Original Research Article

Knowledge, Attitude and Practices Regarding Tuberculosis among Physicians and Nurses at Al Kuwaifiya Specialized Teaching Hospital for Chest and Tuberculosis in Benghazi.

Abstract:

Background: Despite the fact that tuberculosis is the leading cause of infection-related death in the world, it remains a major public health issue. **Aim:** to assess the knowledge, attitude and practices regarding tuberculosis infection control measures among health care workers in AL-Kuwaifiyah hospital, Benghazi.

Methodology: A cross sectional study was conducted in AL-Kuwifiyah hospital, it included 112 health care workers. The data was collected by anonymous self-administrated questionnaire related to TB knowledge, attitudes and practices from March to June 2023 and data were analyzed by SPSS.

Results: In general, health care workers' knowledge level was about 62%. However, it was revealed that doctors' knowledge was slightly higher than nurses. Also, the level was higher among responders' who had the bachelor's and master's degrees as well as their years of experience were 11- 15 years and those who have work experience more than 26 years. Also, Job profession and gender were not associated with the level of knowledge. Furthermore, the study reported that their attitude means is 1.98. On the other hands, their practices regarding TB infection control were not very effective at 56.9%. Additionally, there was no relationship between practices and job profession, gender, qualification and years of experience.

Conclusion: Even though the level of HCW KAP was moderate, some significant knowledge gaps as well as poor attitudes and practices regarding tuberculosis control were identified among them, therefore, they should receive training in order to enhance their understanding of tuberculosis infection control guidelines and control measures. It is essential that health care workers receive education on best practices for TB control in order to reduce TB transmission, as well as decrease TB-related morbidity and mortality.

Key words:

Attitudes, infection control IC, KAP, Knowledge, Practices, Tuberculosis TB, Tuberculosis Infection Prevention Care TBIPC.

1: Introduction

Tuberculosis (TB) infection rate is rising in the world,and itis considered the most common cause of infectious disease-related mortality[1].Each year, more than 10 million peopleare infectedwith TB [2],and the prevalence and incidence rates of TB is higher in developing countries than in other countries[3]. In Libya, TB is the eighth-most lethal illness. However, government investment in the fight against tuberculosis has usually lagged due to a significant number of immigrants from countries where tuberculosis is widespread, such as Niger, Egypt, Sudan, and Chad [4].On the other hand, the TB morbidity rate for the year 2021 is estimated at about 134 per 100,000 people around the world, 0.89 of whom are infected with AIDS. At the local level, the TB morbidity rate in Libya is about 59 per 100,000 people, and 0.38 of them were infected with AIDS in 2021 [1].

According to the WHO, TB illness is often associated with expensive economic costs and negative social effects[5].Besides, it costs the world economy over 1trillion US$ between 2015 and 2030, and kills around 28 million people if control measures are not stepped up [6].

According to the CDC (2021), TB infection can affect anyone, but certain people are more vulnerable to infection because they are at higher risk than others, such as employees who are working at health care facilities and caring for patients in institutions such as hospitals, homeless shelters, correctional facilities, nursing homes, and residential homes for those with HIV disease. Also, people with medical conditions that weaken the immune system [7].

Moreover, the main risk to the public and healthcare workers is the misidentified or unsuspected TB patient. In many low- and middle-income countries, the danger of *Mycobacterium Tuberculosis* transmission from patients to healthcare personnel is an issue that is often ignored [8]. Workers in the health care sector contribute significantly to the global fight against tuberculosis[9], they are at a high risk of active and latent TB infection because they are exposed toinfected patients in the workplace[10], and the high LTBI incidence among workers was associated with an increase worker age [11]and work length in hospitals[12].

The risk of TB cross-transmission can be decreased by Knowledge of TB infection prevention and control (TBIPC) measures among HCWs[13].Many studies conducted around the world have revealed that health care workers (HCWs) have significant knowledge gaps regarding TB diagnosis, treatment,infection prevention and control. They also exhibit poor practices and negative attitudes toward the disease. All of these factors increase the HCWs' risk of infection and have an unfavorable effect on patients and the community.[14].Therefore, raising the knowledge level of HCWs about TB, would improve the likelihood to achieving TB control. So that, in order to reduce the transmission of TB effectively, healthcare workers must possess the necessary education and training[15].
A fundamental knowledge of TB is needed for effective infection control and management[9].For that reason, healthcare workers need to have an adequate level of knowledge, practice and attitude toward TB infection prevention and control measures. Therefore, the aim for this study is to assess the level of Knowledge, Attitude, and Practice KAP of physicians and nurses regarding TB infection control.

