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Health Care Workers Knowledge and Attitude on Tuberculosis Infection Control \ Mosul-Iraq

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Abstract: BACKGROUND: M. tuberculosis infection has a considerable global impact. The World Health Organization estimated in 2021 that more than two billion individuals, nearly one-third of the worldwide population were infected with Mycobacterium tuberculosis. TB remains a leading cause of mortality in the world according to the WHO. The aim of the current study was to assess the knowledge and attitude between specialist and general practitioners who are working in the primary health care centers in Mosul City in Iraq.

METHODS: A cross-sectional survey was performed using a pretested self-administered questionnaire on a sample of 190 randomly selected doctors (specialists and general practitioners) from primary health care centers in Mosul. Descriptive analysis was used in data analysis.

RESULTS: The level of knowledge on TB infection control among almost half (45.8%) of the HCWs was good. The knowledge level was significantly associated with educational status, and TB training and/or orientation received. The majority (73.2%) of HCWs had positive attitude towards TB infection control.

CONCLUSIONS: The majority of participants had good knowledge about disease signs and symptoms, GP and specialists had significant differences in their knowledge about the necessity of sputum tests in the diagnosis of tuberculosis. Majority of participants exhibited a positive attitude towards TB patients.

Keywords: tuberculosis, KAP study, primary health care centers, physician, Mosul.

INTRODUCTION

Infection control remains a key challenge for Tuberculosis (TB) control program with an increased risk of TB transmission among health care workers (HCWs), especially in settings with inadequate TB infection control measures.

Tuberculosis is a common disease caused by a microorganism called Mycobacterium tuberculosis. In many cases it is a lethal, infectious disease caused by various strains of mycobacterium. The *M. tuberculosis* complex (MTBC) comprises four other TB-causing mycobacteria: *M. africanum, M. bovis, M. canetti, and M. microti*"[1, 2].

Robert Koch published the first description of Mycobacterium TB, known as the tubercle bacillus" on March 24, 1882. He awarded the Nobel Prize in 1905 for this discovery. Koch's bacillus is another name for the bacteria. Any organ in the body can be affected by TB, although the most typical site of infection is the lungs (pulmonary tuberculosis) [3]. Pulmonary TB typically accounts for about 90% of TB cases [4]. Extra- Pulmonary TB infects other organs than the lymph nodes, lungs such as pleura, skin, intra-thoracic lymphadenopathy (which could be mediastinal or hilar), genital

and urinary tracts, meninges, bones, joints [5]. Extra pulmonary TB sometimes coexists with pulmonary TB. Anyhow, a patient who had pulmonary and extrapulmonary tuberculosis was diagnosed with pulmonary tuberculosis [6].*Mycobacterium tuberculosis* is typically transmitted by inhaling infectious droplet nuclei containing viable bacilli (aerosol spread) [7]. TB can remain in the air for several hours when a person with active TB starts to cough. Bacilli can also be expelled by sneezing or spitting [8]. The risk of disease transmission is influenced by the initial cases' bacillary load (positive sputum smears and pulmonary opacities on chest radiographs), proximity and duration of exposure which are factors that affect the likelihood of disease transmission [8].

"Mycobacteria are aerobic, non-motile, acid-fast bacilli, non-spore forming bacteria. They are neither gram positive nor gram negative. Although they do not stain readily, once stained they resist decolorization by acid alcohol and retain carbolfuchsin stain, therefore called (Acid Fast Bacilli) [9]. The rapid development of acidity in mycobacteria is due to the high lipid content (approximately 60%) of their cell walls. Mycobacterium tuberculosis, which causes pulmonary and extrapulmonary tuberculosis, is the main human pathogen [9, 10].

The disease has been present in humans since ancient times, with evidence of TB found in human remains from as early as 4000 BC [11]. In 19th century, the industrial revolution provided ideal conditions for the spread of tuberculosis, as people were crowded together in cities and living in unsanitary conditions. It became known as the "white plague" due to the pale appearance of infected people [12]. In 1902, Robert Koch discovered the bacterium responsible for TB, which led to the development of diagnostic tests and treatments. In the 1940s and 1950s, the discovery of antibiotics such as streptomycin greatly improved the prognosis for TB patients [3]. TB remains a significant global health concern, particularly in low-income countries. According to the World Health Organization, TB is one of the top 10 causes of death worldwide, responsible for 1.5 million deaths in 2018. However, the main concern is that drug-resistant strains continue to emerge.

