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Original Article

Development and validation of questionnaire regarding KAP survey on pulmonary and systemic TB

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ABSTRACT

Background and aim: A high level of awareness on tuberculosis (TB) is crucial for the success of the prevention and treatment among the high risk populations. Having a good knowledge, positive attitude and excellent level of practice towards tuberculosis may increase the acceptance of the control measures and decreasing the risk of contracting the disease.

Aim of this study. was to develop and validate a questionnaire about knowledge, attitude and practice (KAP) among the nurses working in TB centres in Libya. Methodology: A Cross-sectional study was conducted among 384 randomly selected nurses working in tuberculosis centers in Libya. This study used a self-administrated questionnaire that takes approximately 15 minutes to complete and was generally well received by the respondent's. The validation involved content validity and internal consistency for reliability.

Results: A total of 384 nurses in tuberculosis centers comprising of 84 (21.9%) were male nurses and 300 (78.1%) were female nurse. The ICC was in the range of 0.63–0.961, P<0.001, while for the attitude component items it was in the range of 0.682–8.99, p<0.001 and for the practice component items it ranged from 0.659–0.981, p<0.001.Cronbach's alpha coefficient, used to assess internal consistency for knowledge, attitude and practice was.0.702, 0.776 and 0.752; respectively.

Conclusions: The questionnaire on TB knowledge, attitude, and practice was valid and reliable with good items that enable its use for assessing TB –KAP survey among the TB nurses.

Key Words: Validity; Reliability; Questionnaire, knowledge, Attitude, Practice, Tuberculosis (TB), and Nurses

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INTRODUCTION

Tuberculosis (TB) is still considered a major public health problem. It is an airborne disease caused by the bacterium Mycobacterium tuberculosis. This bacteria is carried in airborne droplet nuclei and forming a source of infection to the exposed people. A person who is infected by TB usually suffers from repeated coughs with blood-stained sputum, fever, night sweating, anorexia and weight and mild chest pain. It is not only restricted to lungs, but it can be spread through the blood to the brain, larynx, lymph node, spine, bone, or kidney [1]. Knowledge about any disease is fundamental to optimize the care of patients and ensure safe practice. Lack of knowledge and a negative attitude towards TB is one of the major barriers in preventing TB [2]. Knowledge, Attitude and Practice (KAP) surveys are cross-sectional studies that use standardized and structured questionnaires to collect information on what is known, believed, and done by a specific population in relation to a particular topic. In 2008 the World Health Organization (WHO) published a guide to developing KAP surveys, and a TB KAP survey questionnaire sample within the guide [3]. The desirability of KAP surveys is increased recently due to some characteristics such as an easy design, fast implementation quantifiable data, the results are easily interpreted and presented as well as generalizability of small sample results to a large population [3]. There are studies that link higher KAP level with efficient management of illness, response to medical treatment, and promotion of one's own health, and lower KAP level with poor health, inefficient health care use, and decrease of disease screening rate [4-6]. Libyans are still at continues risk of contracting tuberculosis due to unlawful entry of undocumented immigrants and smugglers from high TB-prevalent Sub-Sahara Africa who have to pass through it when they want to enter the country. According to the rational model, effective practice will be achieved when the people have high level of knowledge and positive attitude towards behavior [7]. Therefore, having a valid tool for the assessment of TB knowledge, attitude and the practice of TB is necessary to control the spread of the disease. Hence, this study is carried out to develop and validate the questionnaire of knowledge, attitude and practice on tuberculosis and the finding will hopefully serve as a valid instrument with good items that can be reliably used to assess the knowledge, attitude and practice among nurses dealing with TB patients in Libya or even in other countries.

METHODS

Study design, population, setting and period

A cross – sectional study was conducted in Libya over a period of one year, from January to December 2022 which covered the data collection for development and validation of the questionnaire among nurses who working at TB centers and provided informed consent.

