Libyan Journal of Medical Research

www.ljmr.ly/ eISSN:2413-6096

Original Article

Assessment of knowledge about tuberculosis among nurses in Misurata, Libya

Muftah A. Elbahloul [1], Khadija A.Amer[2], Hussien A. Elaswdi[3], Abdallah R Elgenaidi [4] Osama H. Almajdoub[5].

1. Department of community and family medicine, Faculty of Medicine, Misurata University, Libya
2. General nursing department, faculty of health sciences, Misurata University. Libya
3. Department of community and family medicine, Faculty of Medicine, Misurata University, Libya
4. Department of medical genetics ,faclty of health scienes, Misurata University.libya
5. Libyan medical research center. libya

Corresponded author: Muftah Abdulssalam Elbahloul.e-mail: muftah@med.misuratau.edu.ly

Received: 02/02/2025 | Accepted: 25/02/2025 | Published: 02/03/25| DOI: https://doi.org10 54361/LJMR.19.1.17

ABSTRACT

Background: Nurses make up by far the largest group of healthcare workers in any part of the world and have an important role to play in the direct management of tuberculosis (TB) patients and consequently face a high risk of infection. The **aim** of this study was to assess the knowledge about TB disease among nurses in Misurata, Libya.

Methodology: The study was conducted among 396 nurses working in two public hospitals and five district primary healthcare centres in the province of Misurata, Libya. A validated self-administered questionnaire was used to investigate the nurses' level of knowledge on TB.

Results: Out of the participants, 152 (38.4%) were male and 244 (61.6%) were female. The majority of the participants were in the 26–40 years age group. The results revealed that the overall level of knowledge about the TB disease was poor as only one-fifth (21%) of the nurses gave the correct responses regarding TB symptoms, transmission, risk factors, diagnosis and treatment. The level of knowledge about the prevention of TB was significantly higher among nurses who held a bachelor degree compared to others (p = 0.007). **Conclusion*:*** Most of the nurses who participated in this study were lacking in knowledge on TB. Active educational interventions, such as regular TB awareness programmes in hospitals, are required to improve knowledge about TB. Also, the nursing programme curriculum should be revised and updated in Libya to better prepare nurses to deal with incidences of TB.

Keywords: *tuberculosis; assessment; knowledge; nurses; Libya*

How to cite this article: Elbahloul .M.Ab, Amer.K.A, Elaswdi .H. A, Alghennai S.M.· Almajdoub·O.H : Assessment of knowledge about tuberculosis among nurses in Misurata, Libya

Libya: 2025:19.1

INTRODUCTION:

Tuberculosis (TB) is a major health problem and a leading killer among the infectious diseases that threaten the health and well-being of people globally. Indeed, TB has reached epidemic proportions in many developing countries. In 2011, the World Health Organisation (WHO) recorded an estimated 8.7 million TB incident cases (range 8.3–9.0 million) and also estimated that worldwide eight million new cases of TB are reported annually, of which two to three million cases result in death [1].

The Libyan national TB programme has adopted the directly observed treatment short-course (DOTS) strategy since 1998 and in 2000 the strategy covered all governorates in the country. In 2008, 871 cases (621 nationals and 250 expatriates) were notified by public facilities working under the DOTS strategy. The success rate of the DOTS treatment was 63.5% in 2007. In Libya, a total 1498 new cases of TB were reported in 2011[2].

Healthcare workers (HCWs) are at high risk of TB infection because of their frequent exposure to patients with the disease, either diagnosed or undiagnosed. The global upsurge in the incidence of TB that is being powered by the HIV pandemic, increase in the prevalence of multidrug-resistant TB, and poor hospital infection control practices have all combined to make the condition a serious occupational hazard for HCWs worldwide [3]. Nurses were the first occupational group among the HCWs who were identified as being at increased risk of contracting a range of infections and diseases, and particularly TB. This is not surprising in view of the prolonged and often close contact between hospital nurses and patients [1].