Iraq had a high incidence of TB in the 1950s. In those days, 1,400-3,100 instances of non-pulmonary TB and 3,400-6,800 cases of pulmonary tuberculosis, respectively, were reported each year [6]. Throughout the past ten years the incidence of tuberculosis has been a tripled (from 46.1 in 1989 to 131.6 in 2000 for every hundred thousand citizens). 130 cases per 100000 a year, there are around 273000 new cases a year, of which 12600 are pulmonary tuberculosis (PTB) patients with a positive smear [7].

Early diagnosis and appropriate management of TB cases by knowledgeable and skilled HCWs are key in addressing this global health issue.

METHODOLOGY

To achieve the study's objectives, a cross-sectional descriptive study design is selected to be conducted for physicians' work in primary health care centers in Ayman health Sector and Ayser health sectors of Mosul city/Iraq, and the data collecting period extended from May to July 2023. According to the objectives, the questionnaires were distributed to the primary health care units and given to the working physicians and general practitioner. The selection of enrolled subjects and centers were proportionate with the total number of physicians in Mosul city**.**

A. "Demographic Data"

Age, gender, specialty, and educational level (Diploma, Master's, or Board) were among the fundamental socio-demographic variables that were answered in the study. The survey's questions were modified from one used in a related study. In light of the situation, the questionnaire was somewhat adjusted involving knowledge and attitude.

B. "Knowledge Data"

"Includes the following points, Respondents were requested to choose among two options provided: "Yes", "No": **"**

1. **"**Signs and symptoms of tuberculosis (TB)**".**
2. **"**Method of T.B transmission**".**
3. **"**Person who is at risk of infection **"**?

4. “Method of T.B diagnosis”.
5. “The number of medicines administered in newly detected in active TB”.
6. “Can TB be cured “?
7. ““After starting anti-TB treatment, the number of days contagiousness to be disappeared.
8. ““Duration of T.B treatment”.
9. ““Side effect of the treatment”.
10. “TB treatments have M.D.R (multiple drug resistance)”.
11. “The cost level of TB diagnosis and treatment”.
12. “Vaccination can protect against TB”.

C. “Attitude Data”:

“Include the following date according to participant personal opinion, Respondents were requested to choose among four options provided:

Strongly agree, agree, disagree, and strongly disagree “

1. “Which statement is closest to the feelings about TB patients “?
2. “How community, treat a person with TB”.
3. “How serious is TB in your country”.
4. “There is a high possibility of getting a TB infection”.
5. “The person who could talk about your illness”.
6. “You agree to take treatments for recovery”.
7. “The reason behind that you don’t go to the health facility”.
8. “Using of hygiene kit in a public place”.

Analysis of Statistical Data

The statistical software for social sciences (SPSS version 23) is utilized for the descriptive data analysis. Tables, figures, frequencies, percentages, means, and other metrics were utilized to represent categorical variables.

RESULTS

Demographic data

The included study sample was obtained from Aysar and Ayman health sectors inside Mosul city; 52.1% from Aysar health sector and 47.9% from Ayman health sector as shown in figure (1).

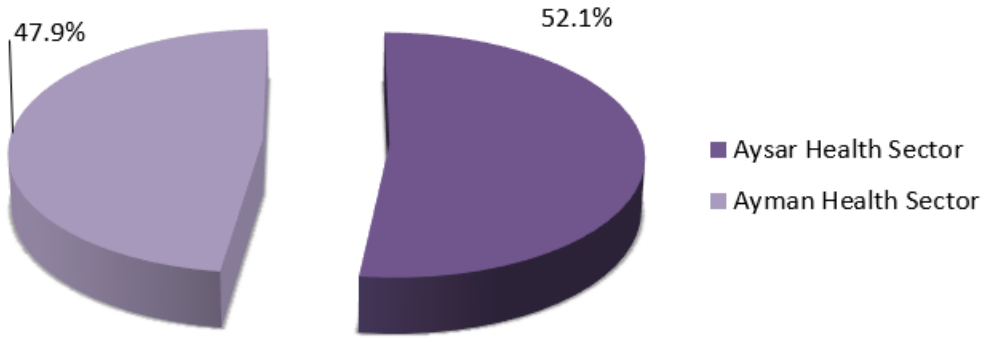

Figure (1): Distribution of the study sample according to work place.

The study sample with 35-45 years age group was the commonest including 68 participants (20 males vs 48 females). Each of the age groups 25-35 and 45-55 years included 51 participants but with different gender distribution (10 males vs 41 females) and (14 males vs 37 females) respectively. The age group 55-65 years involved 20 patients with male-predominance (14 males vs 6 females) as illustrated in figure (2).

