDR) was 76%. All forms of notified TB cases were 8,636 TB cases. The CDR was 37%. The estimated prevalence of all forms of TB cases is 70 per 100000 population with 17000 estimated prevalent cases. There were about 1400 TB deaths in 2011, with mortality rate of 6 per 100000. A 73% of all notified new pulmonary smear positive cases are in the most productive age groups (15-49 years old).^[4] DOTS coverage reached 100% within Ministry of Health facilities in 2007. Treatment success rate increased from 50% before DOTS implementation to 86% for 2011. Tuberculosis case notification is declined steadily from 2000, the question of whether this decrease is true epidemiological or related to operational factors is not solved yet. However, the last survey conducted in 2009, showed that the incidence of new smear positive PTB is 25 per 100000 population.^[4]

In the literature, several different definitions of knowledge can be found. The Oxford English Dictionary (1999) defines knowledge as the “facts, feelings or experiences known by a person or a group of people”.^[6] Knowledge gives a person the ability to use information to guide the actions of the person in a manner that is appropriate to the situation. Knowledge of any disease is necessary and important in order to optimize the patients’ treatment and to improve their quality of life as well as to promote treatment adherence.^[6] Like other chronic illness, appropriate knowledge towards tuberculosis was significantly associated with positive healthcare seeking action.^[7] Lack of knowledge about the disease causes underutilization of the services, delay in seeking diagnosis and poor treatment adherence.^[8] Non-adherence to treatment often results from inadequate knowledge or understanding of the disease and its treatment.^[9-14] Literature indicates that TB control can significantly be enhanced if more concern is given to improve knowledge and attitudes towards disease.^[15]

To the best of our knowledge and through extensive literature review, no studies have been reported from Yemen focusing on knowledge of TB and its treatment. Therefore; the present study was designed to assess the knowledge towards TB among new pulmonary tuberculosis patients in DOTS programme in Yemen.

MATERIALS AND METHODS

Pretest

To assess content validity the first draft of the questionnaire was presented to a panel of three local experts in questionnaire design. Face validity of the questionnaire was tested by administering the questionnaire to 30 patients. Time taken to complete the questionnaire, difficulties in patient comprehension and the extent of patient acceptance were recorded. The questionnaire was administered to the same patients for reliability test. Cronbach’s alpha test of internal consistency was 0.79 for the six items used to assess the patients’ knowledge on tuberculosis.

Study design

A cross-sectional study was conducted for a period of three months (October to December, 2013) to assess knowledge on TB and its treatment among new TB patients as well as to identify possible influencing factors on the patients’ knowledge. The pre-tested questionnaire which included information about socio-demographic characteristics and knowledge about TB and its treatment was used. A total TB knowledge score was created by summing the scores for six questions. The score ranged from 0 to 6, with the higher the score, the greater the patient’s TB knowledge. Patients’ knowledge about TB was established based on the replies provided to the given questions by the patients throughout the interview.

Study area and population

The study was conducted at health centers where TB units exist throughout the 5 regions of Yemen. The study population was a cohort of pulmonary tuberculosis (PTB) patients registered for DOTS in each TB unit. The target population of the study was all positive TB patients receiving treatment under DOTS during the study period.

Data collection

The data were collected by face-to-face interviews using a pilot test questionnaire after obtaining informed consent from the participants. The questionnaire consisted of two sections. Section one dealt with patient background characteristics (sex, age, residence, educational status, marital

status, living status, stigma and education received in the health centre. Meanwhile, the section two estimated patients’ knowledge of tuberculosis through six basic questions. To avoid interviewer bias, the interviewers were not associated with the TB control health services. Interviews with participants took place in a private room at the target health centre to avoid response bias. All interviews were conducted by interviewers who were separately trained for this purpose.

Ethical issues and confidentiality

The research was approved by the Ethics Committee of Medical Research in the Ministry of Public Health and Population. Verbal consent was obtained from the patients.

Statistical analysis

Descriptive results were presented as frequencies and percentage. Kolmogorov-Smirnov test (K-S test) was used for normality test. Chi-square (X^2) testing and Kruskal-Wallis H test was used to describe median differences between groups. Multiple linear regression was performed to identify factors influencing the knowledge score. Multicollinearity was considered before performing multiple linear regression. To test reliability, the internal consistency was assessed using Cronbach’s alpha. The criterion for accepting Cronbach’s alpha was a score above 0.7 (Bland and Altman, 1997). Epi Data software (Version 3.1) was used to validate data entry. Valid data were exported to SPSS version 18 (Chicago, IL) for further analysis. Statistical significance set at $P < 0.05$.