Previous studies indicate that the main factors that influence the extent of the risk posed to HCWs are a knowledge deficit and a significant knowledge gap among HCWs including nurses with respect to TB as well as a negative attitude among HCWs towards the disease and TB patients [4-6] . It can be argued that a knowledge deficit might result in an increase in the risk of nosocomial TB infection among nurses, patients and other persons providing healthcare. In Libya, although nurses play a major role in investigation, immunisation, and administration of treatment of the disease, there is a lack of empirical evidence in the literature regarding nurses' knowledge on TB. Therefore, the current study was designed to investigate the level of knowledge about TB among nurses in Misurata, Libya.

MATERIAL AND METHODS:

Study design, setting, period, sampling and sample size

A cross-sectional study was conducted among 430 nurses randomly selected from seven healthcare facilities (two public hospitals and five district primary healthcare centres) in the province of Misurata, Libya from over period of 3 months (from 12th September 2024 to 30th December 2024. A total of 402 questionnaires were returned and out of these, 396 were usable (93% response rate).

Measurement tool

Basic knowledge of TB was measured using a knowledge assessment questionnaire which is consisted of two parts and 58 items. The first part included questions to gather data on the socio-demographic characteristics of the study sample. The second part covered six knowledge domains of TB: causes, transmission, risk factors, diagnosis, treatment and prevention. All the items in the questionnaire were framed by offering the participants three possible answers: 'Yes', 'No' and 'I don't know'. A score of 1 was given for each correct answer and a negative mark (-1) was given for an incorrect answer, while 'I don't know' was scored as zero (0). The maximum obtainable score was 35 (excluding nine items designed to collect socio-demographic data and information on the source of the nurses' knowledge on TB). A median score of 18 was used as the cut-off for defining a good or a poor level of knowledge. The participants who achieved a score higher than the median (>18) were classified as having good knowledge, whereas those who obtained a score of less than or equal to the median (≤18) were classified as having poor knowledge[7]. The final version of the questionnaire was translated into Arabic using

standard translation measures. Content validity was ascertained through consultation with three academics who were expert in the field of TB. In addition, a test-retest correlation was carried out to evaluate the reliability and face validity of the questionnaire in a pilot study among 30 nurses in public hospitals. As the reliability was found to be high (r = 0.99), it was necessary to make just a few minor corrections to the statements in the questionnaire. After the participants had given their informed consent, they were able to complete the self-administered modified questionnaire in approximately 15 minutes.

Ethical considerations

The study protocol was officially approved and institutional ethical clearance was obtained from the medical directors of the hospitals and public health centres involved in the study. Written informed consent was also obtained from each of the participating nurses before they completed the questionnaire survey.

Statistical analysis

Descriptive statistics were applied to describe all the categorical variables (frequency distributions and percentages) in order to evaluate the knowledge of nurses regarding TB. The *chi-square* test was used to compare different proportions and to test the association between knowledge and a range of socio-demographic variables. An independent *t*-test was used to compare any difference in the knowledge mean scores between two groups while one-way analysis of variance (*ANOVA)* was applied to compare the difference between three or more groups. A *p*-value of less than 0.05 was considered as significant. The Statistical Package for Social Sciences (SPSS) version 20 was used in the data analysis.

RESULTS:

Demographic characteristics of the participants

The characteristics of the 396 participants are shown in table 1.With respect to gender, 152 (38.4 %) and 224 (61.6 %) of the nurses were male and female, respectively. The subjects' age, work setting (workplace), work experience and educational level are also shown in (table1). The nurses' source of information regarding TB comes mostly from health professionals (53%), school (38.7%), television (30.6%) and the internet (27.6%).

Knowledge about TB

From (table2), it can be seen that overall knowledge about TB (symptoms, transmission, risk factors, diagnosis and treatment) was good only among 83 (21%) of nurses. Out of all participants, 221 (55 %) indicated that the causative agent of TB is bacteria, 208 (52.5%) considered coughing up blood to be the main symptom, 214 (54%) confirmed that a sputum examination was the diagnostic test and 127 (23 %) agreed that HCWs were at risk of infection. Meanwhile, 219 (55.3%) of respondents recognised that TB is potentially contagious and 167 (42.2%) recognised that is the mode of transmission is via airborne spread. With respect to treatment, 191 (48.2%) considered that the DOTS is the specific treatment for TB and 103 (26%) agreed that the duration of the treatment is more than six months.