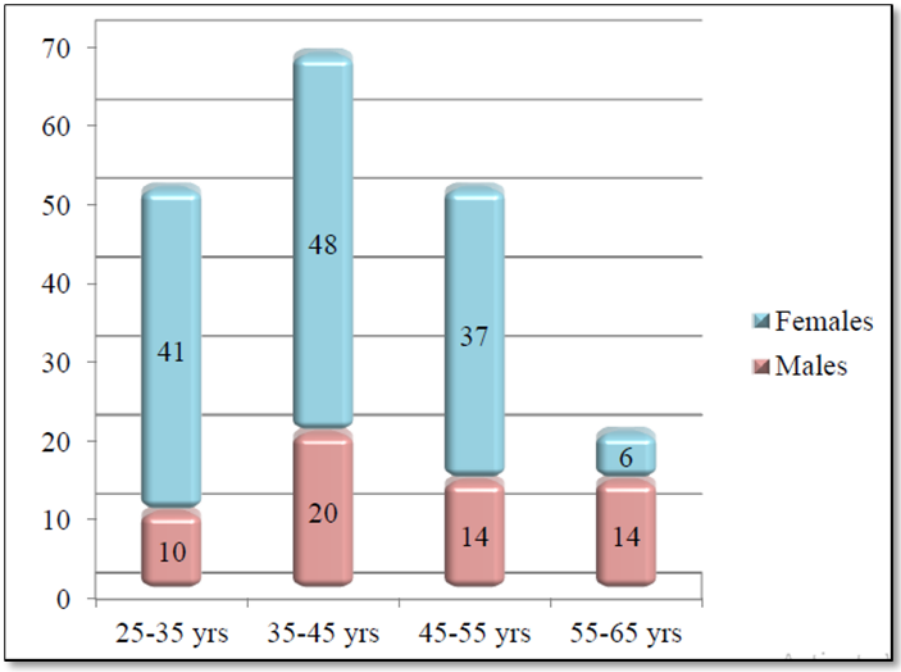

Figure (2): Distribution of the study sample according to gender.

Among the study sample; 106 participants were GP while 84 participants were physician (specialists) as shown in figure (3).

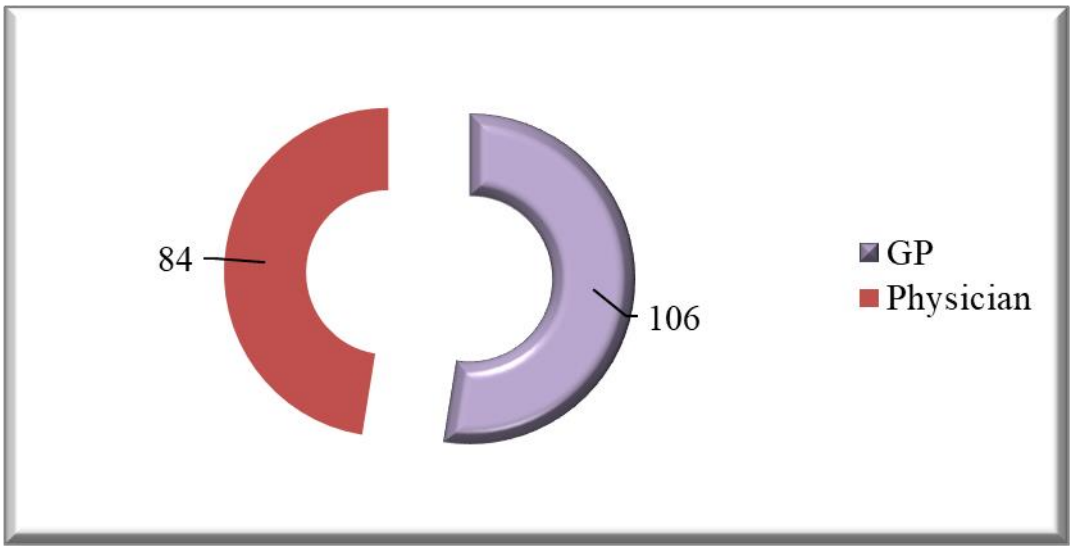

Figure (3): Distribution of GP and Physicians.

Knowledge analysis:

Comparison of response concerning the knowledge was demonstrated in table (1) and revealed statistically significant differences between the responses apart from severe headache.

Table (1): Comparison of response concerning the knowledge.