Sample size and sampling method

As the effective recommended sample size to gain of Cronbach Alpha reliability (0.80-.87) is 300 -400 [8]. However, the calculated sample size for this study was 435. PS power and sample size calculation software was used in the calculation process. The sample size was thus taken to be 395 and 10% non-response rate; a total sample size of 435 was needed. As the target participants of this study were scattered across a wide geographical area, a two stage sampling technique was used to draw the target sample of nurses from the entire population of TB nurses in Libya. The method consisted of the following two stages: Stage 1: fifty percent of TB centres of each stratum were randomly selected. Stage 2: proportionate random sampling (80%) of nurses as each stratum has the same sampling fraction in proportional stratified random sampling. This high fraction was used in aim to minimize the anticipated incomplete or inconsistent response rate from the small number of nurses in each TB centres. Therefore, sample sizes of 130, 98, 167, and 56 participants were allocated to the east, central, west and south provinces, respectively. Finally, the nurses were selected randomly from the selected hospitals (Figure 1).

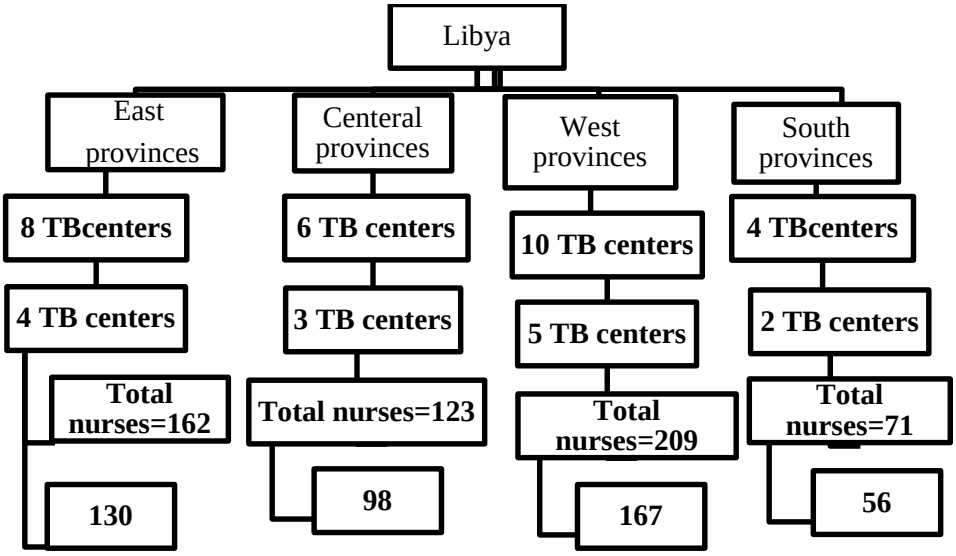

Figure 1: Sampling method of selected sample

Questionnaire development and structure

The research questionnaire that was designed to assess the levels of knowledge, attitude and practice towards TB among Libyan nurses was initially developed in the English language. About 80% of the questions in the KAP parts of the questionnaire were extracted and adapted from questionnaires that had been used in previous studies related to TB KAP surveys. The knowledge questions were obtained from one study conducted in Turkey [9] and the World Health Organization (WHO)' KAP Guide [10]. The attitude questions were extracted from previous studies on attitudes towards TB [11, 12]. The practice questions were extracted from practice guidelines for the prevention of multidrug-resistant TB among hospitalized adult patients in Bangladesh [13]. In addition to the socio-demographic questions, a few questions in the KAP parts were formulated by the researcher.

The questionnaire consisted of closed ended questions. The Knowledge, attitude and practice were the three main domains in the questionnaire. There were 12 components on knowledge with a total 82 items. The 12 components are consisted of cause and infectivity of TB (4 items), modes of TB transmission (6 items), persons who at risk of TB (11 items), clinical features of TB (8 items), common sites in the body rather than the lung affected by TB (4 items), diagnostic tests of TB (2 items), interpretation of tuberculin skin test (5 items), advantages of Interferon-Gamma Release Assays (4 items), TB treatment and delivery of anti-TB drugs (25 items), tests are used in monitoring of MDR-TB treatment (4 items),risk to the patient associated with incomplete or interrupted treatment (3items) and preventive measures of TB (6 items).