2: Methods and Material

2.1 Study site: -
This study was conducted at the AL-Kuwaifiyah Specialized Teaching Hospital for Chest and Tuberculosis in Benghazi, Libya.

2.2 Study Design: -
This was a cross-section study.

2.3 Method of data collection: -
The data was collected by a self- administrated questionnaire to assess thelevel of knowledge, attitude and practice among physicians and nurses working in AL-Kuwaifiyah Specialized Teaching hospital.

2.4 Questionnaire Design: -

The questionnaire includes four sections;

- Section one: it involves socio-demographic information of the participants, which includes age, gender, years of experience, and qualification level. Additionally, it involves other questions regarding previousvaccination and training on TB prevention in the hospital.
- Section two: it involves questions to evaluate the knowledge level; it includes 8 questions about tuberculosis.
- Section three: it involves seven questions about practices that must be taken to prevent and control of tuberculosis.
- Section four: it includes nine questions regarding attitude.

2.5 Sample size: -

The total number of physicians and nurses who worked in the hospital were 173. The questionnaires were distributed,and only 112 out of 173 were returned, with a response rate of 64%,which included 48physicians and 65 nurses.

2.6 Data collection time: -

The data were collected over a period of time from March to June 2023.

2.7 Statistical analysis:

The study uses the statistical package for social sciences (SPSS) version 22 software to analyze the collected data. The frequency and percentage of each question were determined. Furthermore, a T test and an ANOVA test were used to assess therelationship between the knowledge and practices of physicians and nurses and some variables.

2.8Ethical consideration: -

This study was conducted after getting permission from the manager of the AL-Kuwaifiyah Specialized Teaching Hospital for Chest and Tuberculosis, the permission was obtained after sending a preliminary request letter from the University Of Benghazi to the manager of this hospital.

2.9 Limitation: -

The limitations of this study could be the smallsize of study participants compared to other similar studies, which the aim of this study was to fill questionnaires from the whole workers. However, about 60 of them refused to fill out the questionnaire and participate in this study.

3: Results:

Part 1: Demographic information of the participants

Table 1 shows that more than half of the sample were females (N=89, 79.5%) and only 20% were males (N=23), and it shows the highest percentage of participants was at age group between 31and 40 (41.1%), while the lowest percentage was in the age group more than 50 years.

Furthermore, it indicated that the percentage of doctors is lower than the percentage of nurses; which were 42.9% and 57.2% respectively. Besides, it represents that the majority of the sample had experience between 0 and 5 years (31.3%).

Moreover, the percentages of the education level of health care workers were equal for people with a diploma and bachelor's degree (N=50, 44.6% separately), which is the highest percentage, while the lowest among them was for people with a PhD (N=3, 2.7%), and those with a master's degree (N=4,3.6%) and secondary school graduates was (4.5%, N = 5).

Also, it shows that the highest percentage of people were taking care of TB patients for more than 10 years; which were 40.2% of the sample.

Moreover, the largest percentage of participants were vaccinated against tuberculosis (82.1) and only 14.3% of them were not vaccinated.

Furthermore, the highest percentage of the participants had the training about tuberculosis prevention; which were 50.9%, and the people who did not train were 37.5.

Characteristics	Options	Frequency	Percentage
Gender	Male	23	20.5
	Female	89	79.5
Age	20-30Years	30	26.8
	31-40Years	46	41.1
	41-50Years	25	22.3
	>50Years	11	9.8
Professions	Doctor	48	42.9
	Nurse	64	57.2

Table.1:Demographic information of the participants

Years of experience	0-5Years	35	31.3
	6-10Years	20	17.9
	11-15Years	19	17.0
	16-20Years	10	8.9
	21-25Years	10	8.9
	>26Years	18	16.1
Educational level	Secondary school	5	4.5
	Diploma	50	44.6
	Bachelors	50	44.6
	Master	4	3.6
	PhD	3	2.7
How long have you cared TB patient	<1Years	21	18.8
	1-5 Years	16	14.3
	5-10 Years	15	13.4
	>10 Years	45	40.2
	Never	15	13.4
Are you vaccinated against TB	Yes	92	82.1
	No	16	14.3
	Not sure	4	3.6
Training on TB	Yes	57	50.9
	No	42	37.5
	Not sure	13	11.6

Part 2: Knowledge level of the participants

According to table 2, the knowledge level of the workers at Al-Kuwaifiya Hospital for Chest Diseases is 62.3% in 2023, and the majority of knowledge questions were correctly answered by the participants, however, the lowest number of correct answers were observed in question19, which is related to the definition of MDR-TB.