Knowledge	Response				p-value *
	Yes		No		
	No.	%	No.	%	
Signs and symptoms of tuberculosis					
Cough that lasted (> 3 weeks)	186	97.9	4	2.1	0.000
Coughing blood	185	97.4	5	2.6	0.000
Severe headache	91	47.9	99	52.1	0.562
Weight loss	186	97.9	4	2.1	0.000
Fever	184	96.8	6	3.2	0.000
Night sweating	186	97.9	4	2.1	0.000

Chest pain	144	75.8	46	24.2	0.000
Shortness of breath	166	87.4	24	12.6	0.000
Ongoing fatigue	185	97.4	5	2.6	0.000
Method of T.B diagnosis					
Clinical	60	31.6	130	68.4	0.000
Clinical + tuberculin Test +ve	161	84.7	29	15.3	0.000
Clinical + radiological	146	76.8	44	23.2	0.000
Sputum for acid fast bacilli	186	97.9	4	2.1	0.000
Vaccination can protect against T.B	123	64.7	67	35.3	0.000
*Chi square test has been used					

The distribution of the study sample according to the knowledge about symptoms and signs was demonstrated in figure (4). The figure showed that most of the sample responded with yes for the knowledge about cough that lasted (> 3 weeks), coughing blood, weight loss, fever, night sweating, chest pain, shortness of breath, and ongoing fatigue. The low response was with severe headache on which, only half of the sample responded with yes.

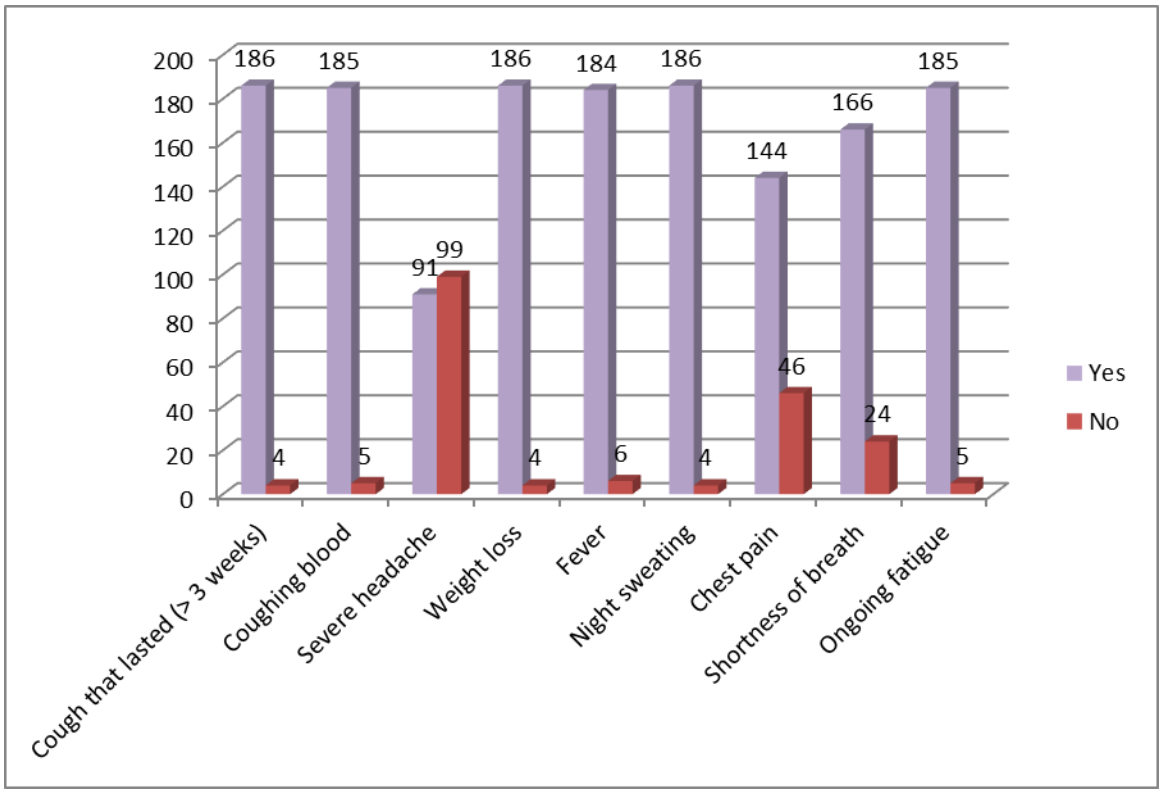

Figure (4): Distribution of the study sample according to the knowledge about symptoms and signs.

Distribution of the study sample according to the knowledge about Methods of diagnosis was displayed in figure (5) which elicited that 186 out of 190 participants responded with yes for diagnosis by sputum for TB bacilli.