Regarding attitude, there were four items about the phobia of TB, while the second contained four items about the social stigma of TB .In the questionnaire, there were five major components that were comprised of a total of 22 questions that covered issues related to nursing practice with regards to TB. The five components are consisted of 4 items regarding services on patient admission, practice towards TB infection control (5items), practice towards respiratory hygiene and collection of sputum (6 items), Practice towards TB treatment and delivery of TB drugs (4 items) and practice towards health education of patients and follow-up (3 items).

Measures

The knowledge-related items were framed using three possible answers (1 = yes, 2 = no, and 3 = I don't know). A score of 1 was given to each correct answer and a score of 0 was given to incorrect and 'I don't know' answers. A five-point Likert scale of agreement: (1 = strongly agree, 2 = agree, 3 = somewhat agree, 4 = disagree, 5 = strongly disagree) was used for attitude items. Based on previous study [14], if the mean score of the component was lower than the cut-off point of the scale, the attitude was considered negative, while if it was equal to or higher than the cut-off point of scale, the level of attitude was considered positive. The questions on practice were framed using a three-option scale of performance (1 = never perform, 2 = sometimes perform, 3= always perform) with (2) as the (cut-off

point). The mean score was calculated for each practice component and if the mean was equal to or higher than the cut-off point of the scale, the level of practice was considered satisfactory, while if it was lower than the cut-off point of scale, the practice level was considered unsatisfactory.

Content and face validity of KAP questionnaire

Face and content validity checks were conducted to ensure that the length and the wording of the questions and the appearance of the questionnaire overall were appropriate in terms of clarity and simplicity, as well as to get comments and suggestions regarding the technical qualities of the research instrument including the scaling and order of the questionnaire items.

First, the questionnaire was developed in the English language with the aid of the researcher's supervisor to ensure that it measured the desired variables. Then, it was submitted to a panel of six experts in order to determine the degree and to what extent each item was relevant and adequate enough to represent the main domains of the questionnaire in terms of knowledge, attitude and practice towards TB. The relevancy of all the items in the knowledge, attitude and practice components were rated by the experts on a five-point ordinal scale of agreement: 1 = strongly disagree (not relevant), 2 = disagree (not relevant), 3 = somewhat agree (somewhat relevant), 4 = agree (relevant), 5 = strongly agree (highly relevant). The items that scored > 3 were accepted as eligible for inclusion in the questionnaire.

The content validity index for each item (I-CVI) was computed as the number of agreements among the experts (giving a rating of either 4 or 5) divided by the total number of experts Total agreements of all experts were equal to score 1 of I-ICV.

Reliability of TB-KAP questionnaire

In order to reach a high degree of reliability or consistency, a reliability test-retest was carried out using the Arabic version of the questionnaire among 30 randomly selected nurses where the questionnaire was administered at a 2-week interval. The intraclass correlation coefficient (ICC) was computed and a high degree of reliability was found between the items of the questionnaire. The Cronbach's alpha coefficient was computed to explore the internal consistency of the knowledge, attitude and practice items.

Ethical considerations

Ethical clearance was obtained from national center of disease control prevention (NCDC) of Libya where the research committee is attributing. Written permissions were obtained from the medical directors of the tuberculosis centers. However, written informed consents were obtained from the participant nurses.

Method of data analysis

SPSS version 20 software was used in data analysis and statistical significance was set as 0.05.Descriptive statistic was used to presents the demographic characteristics of respondents. F- Test, the intraclass correlation coefficient (ICC) and Cronbach's alpha coefficient were used to assess the reliability of the items.

RESULTS

Demographic characteristics

The demographic characteristics of the study population are shown in Table 1.