Table.2: Physicians and nurses' frequency and percentage of distribution the questions to evaluate knowledge level

Question	Answers	Frequency	Percent %
Q1: cause of TB	Incorrect answer	13	11.6
	Correct answer	99	88.4
Q2: Agent of TB	Incorrect answer	48	42.9
	Correct answer	64	57.1
Q3: Symptoms of TB cough	Incorrect answer	17	15.2

	Correct answer	95	84.8
Q4: Symptoms of TB bloody sputum	Incorrect answer	37	33.0
	Correct answer	75	67.0
Q5: Symptoms of TB FEVER	Incorrect answer	28	25.0
	Correct answer	84	75.0
Q6: Symptoms of TB weight loss	Incorrect answer	25	22.3
	Correct answer	87	77.7
Q7: Symptoms of TB night sweating	Incorrect answer	37	33.0
	Correct answer	75	67.0
Q8: Can TB be completely cured	Incorrect answer	12	10.7
	Correct answer	100	89.3
Q9: How is TB transmitted	Incorrect answer	1	0.9
	Correct answer	111	99.1
Q10: a higher risk to get TB is People living with HIV/AIDS	Incorrect answer	22	19.6
	Correct answer	90	80.4
Q11: a higher risk to get TB is young children	Incorrect answer	88	78.6
	Correct answer	24	21.4
Q12: a higher risk to get TB is Close contacts of a confirmed case	Incorrect answer	17	15.2
	Correct answer	95	84.8
Q13: a higher risk to get TB is Laboratory staff	Incorrect answer	85	75.9
	Correct answer	27	24.1
Q14: a higher risk to get TB is People with medical conditions	Incorrect answer	44	39.3
	Correct answer	68	60.7
Q15: a higher risk to get TB is Undernourished people	Incorrect answer	68	60.7
	Correct answer	44	39.3
Q16: a higher risk to get TB is People drinking alcohol or smokers	Incorrect answer	79	70.5
	Correct answer	33	29.5
Q17: a higher risk to get TB is Prisoners	Incorrect answer	53	47.3
	Correct answer	59	52.7
Q18: Do you think there is any relationship between HIV and TB	Incorrect answer	28	25.0
	Correct answer	84	75.0
Q19: What is MDR-TB	Incorrect answer	99	88.4
	Correct answer	13	11.6
Mean of the knowledge level		**62.3**	

The knowledge level of the participants according to some variables:

Table 2 shows that the knowledge levels of doctors and nurses are 68.3% and 57.8% respectively.Furthermore, it reports that the knowledge level of males is 62.2%, while the females' knowledge level is 62.3%. and the highest knowledge level was reported among participants who worked for more than 26 years; then comes participants who had 11 to 15 years of experience, which were 74.8% and 73.6% respectively.On the other hand, workers with 21 to 25 years of experience had the lowest level of TB knowledge, which was 36.3%.

Moreover, it indicated that the participants with highest knowledge levelshad bachelors and master qualifications; which were 68.7 % and 68.4% respectively. on the other hand, participants who hold secondary school level represent the lowest knowledge level; which was 51.5%.

Table.3: Knowledge level of the participants according to some variables:

	Characteristics	N	Mean	Median	Std. Deviation
Professions	Physicians	48	68.3%	68.4	17.3
	Nurse	64	57.8%	57.8	22.0
Gender	Male	23	62.2%	68.4	19.2
	Female	89	62.3%	63.1	21.2
Years of experience	0-5	35	54.8%	52.6	17.3
	6-10	20	68.6%	73.6	20.3
	11-15	19	73.6%	73.6	14.8
	16-20	10	57.8%	47.3	21.7
	21-25	10	36.3%	26.3	18.8
	More than 26	18	74.8%	76.3	13.9
Level of education	Secondary school	5	51.5%	42.1	22.1
	Diploma	50	56.7%	57.8	22.2
	Bachelor's degree	50	68.7%	68.4	17.1
	Master	4	68.4%	68.4	21.9
	PhD	3	59.6%	52.3	27.0

According to the results of the T test, there is no relationship between knowledge level and job profession because the p value is more than 0.05 whereas (p=0.071). Furthermore,there's no statistical correlation between knowledge level and gender because the p value is 0.567, which is greater than 0.05 (see table.4).