RESULTS

The general characteristics of the patients are summarized in Table 1. Of the 450 patients interviewed, 297 (59.3%) were males. Age ranged from 15 to 80 years (mean 32.7 years, SD 13.6). Approximately 90% of the respondents were at their most economically productive age (15-54 years). About 35% of the patients were illiterates. Majority of the patients 440 (97.8%) were living with family or friends. About 64% of the study respondents reported receiving health education by the health staff. One hundred ninety six (43.6%) of the patients, expressed fear of being known as tuberculosis patients in the community.

Patients’ Knowledge of Tuberculosis

Slightly more than a half of respondents (55.6%) knew that TB is a transmitted through airborne droplet nuclei. Only 150 (33.3) reported that TB patients should not eat together with family. About 61% of the patients were aware that the family members need to be screened for tuberculosis. Majority of the patients (82.2%) reported that TB is a curable disease. When the study participants were asked about the curability of the disease with 4-week course, 72% of the respondents reported that TB cannot be cured. But when they were asked about the duration of TB treatment, only 59.3% reported that the treatment can’t be stopped once they were symptoms free and the treatment duration must be reached. Based on the response to the questions, 271 (60.2%) of the respondents were categorized as having good level of knowledge about TB. Table 2 showed the responses to TB knowledge questions among TB patients.

The median knowledge score among study participants was 4.0 ($IQR=3.0-5.0$). Kruskal-Wallis H test showed significant differences in the medians between groups and were as follow gender [$H(1)=4.4, p=0.04$], age [$H(4)=26.2, p<0.001$], education status [$H(1)=65.8, p<0.001$], marital status [$H(3)=16.5, p=0.001$], living status [$H(1)=4.3, p=0.04$], stigma [$H(1)=27.7, p<0.001$] and receiving health education [$H(1)=18.9, p<0.001$]. Table 3 summarized the

Table 1: Socio-demographic characteristics of the patients (n = 450).

Variable	n (%)
Gender	
Male	267 (59.3)
Female	183 (40.7)
Age	
15-24	158 (35.1)
25-34	115 (25.6)
35-44	93 (20.7)
45-54	39 (8.7)
55 and more	45 (10.0)
Region	
North	45 (10.0)
East	45 (10.0)
Middle	68 (15.0)
West	112 (25.0)
South	180 (40.0)
Education Status	
Educated	293 (65.1)
Illiterate	157 (34.9)
Marital Status	
Single	166 (36.9)
Married	265 (58.9)
Divorced	6 (1.3)
Widowed	13 (2.9)
Living Status	
With family/friends	440 (97.8)
Alone	10 (2.2)
Stigma	
Yes	231 (51.3)
No	219 (48.7)
Health Education	
Yes	290 (64.4)
No	160 (35.6)

association of the sociodemographic characteristics of the participants with their knowledge about TB.

Factors influencing patient' knowledge

Multiple linear regression analysis was used to study the effect of factors on TB knowledge. The analysis showed that age ($p=0.05$), education status ($p<0.001$), stigma ($p<0.001$) and health education at health centre ($p=0.001$) were the only factors that significantly influencing the knowledge score. Knowledge score was not influenced by patients' gender, marital status, living status and place of residence.

DISCUSSION

The present study examined knowledge of TB in 450 TB patients who participated in our survey. The study is first of its kind in Yemen. Based on the response to the questions, 271 (60.2%) of the respondents were categorized as having a good level of knowledge about TB. However, contrary to our findings, only 36.5% of respondents in Ethiopian study^[16] were categorized as having good knowledge about TB. While discussing the rout of transmission

Table 2: Responses to TB knowledge questions among 450 TB patients.

Response to questions	n (%)
How is tuberculosis transmitted?	
Droplet	250 (55.6)
Eating utensils	154 (34.2)
Don't know	46 (10.2)
Would you eat together with family?	
Yes	272 (60.4)
No	150 (33.3)
Unsure	28 (6.2)
Do family members need to be screened for tuberculosis?	
Yes	275 (61.1)
No	106 (23.6)
Unsure	69 (15.3)
Is tuberculosis curable with proper treatment?	
Yes	370 (82.2)
No	43 (9.6)
Unsure	37 (8.2)
Can tuberculosis be cured with a 4-week course?	
Yes	81 (18.0)
No	323 (71.8)
Unsure	46 (10.2)
Can treatment be stopped once you are symptom free even though the prescribed treatment duration has not been reached?	
Yes	143 (31.8)
No	267 (59.3)
Unsure	40 (8.9)

of TB, 55.6% of the respondents in the current study declared that TB is transmitted by droplets, these findings are consistent with earlier studies reported in literature.^[17-22] However, contrary to our findings, respondents from other studies^[23-27] reported poor knowledge about the transmission of TB. When the study participants were asked about eating together with family, 60% of respondents have a positive response; these findings were not in agreement with Malaysian study^[23] where only 40% of respondents have positive response. Regarding the family members if they need to be screened for tuberculosis, about 61% have a positive response towards a necessity of screening, this was consistent with Malaysian study.^[23]