Table 1. Demographic characteristics of participants (n=384)

Demographic Variable	n (%)
Gender	
Male	84 (21.9%)
Female	300 (78.1%)
Age	
18 - 25 years	75 (19.5%)
26 - 40 years	246 (64.1%)
> 40 years	63 (16.4%)
Educational Level	
Training course certificate	87 (22.7%)
Diploma of nursing	161 (41.9%)
Bachelor of nursing	136 (35.4%)
Residence	
Urban	176 (45.8%)
Rural	206 (53.6%)
Work experience	
< 1 year	48 (12.5%)
1 -5 years	242 (63.0%)
> 5 years	94 (24.4%)

Results of validity and reliability of KAP

The content validity index for each item (I-CVI) was computed as the number of agreements among the experts (giving a rating of either 4 or 5) divided by the total number of experts. The total agreement of all experts was equal to an I-ICV score of 1 and an I-CVI score of ≥ 0.6 was considered acceptable content validity. No items had an I-ICV score of ≤ 0. 6, therefore all the items for all the components in the questionnaire were considered eligible and retained. The universal agreement rates for the knowledge, attitude and practice components were 0.89, 0.87 and 0.95, respectively.

The intraclass correlation coefficient (ICC) was computed and a high degree of reliability was found between the items of the questionnaire. For the knowledge component items, the ICC was in the range of 0.63–0.961, while for the attitude component items it was in the range of 0.682–8.99 and for the practice component

items it ranged from 0.659–0.981. The Cronbach's alpha coefficient was computed to explore the internal consistency of the knowledge, attitude and practice items. The details of ICC for each item in knowledge, attitude and practice components are shown in Table 2, Table 3 and Table 4. The overall Cronbach's alpha values for knowledge, attitude and practice were.0.702, 0.776 and 0.752, respectively which indicated that the knowledge, attitude and practice items in the questionnaire were reliable (Table 5).

Table 2. Test- retest reliability for knowledge items (n=30)

	Knowledge components with items	ICC	95% CI	F test	*P*-value
Knowledge Component 1 (TB-causes and infectivity)					
1	Bacteria are the microbe that causes TB.	0.79	(0.56 - 0.90)	4.86	<0.001
2	Tuberculosis is considered a serious disease.	0.69	(0.36 - 0.85)	3.30	<0.001
3	Tuberculosis is a contagious can be spread from one to other.	0.90	(0.80 - 0.95)	10.60	<0.001
4	The people may become infected with TB more than once in their lifetime.	0.62	(0.20 - 0.82)	2.64	<0.004
Knowledge Component 2 (mode of transmission)					
1	Through handshakes.	0.68	(0.34 - 0.85)	3.20	<0.001
2	Through the air when a person with TB coughs.	0.90	(0.8 - 0.95)	10.60	<0.001
3	Drinking unpasteurized and non-sterile Cow's milk.	0.81	(0.61 - 0.91)	5.48	<0.001
4	Sharing the TB infected person the same plate during eating or cup during drinking	0.75	(0.48 - 0.88)	2.64	<0.004
5	Through touching items in public places (doorknobs, handles in transportation).	0.72	(0.42 - 08)	3.67	<0.001
6	Through sexual intercourse.	0.72	(0.42 - 0.87)	3.67	<0.001
Knowledge Component 3 (Persons who at risk of TB)					
1	Person with HIV/AIDS.	0.77	(0.53 - 0.89)	4.48	<0.001
2	Person with poor nutritional state.	0.84	(0.67 - 0.92)	6.54	<0.001
3	Person who living in Crowding.	0.68	(0.34 - 08)	3.21	<0.001
4	Homeless person.	0.69	(0.36 - 0.85)	3.32	<0.001
5	Patient with Long hospital admission.	0.80	(0.58 - 0.90)	5.01	<0.001
6	Health care workers.	0.60	(0.17- 0.81)	2.53	<0.007
7	Prison inmates.	0.69	(0.36 - 0.85)	3.32	<0.001
8	Children under five- years.	0.68	(0.34 - 0.85)	3.20	<0.001
9	Farmer.	0.66	(0.29 - 0.84)	2.96	<0.002
10	Family members of a confirmed case.	0.77	(0.53 - 0.89)	4.48	<0.001
11	Person with occupational lung disease.	0.81	(0.61 - 0.91)	5.41	<0.001
Knowledge Component 4 (Clinical features of TB)					
1	Cough up blood	0.74	(0.46 - 87)	3.94	<0.001
2	Coughing for over two weeks	0.69	(0.36 - 0.85)	3.32	<0.001
3	Fever for over two weeks	0.74	(0.47 - 0.88)	3.96	<0.001
4	Loss of appetite	0.72	(0.42 - 0.87)	3.67	<0.001
5	Night sweating	0.78	(0.55 - 0.89)	4.72	<0.001
6	Chest pain and shortness of breath	0.81	(0.61 - 0.91)	5.41	<0.001
7	Total weakness	0.66	(0. 29 - 0.84)	2.98	<0.002
8	Weight loss	0.73	(0. 45 - 0.87)	3.82	<0.000
Knowledge Component 5 (common sites rather than the lung are affected by TB)					
1	Lymph node	0.74	(0.46 - 0.87)	3.90	<0.001

