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Assessment of Patients Knowledge of Tuberculosis Transmission Mode, Risk Factors and Drug Resistance in AL Anbar, Governorate, Iraq 2022-2023

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Abstract: **Background: Tuberculosis (TB) is an airborne infectious disease caused by bacteria that mostly affects the lungs. It spreads through the air when infected people cough, sneeze, or spit. After COVID-19 TB is the second leading infectious killer and death worldwide. Our study assessed the patients' knowledge of Tuberculosis transmission mode, Risk Factors, and drug resistance in the AL-Anbar Governorate.**

Methodology: A cross-sectional study design using a nonprobability sampling of (176) Tuberculosis patients registered at the Tuberculosis Health Center in Ramadi City-Iraq in 2022-2023. A questionnaire sheet was used, and a p-value of less than (0.05) was considered significant.

Results: Ninety percent were over 40 years with a mean of 57±13.4. Most of them were males, married, and farmers. Less than a quarter (20%) with a family income<500,000 Iraqi dinar but more than half (68%) between (500,000 - 750,000) Iraqi dinar monthly. (65%) of the total patients were old cases. Regarding the knowledge of the mode of transmission, more than a quarter said by crowding 51(29%) but less said by cough 40(23%), 32(18%) family history, 23(13%) direct contact, and (17%) didn't know with a statistical significance with education. Regarding risk factors, less than half 70(40%) were smokers but more than a quarter 53(30%) had hypertension, and some of them 27(15%) had diabetes and the same percentage had renal diseases. For drug resistance, a small number of 25(14%) was reported as a secondary line resistant to isoniazid, most of them were males and more than a quarter were smokers. More than a quarter (29%) of the patients had extrapulmonary TB before the age of 50 years while 71% had it after 50 years old with a statistical significance with age.

Conclusions: Middle-aged males with low income were most affected, a small number had secondary line resistance to isoniazid drug. There was a moderate knowledge of the transmission mode affected by education. The most common risk factors were smoking and hypertension.

Keywords: **Knowledge of Transmission Mode, Risk Factor, Drug Resistance.**

1. INTRODUCTION

About 167.000 Tuberculosis patients had HIV. It is a preventive disease with early diagnosis and treatment millions of people will prevent deaths every year [1]. 1.5 million deaths occur per year globally [2]. It has been caused by Mycobacterium tuberculosis mainly. The occurrence of the disease dropped after BCG vaccine anti-TB drugs [3,4] In 2019 the most cases came from Southeast Asia (44%), Africa (25%), the Pacific (18%), the Eastern Mediterranean (8.2%), the Americas (2.9%), and Europe (2.5%) [5]. Regarding Tuberculosis control programs drug resistance becomes a significant challenge. [6]. the resistance toward multi-drug-resistant was 5% while 25% was toward first-line drugs globally [7].

Primary drug resistance occurs in those who had the drug for less than a month or in new cases. At the same time, secondary resistance occurs in people who retreated before [8]. Rifampicin resistance increased by 3% between 2020 and 2021, with 450,000 new cases in 2021 [9]. Resistance to anti-tuberculosis drugs is associated with insufficient therapy, reduced drug supply, unsuitable treatment routines, and low patient compliance [10]. According to the World Health Organization, approximately 10 million people developed TB in 2018 [11]. 18% of retreated TB cases were diagnosed as multi-drug resistant while 3.5% of newly diagnosed were identified as multi-drug resistant [4]. Iraq has a population of approximately 38 million with a TB incidence rate of 42 per 1000 [5]. Since 1994, the World Health Organization (WHO) has systematically collected and analyzed data on levels of resistance to anti-TB drugs from countries [11,12]. Until 2020, the data were used to estimate the number of incident cases of rifampicin-resistant or multidrug-resistant TB that resistance to both rifampicin and isoniazid), collectively referred to as MDR/RR-TB and the proportions of TB cases with various combinations of resistance to first-line and second-line drugs. In 2022, new methods were developed to produce a time series of estimates [13], the incidence was estimated at 450,000 globally [14]. An estimated 191,000 deaths occurred due to TB drug resistance in 2021 [15]. One representative data point for rifampicin has been available for the past 15 years [16,17]. From 2021–2025, WHO lists TB burden and high MDR/RR-TB [18,19]. In persons with active pulmonary tuberculosis, the contamination is through coughing, shouting, singing sneezing, and respiratory secretions but coughing is the most efficient [20]. The prevalence of Mycobacterium tuberculosis was 51.5% among contacts in investigation studies from middle and low-income countries [21]. The research was desighned to assess patients' knowledge of Tuberculosis transmission mode and to assess Risk Factors and drug resistance.

2. METHODOLOGY

A cross-sectional study using a nonprobability sample to assess Tuberculosis transmission mode, Risk Factors, and drug resistance. The target population was all (176) registered tuberculosis patients at the Tuberculosis Health Center in Ramadi City, AL-Anbar Governorate, Iraq in 2022-2023. The data were collected between 2022-2023. Face-to-face interviews were done using a questionnaire sheet, and all the patients agreed to participate in the study. Analysis was done using proportions and a chi-square test. A p-value of less than (0.05) was considered significant.

