

Original Research Article

Assessment of patients' knowledge of tuberculosis and its impact on self-management ability

Ameen M Almohammadi*, Dina S Qurashi, Ghaydaa A Abuouf

Department of Pharmacy Practice, Faculty of Pharmacy, King Abdulaziz University, Jeddah, Saudi Arabia

*For correspondence: **Email:** amalmohammadi@kau.edu.sa; **Tel:** +966-504378234

Sent for review: 24 April 2019

Revised accepted: 16 October 2019

Abstract

Purpose: To assess the knowledge of patients of tuberculosis (TB) and its relationship with patients' self-management in Saudi Arabia.

Methods: The study is based a prospective cross-sectional design. It included a sample of 176 cases with an active or latent diagnosis of TB. A survey was conducted in some hospitals, including King Abdul-Aziz University from November 2016 to January 2017. The collected data were statistically analyzed.

Results: The survey showed that 70 % of the patients had inadequate information on TB and its treatment, while only 4 % showed awareness of the prevalence of TB. Moreover, a significant correlation was found between the educational level of patients and their knowledge of TB. Patients' educational level substantially contributed to their understanding of health education.

Conclusion: The findings suggest that active educational campaigns need to be initiated to enhance the patients' awareness and knowledge of TB.

Keywords: Tuberculosis, Patient's TB knowledge awareness, Patient self-management, Educational campaign

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

Tropical Journal of Pharmaceutical Research is indexed by Science Citation Index (SciSearch), Scopus, International Pharmaceutical Abstract, Chemical Abstracts, Embase, Index Copernicus, EBSCO, African Index Medicus, JournalSeek, Journal Citation Reports/Science Edition, Directory of Open Access Journals (DOAJ), African Journal Online, Bioline International, Open-J-Gate and Pharmacy Abstracts

INTRODUCTION

Tuberculosis (TB) is recognized as the major health concern across the world, particularly in the Kingdom of Saudi Arabia. World Health Organization (WHO) reported that TB affected 8.7 million patients and caused the lives of one million people in 2011 [1]. Various studies have reported the prevalence of TB infection varies across the regions in Saudi Arabia [2,3]. For example, there is a major difference in the prevalence of TB infection in Jeddah and Riyadh. It has been known that the influx of pilgrims is

one of the major root causes of this significant issue [4]. The intensity of this issue further increased given the diversity of the pilgrims; such as 9 million expatriates in South and South East Asia are from endemic regions; whereas, 3 million pilgrims yearly perform Umrah and Hajj in the holy cities of the Kingdom [2,3].

According to the Ministry of Health in Saudi Arabia, the rate of TB infection continues to increase despite the aggressive governmental efforts. For instance, the WHO reported 4590 new cases in Saudi Arabia during 2011, among

which, 1080 HIV-negative cases died [4, 5]. Developing resistance against TB is more costly in Saudi Arabia than that of providing treatment. Four to five first-line drugs, including rifampicin, pyrazinamide, streptomycin, ethambutol, and isoniazid, are used for anti-tuberculosis therapy [6].

Developing new drugs to cure TB related challenges is a dilemma faced by both developed and developing countries. Researchers are investigating new compounds which can help reduce the overall treatment time to cure TB, providing valuable insights on the TB transmission, diagnosis, and treatment [7]. However, despite these efforts, TB persists as a prime cause of several deaths annually all over the world; therefore, effective solutions are required by the health care facilities to accommodate a large number of patients for their treatment [8]. Thereby, the study aims to assess the level of knowledge among patients related to TB and its influence on patient's self-management ability.

METHODS

Study design

A prospective cross-sectional survey was performed at the TB center and hospitals in Makkah from the start of November 2016 to the end of January 2017.

Study participants

The study included 179 TB patients (both male and female) that were diagnosed with TB active or latent and were older than 17 years. In addition, the researcher obtained a signed consent form before recruiting them in the study.

Ethical approval

Ethical clearance was obtained from the ethics committee of King Abdul-Aziz University (approval no. D- 222-166-1439). This study adhered to the international guidelines for human studies [9].