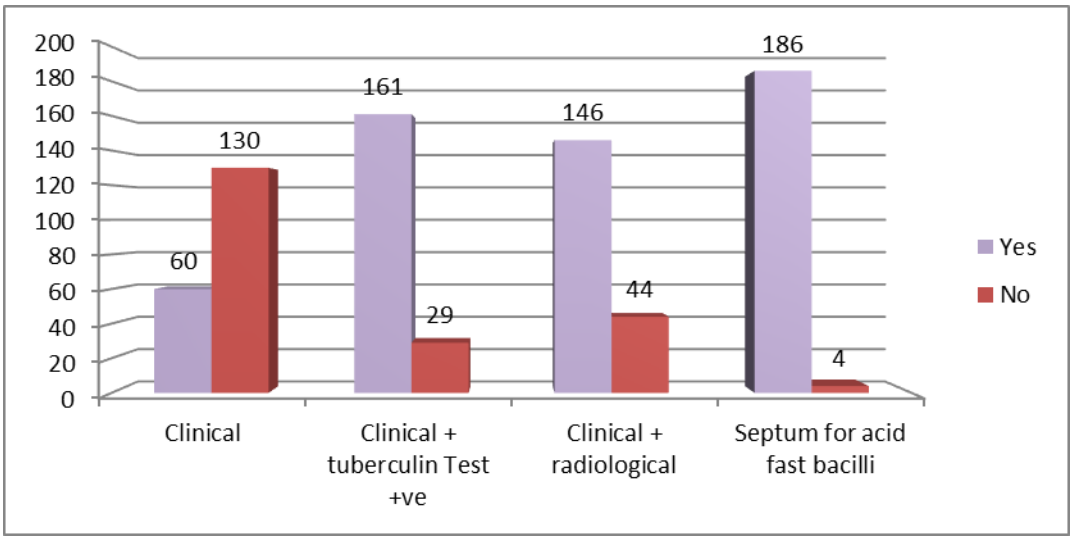

Figure (5): Distribution of the study sample according to the knowledge about Methods of diagnosis.

Comparison of response to knowledge in relation to specialty was showed in table (2). It was demonstrated that statistically significant difference was found only for sputum for acid fast bacilli where 96.8% of GP in comparison to 85.6% of physician (specialist) who responded with yes.

Table (2): Comparison of response to knowledge in relation to specialty.

Knowledge and specialty		Response				p-value
		Yes		No		
		No.	%	No.	%	
Signs and symptoms of tuberculosis						
Cough that lasted (> 3 weeks)	GP	91	97.8	2	2.2	1.000*
	Physician	95	97.9	2	2.1	
Coughing blood	GP	89	95.7	4	4.3	0.204*
	Physician	96	99.0	1	1.0	
Severe headache	GP	50	53.8	43	46.2	0.113*
	Physician	41	42.3	56	57.7	
Weight loss	GP	90	96.8	3	3.2	0.361*
	Physician	96	99.0	1	1.0	
Fever	GP	90	96.8	3	3.2	1.000*
	Physician	94	96.9	3	3.1	
Night sweating	GP	89	95.7	4	4.3	0.056*
	Physician	97	100.0	0	0.0	
Chest pain	GP	73	78.5	20	21.5	0.394**
	Physician	71	73.2	26	26.8	
Shortness of breath	GP	82	88.2	11	11.8	0.744**
	Physician	84	86.6	13	13.4	
Ongoing fatigue	GP	90	96.8	3	3.2	0.678*
	Physician	95	97.9	2	2.1	
Method of T.B diagnosis						
Clinical	GP	28	30.1	65	69.9	0.975**
	Physician	29	29.9	68	70.1	
Clinical + tuberculin Test +ve	GP	77	82.8	16	17.2	0.151**
	Physician	72	74.2	25	25.8	
Clinical + radiological	GP	68	73.1	25	26.9	0.645**
	Physician	68	70.1	29	29.9	
Sputum for acid fast bacilli	GP	90	96.8	3	3.2	0.007**
	Physician	83	85.6	14	14.4	

Vaccination can protect against T.B	GP	61	65.6	32	34.4	0.955**
	Physician	64	66.0	33	34.0	
*Fissure Exact test; **Chi square test have been used						

Attitude analysis

Distribution of the study sample according to attitude was demonstrated in table (3). The table showed that mean response for Feel compassion and desire to help was 4.31 with level of strongly agree. Feel compassion but tend to keep distance from patients and very serious disease had means of 4.14 and 3.65 respectively with level of agree. Others either had mean neutral or disagree.