2	Kidney	0.87	(0.74 - 0.94)	8.23	<0.001
3	Brain	0.73	(0.44 - 0.87)	3.76	<0.001
4	Spinal cord	0.75	(0.49 - 0.88)	4.13	<0.001
Knowledge Component 6 (Diagnostic tests of TB)					
1	Sputum Smear Microscopy and Culture is the gold test for TB-diagnosis	0.88	(0.88 - 0.94)	9.00	<0.001
2	Chest X-ray is helpful test for diagnosis of pulmonary tuberculosis.	0.80	(0.59 - 0.90)	5.13	<0.001
Knowledge Component 7 (interpretation of tuberculin skin test (TST)					
1	People living with HIV.	0.81	(0.61 - 0.91)	5.41	<0.001
2	Recent close contacts of people with infectious TB.	0.86	(0.70 - 0.93)	7.15	<0.001
3	People with chest x-ray findings of TB disease.	0.85	(0.70 - 0.93)	7.06	<0.001
4	People with organ transplants.	0.85	(0.70 - 0.93)	7.00	<0.001
5	Other immunosuppressed patients.	0.89	(0.76 - 0.94)	9.05	<0.001
Knowledge Component 8 (advantages of Interferon-Gamma Release Assays)					
1	Results can be available in 24 hours.	0.73	(0.43 - 0.87)	3.72	<0.001
2	Does not cause booster phenomenon.	0.66	(0.28 - 0.83)	2.95	<0.002
3	Less likely to have incorrect reading of results as compared to TST.	0.67	(0.31- 0.84)	3.06	<0.002
4	BCG vaccination does not affect the results.	0. 86	(0.70 - 0.93)	7.21	<0.001
Knowledge Component 9 (TB treatment and delivery of anti-TB drugs)					
1	DOTS regimen is the recommended treatment of newly active TB.	0.77	(0.52 - 0.89)	4.37	<0.001
2	The standard length of treatment for a newly diagnosed case of TB is ≥6 months.	0. 89	(0.77 - 0.95)	9.52	<0.001
3	Hearing loss and ototoxicity is considered side effect of Amikacin.	0.84	(0.67 - 0.92)	6.36	<0.001
4	Hepatotoxicity is considered side effect of Ethambutol.	0.81	(0.60 - 0.90)	5.25	<0.001
5	Ethambutol can be taken after meals because it does not interact with foods.	0.76	(0.50 - 0.88)	4.22	<0.001
6	The nurse should monitor patients consuming ethambutol for vision changes and blurring	0.91	(0.82 - 0.96)	11.84	0.001
7	Dizziness, vertigo, tinnitus, disequilibrium and loss of hearing side-effects of streptomycin.	0.75	(0.49 - 0.88)	4.12	<0.001
8	Isoniazid, rifampin, pyrazinamide and ethambutol are first-line drugs used in TB-treatment.	0.80	(0.59 - 0.90)	5.23	<0.001
9	The second-line drug used to treat TB includes prednol, teofilin, ephedrine and isoniazid.	0.80	(0.59 - 0.90)	5.23	<0.001
10	Direct Observation Therapy Strategy refers to observation of the patient by an educated person while properly consuming all the doses of the drugs.	0.87	(0.74 - 0.94)	8.12	<0.001
11	Ethambutol can be used for tuberculosis prophylaxis in patients who are at risk.	0.88	(0.76 - 0.94)	8.84	<0.001
12	Presence of acid-fast bacillus in the sputum samples of patients during the fifth month of medical treatment indicates multi-drug resistance.	0.93	(0.86 - 0.96)	15.52	<0.001
13	If the patient did not consume the drug daily, the nurse cans double the dose the next day.	0.89	(0.78 - 0.95)	9.81	<0.001
14	The nurse should administer streptomycin through an intramuscular.	0.72	(0.42 - 0.87)	3.64	<0.001
15	MDR TB is caused by an organism resistant to both isoniazid and rifampicin.	0.96	(0.92 - 0.98)	27.96	<0.001