The results of further analysis showed that the knowledge of the participants was not significantly affected by any of the demographic factors, except for educational level (table 3). Holders of a bachelor degree had a higher level of knowledge about the preventive measures that need to be taken against TB compared to those with a lower level of education (p-value = 0.007) (table 4).

Table1: Demographic characteristics of the participants (n = 396)

Variable	*Frequency*	*%*
Age		
8–25 years	135	34.1%
26–40 years	231	58.3%
>40 years	30	7.6%
Gender		

Male	152	38.4%
Female	244	61.6%
Educational level		
Training course	52	13.1%
Diploma in nursing	146	36.9%
Bachelor of nursing	198	50%
Residence		
Urban	276	69.7%
Rural	120	30.3%
Work experience		
<1 year	51	12.9%
1–4 years	155	39.1%
5–9 years	104	26.3%
10–14 years	42	10.6%
≥15 years	44	11.1%
Workplace		
Primary healthcare centre	**194**	**49%**
Public hospital	**202**	**51%**

Table 2: Frequency and percentage for knowledge of tuberculosis (TB) among the participants (*n* = 396)

Knowledge variable	Correct answer (%)	Wrong answer (%)	Don't know answer (%)
Symptoms of TB			
Cough for over 2 weeks	143 (36.1%)	65 (16.4%)	188 (47.5 %)
Fever for 2 weeks	138 (34.8%)	62 (15.7%)	196 (49.5%)
Loss of appetite	123 (31.1%)	67 (16.9.2%)	206 (52%)
Night sweating	109 (27.5 %)	73 (18.4%)	214 (54%)
Pain in chest	149 (37.6%)	68 (17.2%)	179 (45.5%)
Total weakness	116 (29.3%)	72 (18.2%)	208 (52.5%)
Weight loss	151 (38.1%)	90 (22.7%)	155 (39.1%)
Coughing up blood	208 (52.5%)	59 (14.9%)	129 (32.6%)
TB causes			
Bacteria	221 (55.8%)	65 (16.4.2%)	110 (16.4 %)
TB transmission			
TB is contagious	219 (55.3%)	77 (19.4%)	100 (25.3 %)
Transmit through air droplets	167 (42.2%)	94 (23.7%)	135 (34.1%)
TB risk factors			
HIV	167 (42.2%)	62(15.7%)	167 (42.2%)
Poor nutritional status	115 (29%)	92 (23.2%)	189 (47.7%)
Overcrowding	164 (41.4%)	72 (18.2%)	160 (40.4%)
Long hospital admission	102 (25.8%)	87 (22%)	207 (52.3%)
Person with respiratory disorders	140 (35.4%)	72 (18.4%)	184 (46.5%)
Smoker	159 (40.2%)	85 (21.5%)	152 (38.4%)
Homeless person	106 (26.8%)	92 (23.2%)	198 (50 %)
HCW	127 (32.1%)	115 (29%)	154 (38.9%)
Farmer	78 (19.7%)	108 (27.3%)	210 (53%)
Prison inmate	145 (36.6%)	78 (19.7%)	173 (43.7%)
Children under 5-years	78 (19.7%)	95 (24%)	223 (56.3%)
Family of confirmed case	207 (52.3%)	62 (15.7%)	127 (32.1%)
TB confirming diagnostic test of new case			
Sputum examination	214 (54 %)	75 (18.9%)	107 (27 %)
TB treatment			
TB medicine (DOTS)	191 (48.2%)	74 (18.7%)	131 (33.1%)
> 6-month duration	103 (26%)	83 (21 %)	210 (53%)
Risk of incomplete or interrupted treatment			
Worsening of symptoms and prolonging of treatment	214 (54 %)	59 (14.9%)	123 (31.1%)
Developing drug resistance	159(40.2%)	85(21.5%)	