Table.4: Results of the T test for examining relationship between knowledge level and job profession

	F	P value	T	df
job profession	3.326	0.071	2.700	110
Gender	0.330	0.567	-0.030	110

Besides, according to the results of the ANOVA test, a positive association was reported between knowledge level regarding TB and the years of participants' experience because the p value is less than 0.05, whichwas 0.00 (see table.7). Moreover, a positive correlation between the participants knowledge level and their level of qualification since the p value of the result of the ANOVA test is 0.03 (see table.5).

Table 5: Results of the ANOVA test for examining Relationship between knowledge level and years of experience.

	F	P value	Mean of square	df
years of experience	9.656	0.00	2996.6	5

Educational level	2.683	0.03	1091.0	4

Part 3: Attitude of physicians and nurses regarding TB infection:
Among the 112 participants in this study, 105 (93.7%) had a positive attitude (agree and strongly agree) towards making people with suspected or confirmed pulmonary TB wear masks in the hospital, and 7 (6.2%) had a negative attitude (disagree, strongly disagree and neutral). Besides, 92 (82.1%) out of 112 participants had a positive attitude toward they think are at high risk of getting TB disease and only 20 (17.8%) had a negative attitude (see table 6).

Table.6: Respondents' attitudes of physicians and nurses towards TB infection

Attitude	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**
Q1: Do you think you are at high risk of getting TB disease?	65(58.0)	27(24.1)	9(8.0)	9(8.0)	2(1.8)
Q2: Multi-drug resistant tuberculosis is a major health problem in Benghazi	45(40.2)	48(42.9)	17(15.2)	1(9.0)	1(9.0)
Q3: The majority of staff in your health center have adequate training regarding tuberculosis infection control	17(15.2)	36(32.1)	32(28.6)	21(18.8)	6(4.5)
Q4: Making people with suspected/confirmed pulmonary tuberculosis wear masks in the hospital is acceptable	77(68.8)	28(25.0)	4(3.6)	2(18.0)	1(9.0)
Q5: Teaching tuberculosis patients cough hygiene is not important	16(14.3)	10(8.9)	15(13.4)	33(29.5)	38(33.9)
Q6: If I contracted tuberculosis, I would be allowed to continue working in my current capacity	7(6.3)	9(8.0)	4(3.6)	31(27.7)	61(54.4)
Q7: infectious diseases that can be transmitted in air?	58(51.8)	39(34.8)	6(5.4)	7(6.3)	2(1.8)
Mean		**1.98**			

Part 4: Practice level of the participants:

Table 7 shows that the practice level of the involved sample was poor at 56.9%.Also, it was observed that the majority of doctors and nurses wear masks when they deal with TB patients, and 54.5% of the participants placed the coughing patients who were in the queue in a separate waiting area. On the other hand, 103 out of 112 said the most suitable ventilation in TB rooms is natural ventilation.

Table7: Practice of participants on TB infection control

Practice	**Options**	**No.**	**%**
Q1: What did you do for coughing patient in queue?	Ask duration of their cough	19	17
	Place them in separate waiting area	61	54.5
	Place them in front of queue	5	4.5

	Inform about cough etiquette	18	16.1
	Do nothing	9	8
Q2: Do you separate coughing patients from others?	Yes	63	56.3
	No	11	9.3
	Sometimes	38	33.9
Q3: Do you Provide a mask to a coughing patient?	Yes	94	83.9
	No	4	3.6
	Sometimes	14	12.5
Q4: Do you wear a mask when you deal with a coughing patient?	Yes	105	93.8
	No	3	2.7
	Sometimes	4	3.6
Q5: Do you wear a mask when you deal with a TB patient?	Yes	107	95.5
	No	1	9
	Sometimes	4	3.6
Q6: What type of mask do you use?	N 95 mask	44	39.3
	Surgical mask	62	55.4
	FFP	1	9
	Use face shield	4	3.6
Q7: Regarding TB room ventilation, it is	Don't use any mask	1	9
	Positive pressure room	4	3.6
	Negative pressure room	5	4.5
	Natural ventilation	103	92
Q8: Do you Educating patients about cough hygiene?	Yes	66	58.9
	No	14	12.5
	Sometimes	32	28.6
Q9: Do you Turning on a fan in waiting rooms?	Yes	28	25
	No	56	50
	Sometimes	28	25
	Mean	**56.9**	

Practices level of workers and some variables:

Fromtable.8, the level of nursing practices was higher than that of doctors; which were 59.2 and 53.9. respectively. Also, the table shows that the mean practice of the female was 59.3, while that of the male was 47.8. Besides, the average of practices compared to qualification levelshows that the values of the averages of qualification level and years of experience groups were almost close to each other.