Data collection

Data about patient's demographics, knowledge, and self-management ability were collected through a structured interview by trained research assistants using the designed TB Questionnaire. The questionnaire was specifically designed to help the interviewer research assistants in recording the same

information and items. In addition to the demographic part, patients were interviewed in two parts' questionnaire. The first part consisted of items which assessed the patients' level of knowledge about their disease and treatment. Responses were assessed using a Likert scale ranging from 1 'patients had no knowledge' to 4 'they had adequate knowledge.' The second part included items that assessed the attitude of patients 'and their families' along with their self-management ability, using options yes or no to the specific items.

Data analysis

The collected data were coded, entered, and analyzed using SPSS version 22. Direct descriptive statistics were applied to the collected data. Besides, nonparametric analysis tests, including Mann-Whitney and Kruskal-Wallis, were applied to find the knowledge difference between patients, while Spearman's Correlation test was used to determine the associations with significance levels at $p < 0.05$.

RESULTS

A total of 179 patients were invited to participate in the study, three of which refused. Out of 176 cases, 113 (64.2 %) were male, and 63 (35.8 %) were female. Three patients were diagnosed with latent TB; while, the rest were active (98.3 %). Also, 22 (12.5 %) patients had resistant TB, and 154 (87.5 %) were non-resistant TB patients (Table 1).

The findings in Figure 1 indicate that 70 % of participants had no disease and treatment knowledge, 27 % had low knowledge, and 0.6 % had adequate knowledge.

Table 2 illustrates the patients' response to the knowledge items. Patients with higher education level achieved a higher mean score for their knowledge level ($P < 0.001$), as compared to those with a lower level of education.

Resistant TB patients also possessed higher knowledge, as compared to those with non-resistant TB patients ($p = 0.013$). The percentage of resistance patients was 12.5%. Other (54.5 %) were living away from their health care center. Lower scores in knowledge were reported among older patients, as compared to younger patients ($p = 0.015$). In Jeddah city, the significantly higher total score of knowledge was reported ($p = 0.001$), as compared to those treated in institutions located in Makkah and Taif.

Table 1: Patients' demographics

Variable	N	(%)	Variable	n	(%)
Hospital			Education level		
KAHJ	58	33	Illiterate	49	27.8
CDH	56	31.8	Elementary	42	23.9
KAHM	50	28.4	Intermediate	47	26.7
KAUH	12	6.8	High school	31	17.6
Age (years)			University	7	4
17-40	114	64.8	Co-morbidity		
41-64	50	28.4	None	118	67
65-82	12	6.7	More than one disease	18	10.2
Gender			DM	15	8.5
Male	113	64.2	Anemic	10	5.7
Female	63	35.8	HTN	8	4.5
Nationality			CV	5	2.8
Saudi	93	52.8	Asthma	2	1.1
Non-Saudi	83	47.2	Organ infected		
Income, monthly (US\$)			Lung	161	91.5
<\$266.5	177	63.1	Esophagus	9	5.1
\$266.8-\$799.7	48	27.3	None	3	1.7
\$799.9-\$1599.5	11	6.3	Spinal	2	1.1
\$1599.7-\$2399.1	3	1.7	Bone	1	0.6
>\$2399.1	3	1.7	Resistance		
Diagnosis			TB resistance	22	12.5
Active	173	98.3	Non-resistance	154	87.5
Latent	3	1.7			

Note: KAHJ = King Abdulaziz Hospital Jeddah; KAHM = King Abdulaziz Hospital, Makkah; KAUH = King Abdulaziz University Hospital

Table 2: Patients' responses to questions about their knowledge of TB

Knowledge part	Correct response (%)	Incorrect response (%)
Causative microbe	4	96
Transmission	22.2	77.8
Prophylaxis	11.4	88.6
Symptoms	21	79
Knowing about their diagnosis	13.1	86.9
Medication	4.5	95.5
Treatment and its duration	1.7	98.3