Table (3): Distribution of the study sample according to attitude.

Attitude	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	SD	level
Statement is closest to your feeling about T.B. patients?							
Feel compassion and desire to help	85 (44.7)	93 (49.0)	11 (5.8)	1 (0.5)	4.31	0.812	5
Feel compassion but tend to keep distance from patients.	56 (29.5)	120 (63.2)	14 (7.3)	0 (0.0)	4.14	0.773	4
Fair from them because contiguous	18(9.5)	56(29.5)	102(53.7)	16(8.4)	2.80	1.213	3
No particular feeling	8 (4.2)	17 (8.9)	98 (51.6)	67 (35.3)	1.95	1.045	2
How serious is T.B in your country							
Very serious	60(31.5)	71(37.4)	51(26.9)	8(4.2)	3.65	1.287	4
Somewhat serious	11(5.8)	93(48.9)	80(42.1)	6(3.2)	3.12	1.122	3
Not serious	8 (4.2)	21 (11.1)	121 (63.7)	40 (21.1)	2.13	1.009	2
the reason behind that you don't go to the health facility							
No sure	24(12.6)	86(45.3)	71 (37.4)	9(4.7)	3.23	1.213	3
Cost and difficulty (distance to the clinic)	13(6.8)	75(39.6)	89(46.8)	13(6.8)	2.92	1.188	3
Don't trust a medical health worker	12 (6.3)	81 (42.6)	82 (43.2)	15 (7.9)	2.96	1.196	3
Work Overlap	14(7.3)	88(46.3)	80(42.1)	8 (4.2)	3.10	1.159	3
Don't want to find out there is something wrong	8 (4.2)	89 (46.8)	76 (40.1)	17 (8.9)	2.97	1.183	3

Distribution of the study sample according to the attitude was illustrated in figure (6) and demonstrated the mean responses for each indicator and the mean of feel compassion and desire to help was the highest with strongly agree.