Table8: Practice and job professions

`		N	Mean	Median	Std. Deviation
Professions	Physicians	48	53.9	68.4	17.3

	Nurse	64	59.2	57.8	22.0
Gender	Male	23	47.8	68.4	19.2
	Female	89	59.3	63.1	21.2
Years of experience	0-5	35	52.4	52.6	17.3
	6-10	20	57.8	73.6	20.3
	11-15	19	59.6	73.6	14.8
	16-20	10	60.0	47.3	21.7
	21-25	10	60.0	26.3	18.8
	More than 26	18	58.6	76.3	13.9
Level of education	Secondary school	5	48.8	42.1	22.1
	Diploma	50	59.7	57.8	22.2
	Bachelor's degree	50	55.1	68.4	17.1
	Master	4	58.3	68.4	21.9
	PhD	3	51.8	52.3	27.0

Furthermore, Table 9 reports that there is no statistical relationship between practices and job professions. Moreover, there is no positive correlation between practices of participants and gender because the p value was more than 0.05.

Table.9: Relationship between practices and job professions

	F	**Sig.**	**t**	**df**
Job profession	0.221	0.639	-1.813	110
Gender	0.031	0.861	-3.335	110

Furthermore, table 10 reports no statistical association between TB infection control practices and years of experience because the*p* value was more than 0.05. Besides, it shows no positive association between qualification level and TB infection control practices because the *p* value was more than 0.05.

Table.10: Relationship between TB infection control practices and years of experience. (ANOVA test)

	F	**Sig.**	**df**
Years of experience	0.94	0.454	5
Qualification level	1.039	0.391	4

4. Discussion:

4.1: The knowledge level of health care workers:

Health care providers with TB knowledge deficits may provide substandard care, inefficient services, waste resources, and impact health outcomes, as well as increase TB transmission and resistance. For these reasons the aim of this study is to assess the level of knowledge, attitude, and practice of physicians and nurses working in the AL-Kuwaifiyah Specialized Teaching Hospital for Chest and Tuberculosis in Benghazi, Libya regarding TB infection control.

The findings of this study indicated that the Knowledge levels of participants at Al-Kuwaifiya Hospital regarding TB infection prevention and control are good. Nevertheless, their knowledge level regarding MDR-TB was low or weak. This finding in agreement with a previous study conducted in Iraq, which

revealed that 95.5% of healthcare workers had a good knowledge regarding TB prevention and control [16]. Alongside this, a studyin West Ethiopia conducted by Golja showed that the workers had an excellent knowledge level regarding TB infection control, around 86% [17].
Also, the results are close to study conducted in Qassim, Saudi Arabia that illustrated the knowledge level of study participants regarding TB infection was 67.6% [18]. On the other hand, the results of the current study were inconsistent with a previously conducted study by Shrestha et al., which reported that the knowledge level of HCWs about TB control was 54%, while 46% of them had a poor knowledge level in the Kathmandu Valley of Nepal [19].Similarly, Vigenschow et al. indicated a poor knowledge level among participants of healthcare workers in Moyen-Ogooué Province, Gabon, which scored 40.8% [9]. Moreover, another earlier study reported that the knowledge level of study participants was poor in Saudi Arabia during Hajj season; which was around 52 % [14]. Similarly, the Knowledge level in Southern Mozambique, where the researchers revealed that the knowledge level of participants is poor around 57.3% [15].Alternatively, Baral & Koirala found poor knowledge levels among nurses in Pokhara, Nepal, which was 34.6% in 2021 [13].There are several possible explanations for these results, the reasons could be training deficiencies, routine duties of critical care nursing, and policy consistency in each hospital.

Consider the statistical correlation between knowledge and health care workers job professions, the results revealed no significant relationship between the knowledge level and job professions. It also showed that there is a slight difference in the knowledge level regarding TB prevention, which revealed that doctors' knowledge levels were slightly higher than nurses' knowledge levels. This was supported by the Vigenschow et al. study which reported about 70% of the doctors had excellent knowledge, while 45.5% of the nurses had good knowledge in Moyen-Ogooué Province, Gabon[9].