			152 (38.4%)
Death	194 (49 %)	62(15.7%)	140 (35.4%)
TB prevention			
By minimising frequency of contact with infectious TB patient	216 (54.5%)	76 (19.2%)	104 (26.3%)
By eating a healthy diet	208 (52.5%)	67 (16.9%)	121 (30.6%)
By avoiding alcohol and addictive drugs	193 (48.7%)	64 (16.2%)	139 (35.1%)
By wearing a protective mask during working duty	244 (61.6%)	54 (13.6%)	98 (24.7 %)
By living in a ventilated area	236 (59.6%)	39 (9.8%)	121 (30.6 %)
By vaccination against tuberculosis	294 (74.2%)	25 (6.3%)	77 (19.4%)

Table 3: Effect of socio-demographic variables on knowledge about tuberculosis (TB) among nurses (n = 396)

Variable	Good knowledge	Poor knowledge	Total	
	Score >18 Total = 83 (21%)	Score ≤18 Total = 313 (79%)		p-value
Gender				
Male	34 (22.4%)	118 (77.6 %)	1 52 (100%)	0.296
Female	49 (20.1%)	195 (97.9%)	224 (100%)	
Age				
18–25 years	31 (23%)	104 (77%)	135 (100%)	0.496
26–40 years	46 (19.9%)	185 (80.1%)	231(100%)	
>40 years	6 (20%)	24 (80%)	30 (100%)	
Education				
Training course	5 (9.6%)	47 (90.4%)	52(100%)	
Diploma in nursing	26 (17.8%)	120 (82.2%)	146 (100%)	8.276
Bachelor of nursing	52 (26.3%)	146 (73.7%)	198 (100%)	
Residence				
Urban	56 (20.3%)	220 (79.7%)	276 (100%)	0.247
Rural	27 (22.5%)	93 (77.5%)	120 (100%)	
Years of work experience and workplace				
1 year	8(15.7%)	43(84.3%)	51 (100%)	
1–4 years	38 (24.5%)	117 (75.5%)	155 (100%)	

5–9 years	21 (20.2%)	83 (79.8%)	104 (100%)	2.374
10–14 years	8 (19%)	34 (81%)	42 (100%)	
≥15 years	8 (18.2%)	36 (81.8%)	44 (100%)	
Workplace				
Primary healthcare centre	40 (20.6%)	154 (79.4%)	194 (100%)	0.27
Public hospital	43 (21.3%)	159 (78.7)	202 (100%)	

*denotes *chi-square* test

Table 4: Knowledge on tuberculosis (TB) prevention measures among nurses (*n* = 396)

Variable	Mean ±SD	p-value
Age		
18–25 years	2.80 ± 2.22	0.632
26–40 years	2.58 ± 2.41	
>40 years	3.0 ± 2.24	
Gender		
Male	2.82 ± 2.17	0.607
Female	2.61 ± 2.43	
Education		
Training course	1.96 ± 2.31	0.007
Diploma in nursing	2.45 ± 2.37	
Bachelor of nursing	2.69 ± 2.33	
Residence		
Urban	2.80 ± 2.29	0.108
Rural	2.44 ± 2.42	
Workplace		
Primary healthcare centre	2.50 ± 2.35	0.084
Public hospital	2.87 ± 2.31	
Work experience		
<1 year	2.49 ± 2.12	
14 years	3.02 ± 2.28	0.294
59 years	2.35 ± 2.58	
10–14 years	2.59 ± 2.04	
≥15 years	2.36 ± 2.36	

DISCUSSION:

Nurses are an integral part of any healthcare system. The expansion and strengthening of patient care requires sufficient and well-trained healthcare practitioners. Currently, the need for an effective workforce in healthcare outstrips the supply of trained personnel at all levels of service delivery[7]. As TB is an ongoing major health concern in Libya, the current study sought to examine the level of knowledge on TB among 396 Libyan nurses. The study is unique because of the large sample and to our knowledge it is the first of its kind in Libya.

The results of the current study revealed that the majority of participants had poor knowledge about TB, with only 21% of nurses having a good level of knowledge. This finding is consistent with the results of previous studies conducted in different settings that found evidence of a significant knowledge gap among nurses with respect to TB[8-14]. Based on participant's demographic characteristics, namely age, gender, educational level, workplace, and work experience, this study did not find any statistically significant difference among the respondents with regards to their knowledge of TB, except for education level. The level of knowledge on TB prevention among nurses with a bachelor degree was significantly higher than among those with a training course certificate or diploma in nursing (p = 0.007). We found no association between knowledge and age. This was in contrast to a study conducted in Iraq where age and work experience were found to be significantly associated with good knowledge among the participating nurses [12]. As for gender, in our study, the majority of nurses (224; 61.6%) were female. This could be attributed to the local culture where most women prefer this kind of job.