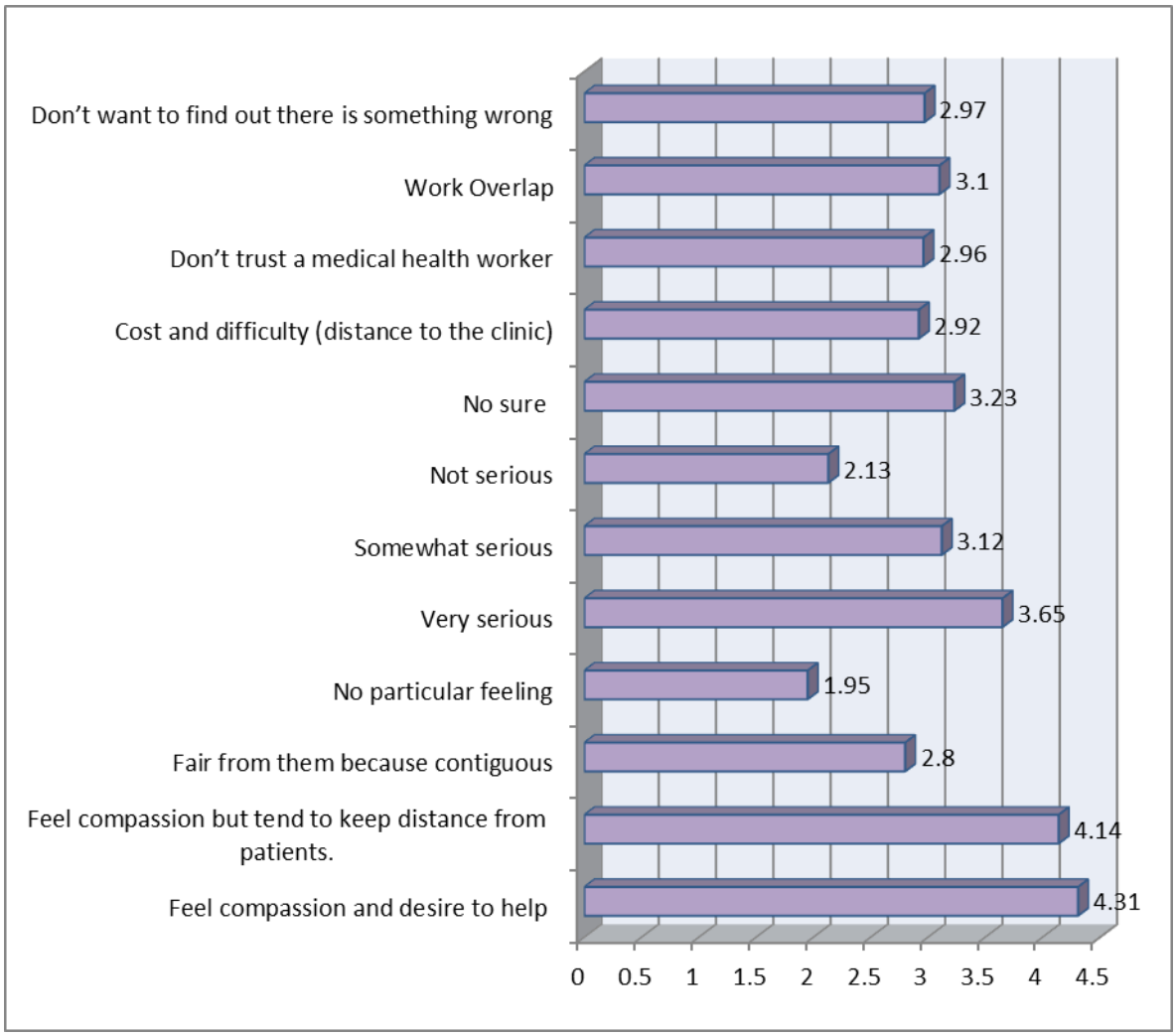

Figure (6): Distribution of the study sample according to the attitude.

Comparison of response to Attitude in relation to specialty showed in table (4) and revealed that only don't trust a medical health worker showed significant difference between GP and physicians.

Table (4): Comparison of response to Attitude in relation to specialty.

Attitude and specialty		Strongly Agree	Agree	Disagree	Strongly Disagree	p-value*
Statement is closest to your feeling about T.B. patients?						
Feel compassion and desire to help	GP	42(45.2)	46(49.5)	5(5.4)	0(0.0)	0.204
	Physician	43(44.3)	47(48.5)	6(6.2)	1(1.0)	
Feel compassion but tend to keep distance from patients.	GP	29(31.2)	58(62.4)	5(5.4)	1(1.1)	0.602
	Physician	27(27.8)	62(64.0)	8(8.2)	0(0.0)	
Fair from them because contiguous	GP	7(7.5)	28(30.1)	48(51.6)	10(10.8)	0.138
	Physician	11(11.3)	28(28.9)	54(55.6)	6(6.2)	
No particular feeling	GP	3(3.2)	12(12.9)	36(38.7)	42(45.2)	0.233
	Physician	5(5.2)	5(5.2)	62(64.0)	25(25.6)	
How serious is T.B in your country						
Very serious	GP	26(28.0)	34(36.5)	27(29.0)	6(6.5)	0.386
	Physician	34(35.1)	37(38.1)	24(24.7)	2(2.1)	
Somewhat serious	GP	4(4.3)	47(50.5)	36(38.7)	6(6.5)	0.498
	Physician	7(7.2)	46(47.4)	44(45.4)	0(0.0)	
Not serious	GP	5(5.4)	9(9.7)	59(63.4)	20(21.5)	0.968
	Physician	3(3.1)	12(12.3)	62(64.0)	20(20.6)	

the reason behind that you don't go to the health facility						
Not sure	GP	8(8.6)	43(46.2)	36(38.7)	6(6.5)	0.549
	Physician	16(16.5)	43(44.3)	35(36.1)	3(3.1)	
Cost and difficulty (distance to the clinic)	GP	6(6.5)	32(34.4)	47(50.5)	8(8.6)	0.108
	Physician	7(7.2)	40(41.3)	42(43.3)	5(5.2)	
Don't trust a medical health worker	GP	6(6.5)	42(45.2)	37(39.7)	8(8.6)	**0.001***
	Physician	6(6.2)	39(40.2)	45(46.4)	7(7.2)	
Work Overlap	GP	8(8.6)	42(45.2)	38(40.9)	5(5.4)	0.879
	Physician	6(6.2)	46(47.4)	42(43.3)	3(3.1)	
Don't want to find out there is something wrong	GP	6(6.5)	38(40.9)	38(40.9)	11(11.7)	0.074
	Physician	2(2.1)	51(52.6)	38(39.1)	6(6.2)	
*Independent t-test						

DISCUSSION

Knowledge assessment:

Tuberculosis was well recognized among healthcare providers and physicians in Mosul city, since the majorities were aware of all signs and symptoms of tuberculosis, which included a persistent (> 3 weeks) and bloody cough, weight loss, fever, nighttime sweating, chest discomfort, shortness of breath, and chronic fatigue. Not surprisingly, good knowledge was substantially related to age and duration of work, as the majority of participants were between the ages of 35-45y. This is explained by the fact that more experience and a longer period of service put medical professionals in more intense training courses, maximizing their understanding of TB. Current findings coincide with earlier Iraqi research conducted by Hashim in 2003 [13] and other studies conducted internationally [14,15, 16], but contradict with a study conducted in Norway [17] . According to the author, this is due to a superficial understanding of tuberculosis infection and an inability to deliver accurate information when communicating with patients, family members, and individuals at risk.