In addition, the present study indicated that there was no statistical correlation between knowledge level regarding TB control measures and gender because the knowledge level of both males and females is very close; therefore, both of them had a good level of knowledge. This result was close to Hashim et al., which found that the knowledge levels of both genders were good and the level of male is slightly higher than female, which was (61.7%) and(65.8%) respectively [16]. The findings of the present study were inconsistent with the findings of the Shrestha et al. study in Nebal; they observed a significant difference in the knowledge level between males and females. Shrestha et al. revealed that the knowledge levels of females were good(60.2%) and higher than males which were poor (39.8%)[19].In contrast, the previous studies conducted in Nigeria showed that there was a significant difference in the level of knowledge among females compared to males, which the knowledge level of females is good (75.3%), while the knowledge level of males is poor (24.7%) [20]. This was contradictory to a study conducted in Qassim, Saudi Arabia, which indicated the level of knowledge of males was higher than females, which was 70% of males having a good knowledge level and only 64.5% of females had good knowledge regarding TB infection control [18].

Furthermore, the present study found that nurses' and doctors' knowledge levels regarding TB infection control measures have statistically significant relationship with qualification level. it found that those with higher educational levels such as bachelor's and master's degrees had a higher level of knowledge than those with lower qualifications.This comes in agreement with the Vigenschow et al. study, in which they found that HCWs' knowledge had a statistical correlation with their qualification levels, in more detail, they found that bachelor's degree holders had good knowledge about TB infection control [9]. Alongside this, Neo et al. reported that there was a positive association between the knowledge level and qualification level of study participants [15].In contrast, the findings of the Hashim et al. study come in differ from the present study findings, which indicated that the level of knowledge has no significant relationship with HCWs qualifications, which reported that a high knowledge levels regarding TB infection control measures were observed at all levels of qualification [16].

According to the results of the present study, there is an association between knowledge level regarding TB infection control and years of experience; however, it was found that doctors and nurses with years of experience between 11-15 years and >26 years had a good knowledge level compared to other categories. In contrast, Shrestha et al.observed no significant difference between knowledge level and years of experience, as the mean for years of experts is close to each other [19].On the other hand, Vigenschow et al. reported that the knowledge levels with years of experience 6-10 years and 11-20 years had a good knowledge level compared to other categories [9].

4.2 Attitudes of physicians and nurses regarding TB infection control

This study found that the attitudes of the respondents were positive.It found that the participants had the highest positive attitude towards the statement of making people with suspected or confirmed pulmonary TB wear masks in the hospital. However, it is considered a high practice level compared to a previous study conducted in the Centre region of Cameroon in 2022[21].There are similarities between the findings of the current study and the results of previously conducted studies in Nepal and Moyen-Ogooue Province; they found that participants had positive attitudes toward TB infection control measures[19, 9]. On the other hand, the current study is in differentfrom a study conducted in Iraq, which reported that healthcare workers had a negative concept regarding TB prevention and control [16].

4.3 Practice level of physicians and nurses regarding TB infection control

The current study showed that health care workers' practice levelwas poor. Compared to the previous studies, some of them reported a high practice level and the others reported a low level [22].The resultsof this study are considered to be higher compared to a previous study conducted in Iraq,in which the practice level of participants was around 38.2% [16]. Similarly, a previous study conducted by Noe et al. in southern Mozambique found that the practice level was 35.6% [15].Alongside this, Adebanjo and Malangu reported that unsafe practicesin TB control are directly associated with low knowledge levels regarding TB prevention [23].However,Khaund et al. indicated a good knowledge level with a bad practice level among workers in TB units at a multi-specialty tertiary care hospital in India [24].

On the other hand, these results were not consistentwith a study conducted in west Ethiopia, which found a high level of practicereported among a high percentage of workers [17].Besides, Tenna et al. found that a majority of physicians and nurses at 2 university hospitals in Addis Ababa had excellent knowledge toward TB prevention and control, which was more than 90%, and it was reported that only 56% of them said gloves do not protect them from TB infection. Furthermore, 92% believe that by performing hand hygiene, they will not transmit the infection to patients, and they also believe that wearing a mask is an essential step in preventing disease. Additionally, it indicated that only 7% performed hand hygiene before contact with patients, 42% before contact with patients' wound, and only 48%did hand hygiene after contact with patients. Also, it reported that physicians perform hand hygiene more than nurses [25].