16	The main reason of MDR during tuberculosis therapy is use of drug combinations.	0.80	(0.59 - 0.90)	5.16	<0.001
17	Anti-tuberculosis treatment should be terminated in patients receiving haemodialysis.	0.78	(0.54 - 0.89)	4.62	<0.001
18	The nurse should explain to women that rifampin might decrease the effects of oral hormone-based contraceptives.	0. 84	(0.67 - 0.92)	6.39	<0.001
19	Patients using rifampin should be monitored for anaemia and thrombocytopenia.	0.69	(0.35 - 0.85)	3.24	<0.001
20	Diabetic patients on rifampin should be monitored for blood-urine glucose level during treatment course.	0.82	(0.63 - 0.91)	5.82	<0.001
21	Isoniazid might be less effective when used with antacids containing aluminium hydroxide.	0.85	(0.68 - 0.92)	6.67	<0.001
22	The nurse should explain to mothers to avoid breast-feeding while on isoniazid therapy.	0.63	(0.22 - 0.82)	2.70	<0.005
23	In case of vomiting, tablets of rifampin can be given in divided doses at different times	0.85	(0.68 - 0.92)	6.67	<0.001
24	In case of MDR-TB the therapy with the same treatment drugs for extra one (1) month.	0.82	(0.62 - 0.91)	5.65	<0.001
25	Patient should stop treatment when the symptoms of TB subside or when they feel better.	0.78	(0.55 - 0.89)	4.72	<0.001
Knowledge Component 10 (tests are used in monitoring of MDR-TB treatment)					
1	Sputum smear and culture.	0.77	(0.52-0.89)	4.43	<0.001
2	Liver Function Test.	0.73	(0.45-0.87)	3.82	<0.000
3	Chest X-Ray.	0.68	(0.34 - 0.85)	3.20	<0.001
4	Renal Function Test.	0.94	(0.8 - 0.97)	17.33	<0.001
Knowledge Component 11(risk to the patient with incomplete or interrupted treatment)					
1	Worsening of symptoms and prolonged treatment course.	0.76	(0.50 - 0.88)	4.20	<0.001
2	Development of drug-resistance.	0.89	(0.77 - 0.94)	9.39	<0.001
3	Death.	0.92	(0.83 - 0.96)	13.02	<0.001
Knowledge Component 12 (prevention of TB infection)					
1	Avoidance of direct contact of TB patient.	0.75	(0.47- 0.88)	4.00	<0.001
2	By taking a healthy diet and doing a lot of physical activities.	0.96	(0.92 - 0.98)	27.96	<0.001
3	By avoiding alcohol and other drug abuse.	0.80	(0.59 - 0.90)	5.13	<0.001
4	By wearing face mask as Personal protective Equipment (PPE).	0.65	(0.26 - 0.83)	2.86	<0.003
5	By living in ventilated residences.	0.86	(0.72 - 0.93)	7.50	<0.001
6	By vaccination against the disease.	0.75	(0.48 - 0.88)	4.06	<0.001