Despite the challenges faced in Iraq, it can be said that the educational and other activities of the national TB control program have had a positive impact on the knowledge of TB by healthcare professionals. In addition to having good general knowledge about TB, these physicians also had good knowledge about the diagnosis of TB.

Current study revealed participant had good knowledge about methods of diagnosis, where 68.4% agreed that clinical diagnosis alone is not effective and accurate way for definitive diagnosis , while most participant agreed that combined methods is the key element for proper and firm diagnosis , 94.7% of doctors confirms their diagnosis by microbiological investigation. Rapid and accurate diagnosis is crucial to lower morbidity and death linked to TB and to prevent transmission. Culture remains the most sensitive approach for detecting M. tuberculosis in clinical specimens. In cases where TB is suspected based on clinical symptoms, epidemiological data, and radiological evidence, microbiological confirmation is essential to making the precise and accurate diagnosis.

Current findings found no significant differences in age regarding overall knowledge, On the other hand, GP and specialists had significant differences in their knowledge about the necessity of sputum tests in the diagnosis of tuberculosis, this may attributed to the fact the GP depend of ordinary diagnostic methods while Specialists rely on modern methods for diagnosis like ELISA techniques which based on antibody-antigen detection , this results disagrees with the Norway study [17] , where because secondary care specialists handle the primary diagnosis and treatment of TB cases, they discovered that general practitioners' knowledge of the disease is insufficient. However, the majority of TB and latent TB cases were referred to GPs for routine blood test control during the course of treatment.

On the other hand, in research done in countries with high TB incidents, the opposite outcomes are obtained. According to a research performed in India, just 51% of doctors recognize the symptoms and only 41% know the diagnosis [18]. Another research done in Pakistan found that general practitioners' diagnosis success was 20% and their treatment knowledge was 41% [19]. It was

discovered that there is a knowledge gap between public and private health doctors. There was no difference in age, gender, time in profession, or workplace among doctors in either of these studies, and only the knowledge level of those who received training was found to be significantly higher.

The comparatively high level of excellent knowledge shown in this study is most likely owing to the extensive educational activities conducted by national and educational institutions, as well as face-to-face health education. These actions highlighted the seriousness of tuberculosis in Iraq.

Attitude assessment:

In this study, attitude was evaluated towards their roles and responsibilities. Present study revealed good attitude toward TB patients were participant had good compassion toward them and their desire to help was the highest with strongly agree, as well as didn't show fear from being contagious, this indicates the doctors in Mosul treated people with tremendous compassion, humanity and humbleness .

Participant mostly agree that TB is very serious disease that should had all medical attention , in respond to patients attendance to clinic , doctors were split in their answers regarding cost and distance of the clinic, or why patients don't trust a medical stuff , work overlap , or some may don't want to find out if they had any medical issue . 45.2% of GPs agree with the patients' attitude toward their negative attendance to clinic, GP thought that there were no medications, few lab tests and no governmental support. Although the truth is not so, because medicines are available and software updates are present, but the lack of communication between health centers and the distinicted clinic, despite the presence of the health coordinator, the absence of health awareness, as well as the absence of financial support, led to this.

The reason for this discrepancy is that research participants may have worked in various clinics and health facilities with patients from various socio-cultural backgrounds.

Different Studies [13, 20] had positive attitude and go in agreement with our results, they found a positive relation between good knowledge and attitude toward TB patients. Otherwise, other studies globally [16, 21, 22] showed poor and unfavorable attitude toward TB and this attitude was revealed mostly by rural residents; this could be responsible for the discrepancies in TB detection and care observed by the author. 40.7% of research participants in another study done in Ethiopia found that TB is hazardous and severe for the community [22]. This compels doctors and other concerned organizations to develop plans for raising more people's knowledge of the condition.

Age and gender differences was not significant in present study, were their attitude was almost the same, meanwhile GP had significant increase in their answers toward patients attendance to clinic, this because they represent the largest proportion in the sample study and their opinion might base on their years of experience and long service in local health centers that had earned them more experience and special social bonds toward local patients.

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Conflict of interest

None declared.

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