Furthermore, Engelbrecht et al. observed that nurses in primary healthcare workers in South Africa had positive attitudes and good practices toward TB infection control in 2016, and they reported that the increase in attitude was correlated with an increase in practice by 1.090 times [26]. Besides, Temesgen et al. found that the majority of health professionals in Northwest Ethiopia hadgood TBIC knowledge and practice, and this level was high among professionals who trained on TBIC [27].

There are several possible explanations for this variation; it could be a result of the differences in sample size, the quality of the healthcare centers, and the training and educational programs that health care workers received.

Regarding the association between practice level and job professions.The present study that reported there was no association in the practice level between nurses and physicians. Besides, no previous research studied the relationship between practice level and job professions.

In addition, the present study has shown that there is no positive correlation between the practice level of TB prevention among females and males. On the other hand, there is no published articles study the same correlation.

Moreover, the present study indicated no significant relationship between the practice level of physicians and nurses regarding TB infection control measures and their level of education. Compared to the previous studies, no study discussed the relationship between the practice level of healthcare workers and their educational level.

According to the current study, there is no significant correlation between the practice level and years of experience of health care workers.On the other hand, there was no scientific study on the relation between years of experience and practice regarding TB infection control until now.

5: Conclusion

The physicians and nurses had a good knowledge level regardingTB infection control measures in Al-Kuwaifiya Hospital for chest diseases. In addition, those with bachelor's and master's degrees had a higher level of knowledge than those with other qualifications. Furthermore, this study reported no

statistical differences in the knowledge level between males and females or job professions. However, it found a significant relationship between years of experience and qualification and knowledge level. On the other hand, the study found that health care workers had a positive attitude; additionally, it revealed that the practice level of physicians and nurses was poor and it was reported that there was no statistical association between practice level and gender, years of experience, job profession, or qualification. Health care workers need to be educated about TB control measures in order to improve their knowledge, attitude, and practice.

Reference:

[1]. WHO. Sever of infection. 2021. Available online at https://www.healthynewbornnetwork.org/issue/severe-infections-pneumonia/

[2]. WHO. Global tuberculosis report 2023. 2023. Available online at https://www.who.int/publications/i/item/9789240083851

[3]. Okhovat-Isfahani B, Bitaraf S, Mansournia MA, Doosti-Irani A. Inequality in the global incidence and prevalence of tuberculosis (TB) and TB/HIV according to the human development index. *Med J Islam Repub Iran*. 2019 (22 May); 33:45.

[4]. Balakrishnan VS. The burden of tuberculosis in Libya. The Lancet Respiratory Medicine. 2022 Nov 1;10(11):e99-100.

[5]. WHO. Financial burden. 2023 available online at http://www.who.int?westernpacific/activities?addressing-financial-burden-due-t0-tb

[6]. Burki TK. The global cost of tuberculosis. The Lancet Respiratory Medicine. 2018 Jan 1;6(1):13.

[7]. CDC, 2021. Tuberculosis Risk Factors. Available online at https://www.cdc.gov/

[8]. Demissie Gizaw G, Aderaw Alemu Z, Kibret KT. Assessment of knowledge and practice of health workers towards tuberculosis infection control and associated factors in public health facilities of Addis Ababa, Ethiopia: A cross-sectional study. Archives of public health. 2015 Dec;73:1-9.)

[9]. Vigenschow A, Edoa JR, Adegbite BR, Agbo PA, Adegnika AA, Alabi A, Massinga-Loembe M, Grobusch MP. Knowledge, attitudes and practices regarding tuberculosis amongst healthcare workers in Moyen-Ogooué Province, Gabon. BMC Infectious Diseases. 2021 Dec;21(1):1-7.

[10]. Lubis R, Giriputro S, Handayani D. High prevalence of latent tuberculosis infection among helathcare workers with history of contact with tuberculosis hospital. Respirology. 2017;22(Suppl 3):4-87.

[11]. Kayanja HK, Debanne S, King C, Whalen CC. Tuberculosis infection among health care workers in Kampala, Uganda. The international journal of tuberculosis and lung disease. 2005 Jun 1;9(6):686-8.