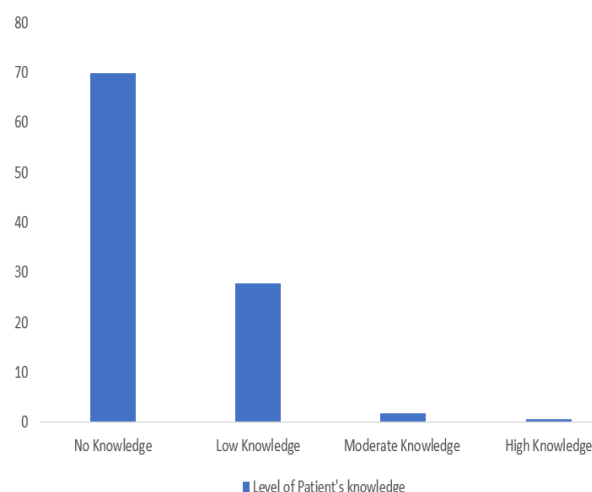


Figure 1: Total mean score of patient's knowledge

The findings reveal that 109 (62%) patient's families had prophylaxis; while, 67 (38%) patients' family did not have any prophylaxis or even checkup after their family member was

diagnosed with TB. Most of the patients 162 (92 %) replied that they get full family support, while 14 (8%) did not have any family support. Regarding current smoking status, 77 (43.8 %) patients were reported as smokers, whereas, 34 (19 %) patients were hookah smokers. Unfortunately, 16 (9 %) patients were consuming Marijuana (Cannabis), while 160 (90.9 %) were drug-free.

In their early coping with the symptoms of the TB, 11 (6.3 %) patients tried traditional therapy as honey, olive leaf, guava leaf, lemon leaf, barley sugar, ginseng tea, nigella, and liquorice to reduce the chest pain, cough, and fever before seeking medical help, while 165 (93.8 %) patients headed directly to the hospital. After patients were placed on therapy, 120 (68.2 %) of them reported no adverse effect. Commonly reported adverse effects were vomiting, nausea, cough, and difficulty swallowing (Table 3 and Table 4).

Table 3: Patients behavior and self-management ability

Variable	N	(%)
Family prophylaxis		
Yes	109	61.9
No	67	38.1
Family support		
Yes	162	92
No	14	8
Hookah		
Yes	34	19.3
No	142	80.7
Smoking		
Yes	77	43.8
No	99	56.3
Drug abuse		
Yes	16	9.1
No	160	90.9
Traditional medicine		
Yes	11	6.3
No	165	93.8
Food Shortage		
Yes	64	36.4
No	112	63.6

Table 4: Side-effects reported by patients

Variable	N	(%)
None	120	68.2
More than one side effect	19	10.8
Difficulty Swallowing	16	9.1
Vomiting	9	5.1
Nausea	7	4
Cough	3	1.7
Buzz in ears	2	1.1

DISCUSSION

The results showed that the majority of the interviewed patients lacked the necessary information about TB disease and its treatment. Such as only a few patients in this study showed some knowledge about the causative agent of TB. These results corroborated with the study conducted in Sudan [10]. Data from this study showed that there was a significant relationship between education level and patients' knowledge about the TB and ways to deal it, which is in-line with the study results of Hoa, Diwan, and Co [11].

The present study findings are also supported by Gebreweld *et al* [12], who examined the patients' knowledge of Tuberculosis. Results of the study indicated that the patients were unaware of the overall treatment measures, which hinder its successful treatment. It further provided that a lack of knowledge regarding tuberculosis disease resulted in its late diagnosis. Besides, a significant relationship was found between the distance of patients' home from the health care

center and the resistance development. This result may be due to location status that enabled patients' direct access to the healthcare center for treatment purposes. The delay in drug delivery to patients leads to noncompliance in medication use or irregularity in their medication schedule [13].