Table 3. Test- retest reliability for attitude items (n=30)

	Attitude components with items	**ICC**	**95% CI**	**F test**	***P*-value**
Attitude Component 1 (phobia of tuberculosis)					
1	I wouldn't feel comfortable about being near to tuberculosis patient.	0.88	(0.75 - 0.95)	8.64	<0.001
2	I wouldn't in prolonged contact with tuberculosis patient to be safe.	0.88	(0.75 - 0.95)	8.73	<0.001
3	If I had TB, it would be a problem to find a partner for marriage.	0.77	(0.531 - 0.89)	4.48	<0.001

4	I will leave my job if I got a TB.	0.69	(0.35 - 0.85)	3.24	<0.001
Attitude Component 2 (social stigma of tuberculosis)					
1	If I found out had TB, I would feel a shamed and embarrassed.	0.89	(0.78 - 0.95)	9.89	<0.001
2	If I had TB, the others would think less of my family.	0.71	(0.40 - 0.86)	3.55	<0.001
3	I am worried that the others and hospital's staff may laugh at me if I got a TB.	0.68	(0.33 - 0.84)	3.16	<0.001
4	I would hide my TB if I got it.	0.80	(0.5 - 0.90)	5.04	<0.001

Table 4. Test- retest reliability for practice items (n=30)

	Attitude components with items	**ICC**	**95% CI**	**F test**	***P*-value**
Component 1 (tasks at the admission of TB patients)					
1	I ask the patients during admission about previous history of TB infection.	0.98	(0.96 - 99)	52.03	<.001
2	I ask patient about any close contact with household members or friends.	0.85	(0.69 - 0.93)	6.84	<.001
3	I check the patients' drugs that they have during admission.	0.97	(0.95 - 0.99)	46.51	<.001
4	I fill and send the disease notification form to the relevant registration unit.	0.80	(0.59 - 0.90)	5.23	<.001
Component 2 (tasks toward TB infection control measures)					
1	I ask the patients in the ward to always wear the protective mask.	0.96	(0.93 - 0.98)	29.92	<.001
2	I wear the protective face mask and gloves while handling the patients	0.89	(0.78 - 0.95)	9.69	<.001
3	I put the infectious and non- infectious patients in the separate rooms.	0.82	(0.62 - 0.91)	5.55	<.001
4	I use separate treating and testing devices for every individual patient.	0.96	(0.93 - 0.98)	30.78	<.001
5	I ask the patients to cover their mouth and nose during coughing, or talking.	0.67	(0.32 - 0.84)	3.10	<.002
Component 3 (tasks regarding respiratory hygiene and collection of sputum)					
1	I collect sputum specimens from patients in a separate ventilated space.	0.84	(0.66 - 0.92)	6.31	<.001
2	I collect the sputum in a pot with lid and then dispose properly.	0.97	(0.95 - 0.98)	44.86	<.001
3	I collect the THREE (3) samples of sputum for AFB with fully completed form.	0.92	(0.84 - 0.96)	13.13	<.001
4	I explain and follow the sputum collection procedures.	0.83	(0.65 - 0.92)	6.09	<.001
5	I explain to the patients how the test to be done and the reason for doing it.	0.82	(0.62 - 0.91)	5.67	<.001
6	I help the patients to collect sputum when they cannot produce sputum.	0.93	(0.85 - 0.96)	14.33	<.001
Component 4 (tasks regarding treatment of patient and delivery of drugs)					
1	I ensure the correct dosages of drugs during distribution of medications.	0.65	(0.28 - 0.87)	2.92	<.003
2	I ask and remind the patients to take their drugs regularly on time.	0.98	(0.96 - 0.99)	52.03	<.001