[12]. de Lourdes García-García M, Jiménez-Corona A, Jiménez-Corona ME, Ferreyra-Reyes L, Martínez K, Rivera-Chavira B, Martínez-Tapia ME, Valenzuela-Miramontes E, Palacios-Martínez M, Juárez-Sandino L, Valdespino-Gómez JL. Factors associated with tuberculin reactivity in two general hospitals in Mexico. Infection Control & Hospital Epidemiology. 2001 Feb;22(2):88-93.

[13]. Baral MA, Koirala S. Knowledge and practice on prevention and control of tuberculosis among nurses working in a regional hospital, Nepal. Frontiers in Medicine. 2022 Feb 4;8:788833.

[14]. Alotaibi B, Yassin Y, Mushi A, Maashi F, Thomas A, Mohamed G, Hassan A, Yezli S. Tuberculosis knowledge, attitude and practice among healthcare workers during the 2016 Hajj. PloS one. 2019 Jan 25;14(1):e0210913.

[15]. Noé A, Ribeiro RM, Anselmo R, Maixenchs M, Sitole L, Munguambe K, Blanco S, le Souef P, García-Basteiro AL. Knowledge, attitudes and practices regarding tuberculosis care among health workers in Southern Mozambique. BMC pulmonary medicine. 2017 Dec;17:1-7.

[16]. Hashim DS, Al Kubaisy W, Al Dulayme A. 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.

[17]. Golja EA. The assessment of knowledge, attitude and practice towards tuberculosis infection control among health professionals in Nekemte referral hospital, Nekemte, Oromia, West Ethiopia: cross sectional facility based study. International Journal of Infection Control. 2020 Jul 23;16(3).

[18]. Abalkhail, A., Al Imam, M.H., Elmosaad, Y.M., Jaber, M.F., Al Hosis, K., Alhumaydhi, F.A., Alslamah, T. and Mahmud, I., 2021. Knowledge, Attitude and Practice of Standard Infection Control Precautions among Health-care Workers in a Hospital in Qassim, Saudi Arabia: A Cross-sectional Survey.

[19]. Shrestha A, Bhattarai D, Thapa B, Basel P, Wagle RR. Health care workers' knowledge, attitudes and practices on tuberculosis infection control, Nepal. BMC infectious diseases. 2017 Dec;17(1):1-7.

[20]. Ekuma AE, Oridota ES. Knowledge, attitude and tuberculosis infection control practice among healthcare workers in DOTS centres in Lagos, Nigeria. International Journal of Infection Control. 2016 Dec 2;12(4).

[21].Vukugah, T.A., Akoku, D.A., Tchoupa, M.M. and Lambert, E., 2022. Knowledge, Attitude, and Practice on Pediatric Tuberculosis Management among Healthcare Workers in the Centre Region of Cameroon: A Cross-Sectional Study. Journal of Tropical Medicine, 2022.

[22].Farhanah AW, Sarimah A, Jafri Malin A, Hasnan J, Siti Suraiya MN, Wan Mohd Zahiruddin Wan M, Abdul Aziz MY, Tharakan J, Shalini B, Muthuraju S, Mohd Shah M. Updates on knowledge, attitude and preventive practices on tuberculosis among healthcare workers. Malaysian Journal of Medical Sciences. 2016;23(6):25-34.

[23]. Adebanjo OD, Malangu N. Knowledge and practices about multidrug-resistant tuberculosis amongst healthcare workers in Maseru. African Journal of Primary Health Care and Family Medicine. 2015 Jan 1;7(1):1-5.

[24]. Khaund K, Sudhakar C, Vaz CJ. Infection Control Prevention Practices on Pulmonary TB Transmission among Health Care Personnel of Selected Hospital in India. Journal of Clinical & Diagnostic Research. 2018 Nov 1;12(11).

[25].Tenna A, Stenehjem EA, Margoles L, Kacha E, Blumberg HM, Kempker RR. Infection control knowledge, attitudes, and practices among healthcare workers in Addis Ababa, Ethiopia. Infection Control & Hospital Epidemiology. 2013 Dec;34(12):1289-96.

[26]. Engelbrecht M, Janse van Rensburg A, Kigozi G, van Rensburg HC. Factors associated with good TB infection control practices among primary healthcare workers in the Free State Province, South Africa. BMC infectious diseases. 2016 Dec;16(1):1-0.

[27]. Temesgen C, Demissie M. Knowledge and practice of tuberculosis infection control among health professionals in Northwest Ethiopia; 2011. BMC health services research. 2014 Dec;14(1):1-7.