Also, most of the studies reported major side effects after treatment that were in the form of increased tests of liver functioning, itching, skin reactions [14]. Another study indicated that vomiting, lack of appetite, body pain, and discoloration of urine were the major side effects reported by patients [15]. Tuberculosis affects the lives of the patients, as well as the patients' family and caretakers. To overcome this, actions similar in India can be adopted, which recorded that only 24 % of the 9 million cases in the years 2013. This occurred as an outcome of the Revised National TB Control Programmed (RNTCP) developed after the global emergency regarding TB declared in the year 1993. However, recent research concluded that non-compliance related to the treatment of TB is due to the priorities and needs of the patients [16]. New mechanisms are required for patient-centered care, which enables the patients to cope with the disease efficiently.

The possibility of the occurrence of TB is high in the population, such as homeless people, HIV patients, prisoners, and those who use drugs and alcohol. This particular population is more likely to be attacked by the causative organism of TB. In the 1980s, the TB related services were reduced to a minimum due to the non-occurrence of this disease among the UK population. The patients suffering from TB are likely to assess and recognize their symptoms than consult with a health care specialist. Craig, Joly, and Zumla [17] evaluated the levels of awareness among patients with Tuberculosis. The results showed that participants possessed some knowledge and awareness regarding TB; however, the personal risk associated with it was not found among them.

The results of the study by Mohamud [18] are consistent with the present study finding. Mohamuds' study was conducted in Kenya, and a knowledge gap was found regarding the awareness of TB, its symptoms, and its treatment. Electronic media was found to be a major source of raising awareness among the mass population regarding the occurrence of TB. Moreover, adequate knowledge was not found among patients of TB in Kenya. Thus, education, religion, nationality, and occupation were found to be the major factors which influenced the

attitude, practice, and knowledge of TB prevention behavior among the patients.

Health education plays an important role in encouraging and empowering the patients of TB. Similar findings were reported by Kigozi *et al* [19] who assessed the knowledge and awareness of the patients suffering from TB, in South Africa. The study showed that health care education was lacking among the patients; therefore, there was a need to emphasize on strengthening health care education in South Africa. The dissemination of information in primary health care facilities resulted in increased infection control practices. The results of this study are consistent with previous studies in the context of knowledge and treatment gap [20,21].

Limitations of the study

The main limitation of the study was the small sample size that was selected for assessing the knowledge and patient's self-management ability related to tuberculosis. Furthermore, the study did not particularly focus on patients living in rural areas and the impact of this disease on their personal and professional life. The role of physicians in disseminating knowledge regarding TB was also not assessed in the study. These limitations can be used by future studies to expand the research area further.

CONCLUSION

The study affords important information on the association between patients' knowledge of TB and their self-management ability. Good TB knowledge is important for early diagnosis and for attaining successful treatment outcomes. TB control may be achieved by imparting useful knowledge to patients on causes, symptoms, and treatment processes. The findings of this study are helpful and can be applied in various hospitals of Saudi Arabia.

DECLARATIONS

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgment

The Deanship of Scientific Research (DSR) supported this work, King Abdul-Aziz, University, Jeddah (grant no. D- 222-166-1439). The

authors, therefore, gratefully acknowledge DSR technical and financial support.

Conflict of interest

No conflict of interest is associated with this work.

Contribution of authors

We 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 the authors.

Open Access

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

REFERENCES

1. Tuberculosis profile. 2011. WHO. Retrieved from: www.who.int/tb/data.
2. Central department of static & information. 2013. Retrieved from: <http://www.cdsi.gov.sa/index.php>
3. Wilder-Smith A, Foo W, Earnest A, Paton NI. Paton. High risk of Mycobacterium tuberculosis infection during the Hajj pilgrimage. *Trop Med Int Health* 2005; 10: 336-339. Doi: 10.1111/j.1365-3156.2005.01395.x
4. Al-Hajj SA. Tuberculosis in Saudi Arabia: Can we change the way we deal with the disease? *J Infect Public Health* 2010; 3: 17-24. Doi: 10.1016/j.jiph.2009.12.001
5. Al-Hajj S. Tuberculosis in Saudi Arabia, Understanding Tuberculosis - Global Experiences and Innovative Approaches to the Diagnosis, Dr. Pere-Joan Cardona (Ed.) 2012, ISBN: 978-953-307-938-7, InTech. Doi: 10.5772/30369
6. Al-Hajj SA, Zozio T, Al-Rabiah F, Mohammad V, Al-Nasser M, Sola C, Rastogi N. First Insight into the Population Structure of Mycobacterium tuberculosis in Saudi Arabia. *J Clin Microbiol* 2007; 45: 2467-2473.
7. Wallis RS, Maeurer M, Mwaba P, Chakaya J, Rustomjee R, Migliori GB, Marais B, Schito M, Churchyard G, Swaminathan S, Hoelscher M. Tuberculosis—advances in development of new drugs, treatment regimens, host-directed therapies, and biomarkers. *The Lancet infectious diseases* 2016; 16: 34-46.