Half (51%) of the participants in this study were recruited from general teaching hospitals and secondary healthcare centres where a large number of suspected or active TB-infected patients may attend, so it was expected that those nurses in particular would have basic knowledge about the risk factors, mode of transmission and clinical manifestations of TB regardless of their subcategory of job, work experience and level of education. However, recently, due to the instability of the political and security situation in Libya, the majority of expatriate nurses have left the country. Consequently, to cover the shortage of nursing staff across all kinds of healthcare facilities, a six-month training course on nursing skills has been put in place to improve the national capacity of the Libyan people to fulfil this gap in skilled personnel. Unfortunately, the course does not include any intensive theoretical education about infectious diseases, particularly those that can be nosocomial.

According to our findings with respect to knowledge on the aetiology of the disease only 221 (55.8%) of respondents answered correctly that TB is caused by bacteria. With regards to the mode of transmission and infectivity of TB, only 219 (55.3%) of the respondents indicated that TB is an infectious disease and only 167 (42%) knew that air droplets produced by infected person while coughing or sneezing is the most usual mode of transmission. This contrasts with the results of a study conducted in India where (36%) of the respondents said (incorrectly) that a virus is the causative organism of TB but 78.6% mentioned that the inhalation of air droplets from an infected source is the transmission mode of the disease[15].

With respect to the factors related to increased vulnerability to the disease, 164 (41.4%) of the participants stated that overcrowding is a risk factor in acquiring the disease, whereas 77 (58.7%) of the participants in the India-based study identified this as a factor [15]. Moreover, only 127 (32%) and 102 (25%) of the participants in the current study mentioned that HCWs and long-stay hospital patients, respectively, were vulnerable to TB.

With regards to the relationship between vulnerability to TB and knowledge, according to a study carried out in Brazil, professional nurses and nursing students are more vulnerable to the disease if their knowledge about diagnosis, transmission and prevention of TB is poor. Thus, continuous education programmes can play an essential role in hospital institutions in updating knowledge about TB among professional nurses,

particularly information related to self-protection and control measures. Similarly, in-depth education on health-related occupational diseases, including TB, should be incorporated into undergraduate nursing programmes. Moreover, our findings indicate that there is an urgent need for medical centres and nursing education institutions to make greater efforts to spread knowledge about TB[16].

The presence of well-educated healthcare worker is essential in reducing nosocomial infections. The educational needs of such personnel should be determined according to their job category and programmes should be designed to eliminate misperceptions and improve knowledge. Some previous studies have shown that knowledge and attitude among nurses specifically and HCWs generally are significantly improved after training and other forms of educational intervention, as indicated by improved post-intervention knowledge scores[17-19].

Limitations

The current study was carried out in one region of Libya and as the sample was recruited only from two public hospitals and five district primary healthcare centres, any generalisation of these results should be made with high caution as the sample may not reflect the true extent of the knowledge about TB among all Libyan nurses. Therefore a nationwide survey is recommended in order to get a better insight into knowledge of TB among nurses in the country.

Strengths

The current study has several strengths. First, we used a cross-sectional study design, which is purely descriptive, to assess the frequency and distribution of particular variables in a defined population. Second, this research study was also relatively inexpensive and did not take a long time to conduct. Third, the validated questionnaire has high reliability (99%), which makes it suitable for use in other similar studies. Fourth, throughout the period of study, we excluded participants who left the programme and those who were not available during the whole period covered by the questionnaire survey as well as those who did not answer the questionnaire sincerely so as to minimise bias. After applying these exclusion criteria, the response rate of the study was still relatively high at 93%. Last but not least, to our knowledge, this study is the first of its kind in Libya and lays strong foundations upon which to build future work.