Most of the respondents were aware that TB is a highly infectious but curable disease. Majority of the patients (82.2%) in our study reported that TB is a curable disease; these findings are consistent with earlier studies reported in literature.^[16-17, 20-21, 23-24, 27] When the study participants were asked about the curability of the disease with 4-week course, 72% of the respondents reported that TB cannot be cured; these findings are consistent with earlier studies reported in literature.^[16,20,23] On the other hand, when the patients were asked about the duration and a possibility of stopping treatment once they were symptoms free, 71.8% reported that the treatment cannot be stopped within 4 weeks or once the patient was symptoms free and the treatment duration must be reached. This finding was supported by other studies.^[17,19,20-21,23] However, these finding were not in line with other studies reported in literature.^[24,27,28]

Our study findings showed a significant difference in median scores for gender, age, education, marital, living status, stigma and health education.

Table 3: Overall knowledge score (0–6) by gender, age group, education status, marital status, living status, stigma and having received health education by health staff among 450 PTB patients.

Patient's characteristic	Interviewed n (%)	Knowledge score Mean rank	Chi-Square	P value*
Gender				
Male	276 (59.3)	236.0	4.4	0.04
Female	183 (40.7)	210.2		
Age group			26.2	<0.001
15-24	158 (35.1)	248.9		
25-34	115 (25.6)	249.0		
35-44	93 (20.7)	204.1		
45-54	39 (8.7)	178.4		
55- and more	45 (10.0)	168.5		
Education Status			65.8	<0.001
Educated	293 (65.1)	261.2		
Illiterate	157 (34.9)	158.9		
Marital Status			16.5	0.001
Single	166 (36.9)	249.6		
Married	265 (58.9)	216.0		
Divorced	6 (1.3)	209.9		
Widowed	13 (2.9)	119.0		
Living Status			4.3	0.04
With family/friend	440 (97.8)	227.4		
Alone	10 (2.2)	143.2		
Stigma			27.7	<0.001
Yes	219 (48.7)	258.0		
No	231 (51.3)	194.7		
Health Education			18.9	<0.001
Yes	290 (64.4)	244.9		
No	160 (35.6)	190.4		

P value* is based on a comparison of two or several medians using Kruskal-Wallis H test.

From the current study, educated respondents had better Knowledge of TB. Several other studies^[7,17,19,29-31] also showed similar relationship between level of education and TB knowledge. Findings from current study also revealed that patients' knowledge is associated with gender and age, these findings are in line with some studies.^[19,30-32] However, contrary to our findings, other studies^[17,29] reported no association between patients' knowledge of TB and mentioned demographic factors (age and gender).

It was surprising to find that majority of the patients in south region (the highest educated region throughout the country) and those who had received health education in TB centers had knowledge scores below the overall median. However, this could be attributed to the political situation in the country and ongoing civil war.

CONCLUSION

The knowledge of TB and its treatment was generally moderate; it was strongly associated with level of education followed by age and place of residence however not by health education. Therefore, the health education that is giving to patients should be improved. Patients with limited access to media and low education levels may benefit from specially targeted educational interventions. To reduce stigma and the impact of social consequences of TB, an ongoing health education programme designed to increase the knowledge level in the whole population is recommended.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

MSA contributed to the design of the study, coordinated the inclusion and data acquisition, acquired and analyzed data and wrote the article, was responsible for the conduct of the study.

SA, SOA, MA, KS contributed to the conception of the study and design and have been involved in revising the article critically for important intellectual content. **AHA** contributed to the acquisition of data and coordinated for the study.

All authors read and approved the final version of the manuscript.

ABBREVIATIONS

TB: Tuberculosis; **PTB:** Pulmonary tuberculosis; **NTCP:** National TB control programme; **CDR:** Case detection rate; **DOTs:** Directly Observed Treatment, Short-course; **IQR:** Interquartile range; **WHO:** World Health Organization.

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