8. Fogel N. Tuberculosis: a disease without boundaries. *Tuberculosis* 2015; 95: 527-531.
9. *International Ethical Guidelines for Health-related Research Involving Humans*. Prepared by the Council for International Organizations of Medical Sciences (CIOMS) in collaboration with the World Health Organization (WHO). 2016.
10. Mohamed AI, Yousif MA, Ottoa P, Bayoumi A. Knowledge of tuberculosis: a survey among tuberculosis patients in Omdurman, Sudan. *Sudanese J Public Health* 2007; 2: 22.
11. Hoa NP, Diwan VK, Co NV, Thorson AE. Knowledge about tuberculosis and its treatment among new pulmonary TB patients in the north and central regions of Vietnam. *The Int J Tuberculosis Lung Dis* 2004; 8: 603-608.
12. Gebreweld FH, Kifle MM, Gebremicheal FE, Simel LL, Gezae MM, Ghebreyesus SS, Mengsteab YT, Wahd NG. Factors influencing adherence to tuberculosis treatment in Asmara, Eritrea: a qualitative study. *JHPN*. 2018 Dec; 37(1): 1. Doi: <https://doi.org/10.1186/s41043-017-0132-y>
13. DiPiro JT. *Pharmacotherapy: a pathophysiologic approach*. 7th ed. New York: McGraw-Hill Medical; 2008.
14. El Din MA, El Maraghy AA, Hay AH. Adverse reactions among patients being treated for multi-drug resistant tuberculosis at Abbassia Chest Hospital. *Egypt J Chest Dis Tuberc*. 2015 Oct 1; 64(4) :939-952.
15. Boru CG, Shimels T, Bilal AI. Factors contributing to non-adherence with treatment among TB patients in Sodo Woreda, Gurage Zone, Southern Ethiopia: A qualitative study. *JIPH*. 2017 Sep 1; 10(5): 527-533.
16. Yellappa V, Lefèvre P, Battaglioli T, Devadasan N, Van der Stuyft P. Patients pathways to tuberculosis diagnosis and treatment in a fragmented health system: a qualitative study from a south Indian district. *BMC public health* 2017; 17: 635.
17. Craig GM, Joly LM, Zumla A. 'Complex 'but coping: the experience of symptoms of tuberculosis and health care seeking behaviors-a qualitative interview study of urban risk groups, London, UK. *BMC public health* 2014; 14: 618. Doi: 10.1186/1471-2458-14-618
18. Mohamud F. Assessment of prevention behavioral practices among adult tuberculosis patients in Eastleigh division, Nairobi County, Kenya (Doctoral dissertation).
19. Kigozi NG, Heunis JC, Engelbrecht MC, van Rensburg AP, van Rensburg HD. Tuberculosis knowledge, attitudes, and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. *BMC public health* 2017; 17: 795.
20. Tola HH, Shojaeizadeh D, Tol A, Garmaroudi G, Yekaninejad MS, Kebede A, Ejeta LT, Kassa D, Klinkenberg E. Psychological and educational intervention to improve tuberculosis treatment adherence in Ethiopia based on health belief model: a cluster randomized control trial. *PLoS One* 2016; 11: e0155147. Doi: 10.1371/journal.pone.0155147
21. Kiros YK, Teklu T, Desalegn F, Tesfay M, Klinkenberg E, Mulugeta A. Adherence to anti-tuberculosis treatment in Tigray, Northern Ethiopia. *Public health action* 2014; 4: S31-S36.