CONCLUSION:

The majority of nurses in Libya are lacking in knowledge on tuberculosis. Active interventions are required to improve their knowledge via an effective educational programme and better implementation of the national TB programme. A review and revision of the curriculum and teaching methodologies in nursing programmes is also recommended.

Acknowledgements:

The authors acknowledge and thank the respondents who participated in the survey.

Conflicts of interest and funding

The authors have no conflicts of interest or funding with respect to the material presented in this paper.

REFERENCES:

1. Organization, W.H., *The global plan to stop TB, 2006-2015*. 2006, World Health Organization.
2. Cusick, A. and R.M. Hamed El Sahly, *People with disability in Libya are a medicalised minority: Findings of a scoping review.* 2018.
3. Harries, A.D., D. Maher, and P. Nunn, *Practical and affordable measures for the protection of health care workers from tuberculosis in low-income*

countries. Bulletin of the World Health Organization, 1997. **75**(5): p. 477.
4. Yükseltürk, N. and L. Dinç, *Knowledge about anti-tuberculosis treatment among nurses at tuberculosis clinics*. International Journal of Nursing Practice, 2013. **19**(1): p. 47-53.
5. Akin, S., et al., *Knowledge of and attitudes toward tuberculosis of Turkish nursing and midwifery students*. Nurse education today, 2011. **31**(8): p. 774-779.
6. Woith, W.M., G. Volchenkov, and J.L. Larson, *Russian health care workers' knowledge of tuberculosis and infection control [Notes from the field]*. The international journal of tuberculosis and lung disease, 2010. **14**(11): p. 1489-1492.
7. White, Z.N., *Survey on the knowledge, attitudes and practices on Tuberculosis (TB) among health care workers in Kingston and St. Andrew, Jamaica*. Unpublished Master of Public Health dissertation in The University of Liverpool, UK, 2011.
8. Farhanah, A.W., et al., *Updates on knowledge, attitude and preventive practices on tuberculosis among healthcare workers*. Malaysian Journal of Medical Sciences, 2016. **23**(6): p. 25-34.
9. Hashim, D., W. Al Kubaisy, and A. Al Dulayme, *Knowledge, attitudes and practices survey among health care workers and tuberculosis patients in Iraq*. EMHJ-Eastern Mediterranean Health Journal, 9 (4), 718-731, 2003, 2003.
10. Baussano, I., et al., *Tuberculosis among health care workers*. Emerging infectious diseases, 2011. **17**(3): p. 488.
11. Zwerling, A., et al., *TB screening in Canadian health care workers using interferon-gamma release assays*. 2012.
12. Moustafa AF, A., et al., *Prevalence of latent TB among health care workers in four major tertiary care hospitals in Riyadh, Saudi Arabia*. 2010.
13. He, G.X., et al., *Infection control and the burden of tuberculosis infection and disease in health care workers in china: a cross-sectional study*. BMC infectious diseases, 2010. **10**: p. 1-9.
14. Drobniewski, F., et al., *Rates of latent tuberculosis in health care staff in Russia*. PLoS medicine, 2007. **4**(2): p. e55.
15. Singla, N., P. Sharma, and R. Jain, *Awareness about tuberculosis among nurses working in a tuberculosis hospital and in a general hospital in Delhi, India*. The International Journal of Tuberculosis and Lung Disease, 1998. **2**(12): p. 1005-1010.
16. Mussi, T.V.F., M.C. Traldi, and J.N.d.S. Talarico, *Knowledge as a factor in vulnerability to tuberculosis among nursing students and professionals*. Revista da Escola de Enfermagem da USP, 2012. **46**: p. 696-703.
17. Tachfouti, N., et al., *The impact of knowledge and attitudes on adherence to tuberculosis treatment: a case-control study in a Moroccan region*. Pan African Medical Journal, 2012. **12**(1).
18. Wu, P.-S., et al., *Assessment of changes in knowledge and stigmatization following tuberculosis training workshops in Taiwan*. Journal of the Formosan Medical Association, 2009. **108**(5): p. 377-385.
19. Naidoo, S., et al., *Changes in Healthcare Workers' Knowledge about Tuberculosis Following a Tuberculosis Training Programme*. Education for Health, 2011. **24**(2): p. 514.