3	I take note of any appeared side effects or allergic reaction of drugs.	0.90	(0.80 - 0.95)	10.73	<.001
4	I monitor whether the patients have response or resistance to treatment.	0.94	(0.87 - 0.97)	16.71	<.001
Component 5 (tasks about patient education and follow-up)					
1	I teach the patients about the different aspects of the TB disease.	0.65	(0.28 - 0.38)	2.92	<.003
2	I explain to the patients the treatment at home and follow up during discharge	0.88	(0.76 - 0.94)	8.92	<.001
3	I call and remind the patients if they missed the follow-up appointment.	0.91	(0.82 - 0.96)	11.75	<.001

Table 5. Knowledge, Attitude and Practice items-reliability (n=384)

Variable	Overall Cronbach's alpha	Number of items
Knowledge	0.702	80
Attitude	0.766	8
Practice	0.752	22

DISCUSSION

The knowledge, attitude and practice towards tuberculosis (TB-KAP) are crucial for fruitful performance by nurses and for effective prevention of TB infection among susceptible groups. Hence, it is necessary to have a valid tool for the assessment of knowledge of and attitude and practice towards TB. Over the years, limitations of KAP surveys are emerged, and authors consider that KAP survey alone do not provide a complete panorama concerning a particular health issue in a specific population [15]. However, KAP surveys can be useful as a part of the whole investigation [15]. Moreover, even if TB knowledge without accessibility to diagnosis and treatment, and social support cannot improve TB control, TB knowledge is an essential element to tackle TB epidemic [16, 17]. Most of the published studies regarding validity and reliability of TB-KAP questionnaire were conducted among TB patients ([18, 19], students [20] and general populations [21]. However, items and questions in these studies were not suitable to be used in our questionnaire since we were conducting the study among the nurses. Moreover, one previous study conducted to assess the validity and reliability of TB- KAP questionnaire among healthcare worker in general hospital [22].

In this study, the content validity was ascertained through assessment of the items in the questionnaire by a panel of six experts in their fields from different specialties;

public health, respiratory medicine, health education and microbiology, in aim of obtaining high assessment scores of all items. Based on the guideline for an acceptable I-ICV in relation to the number of experts, an I-CVI score of ≥ 0 .83 is acceptable when the number of experts is more than five [23]. In this study all the items had I-ICV scores of ≥ 0. 83; therefore, all the items for all the components in the questionnaire were considered eligible and therefore, retained.

In our study, the overall obtained Cronbach's alpha values for knowledge, attitude and practice components in the questionnaire indicated that these components in the questionnaire were reliable. These Cronbach's alpha values were similar to values obtained from two previously conducted studies to assess TB-KAP validity and reliability among healthcare workers [22, 24]. However, Cronbach's alpha score of our study would have dropped if any attitude item was deleted, indicating that all the items should be retained.

The intraclass correlation coefficient (ICC) was computed and a high degree of reliability was found between the items of the questionnaire. For the knowledge component items, the ICC was in the range of 0.63–0.961, while for the attitude component items it was in the range of 0.682–8.99 and for the practice component items it ranged from 0.659–0.981. These ICC values matched the finding (ICC=0.606) of previously conducted study [25].

CONCLUSION

In the present study, we developed and validated an instrument with good items that can be reliably used in assessment of knowledge, attitude and practice among nurses dealing with TB patients in Libya or even in other countries and a contribution to improve TB prevention and control.

Limitations

The exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were not used in this study. This instrument was validated to be used among TB nurses and may not be suitable for the assessment of knowledge, attitude and practice among nurses in non-TB healthcare facilities.

Authors' Contributions

Conception and design: Muftah Abdulssalam Elbahloul

Collection and assembly of data: Muftah Abdulssalam Elbahloul and Khadija Ali Amer

Analysis and interpretation of the data: Muftah Abdulssalam Elbahloul

Drafting of the article: Khadija Ali Amer, Sana Mokhtar Alghennai

Critical revision of the article for important intellectual content: Sana Mokhtar Alghennai

Final approval of the article: Muftah Abdulssalam and Sana Mokhtar

Statistical expertise: Muftah Abdulssam.

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