Inclusion Criteria: Tuberculosis patients, tuberculosis health center.

Exclusion Criteria: Non- tuberculosis patients, hospital.

Study tool: The tool was a questionnaire sheet prepared in 4 parts. 1st part was considered to determine the socioeconomic status, such as age, sex, occupation, education, marital status, and family income. 2nd part was to determine the risk factors, such as hypertension, diabetes mellitus, renal diseases, and smoking. 3rd part was to determine the knowledge about transition mode by the talk of the patients. 4th part was to determine the registered cases of drug resistance with risk factors.

Sample Size: The sample size should be 234, the prevalence was 18.6 in 2021and by using the (Cochran) sample size = $\frac{(1.96)^2 \times P(1-P)}{m^2}$ [22,23].

In all the registered cases (176) during 2022-2023 were interviewed.

Ethics approval: The protocol of the study was approved by the Ethics Committee of the College of Medicine. Anbar University, Ramadi, Iraq, on March 2022. Before filling out the questionnaire verbal consent was taken from the participants and informed that their participation was voluntary after explaining the study objectives with the guarantee of secrecy.

Statistical analysis: The SPSS (V. 25) software was used to analyze the data. The age variable was presented as mean and standard deviation while the categorical variables were reported as frequency and percentage. Qi-square was used to study the relationship between the knowledge about the mode of transmission and education, and distribution between the site of TB and age. Confidence Interval was 95% and statistically significant was considered below 0.05.

3. RESULTS

Sociodemographic characteristics: The study showed that 25% completed primary school, 45% completed secondary school while (30%) graduated. (9) (5%) were between (20-29), the same percentage were between (30-39), and (44) (25%) were (41- 49 years), (53) (30%) (50-59) years, and 61 (35%) ≥ 60 years. According to gender (141) (80%) were males, while (35) (20%) were females. (10%) of the patients were employees, (10%) were students, (70%) were farmers, and (10%) were nonworkers. (90%) of the patients were married and (10%) were unmarried. Regarding the monthly income, the study showed that (20%) was less than 500.000 (68%) was between 500.000-750.000, and (8%) was between 750.000-1.000000, while (4%) was abov1.000000 Dinar monthly (Table 1).

Table (1): Distribution of the sociodemographic characteristics

Socio-demographic		No.	%
Education	Primary	44	25
	Secondary	79	45
	Graduated	53	30
Age	(20-29)	9	5
	(30-39)	9	5
	(40-49)	44	25
	(50-60)	53	30
	(>60)	61	35
	Mean	**57**	**SD 13.4**
Gender	Male	141	%80
	Female	35	%20
Occupations	Employees	18	%10
	Students	18	%10
	Farmer	123	%70
	nonworkers	18	%10
Marital Status	Married	158	%90
	Unmarried	18	%10
Family income	≤ less 500	35	%20
	500-750	120	%68
	750- 1 million	14	%8
	≥ million	7	%4

Risk factors: The study showed that 53(30%) had hypertension, 27(15%) had Diabetes Mellitus, the same percentage had Renal diseases, and 70(40%) were smokers (Table 2).

Table (2): Risk Factors of TB

Diseases	Yes No. %	No No. %	Total
Hypertension	**53 (30)**	**123 (70)**	**100**
Diabetes Mellitus	**27(15)**	**149(85)**	**100**
Renal diseases	**27(15)**	**149(85)**	**100**
Smoking.	**70(40)**	**106(60)**	**100**

Knowledge of the mode of transmission: The study showed that (40) (23%) of the patients said the transmission was by coughing, 23(13%) by direct contact, 51(29%) was by crowding, 32(18%) was by family history, and 30 (17%) didn't know with statistical significance with education (Table 3).

Table (3): Association between knowledge about mode of transmission and education

Mode of transmission	Primary No.%	Secondary No.%	Graduated No.%	Total No.%	*x^2, df, p-value
Cough	**5 (3)**	**15 (9)**	**20 (11)**	**40 (23)**	
Direct contact	**7 (4)**	**5 (3)**	**11 (6)**	**23 (13)**	
Family history	**7 (4)**	**10 (7)**	**15 (9)**	**32 (18)**	
Crowding	**8(5)**	**15 (9)**	**26 (15)**	**51 (29)**	
Don't know	**17(10)**	**5 (3)**	**---**	**30 (17)**	
Total	**44**	**79**	**53**	**176 (100)**	**39.17,4,0.001**

***Significant using Pearson Chi-square test at 0.05 level of significance**

Drug resistance: The study showed that there was no resistance against the combination of rifampicin +isoniazid + pyrazinamide but 25(14%) had resistance against Isoniazid with 2nd line treatment, 71% were males, 30% were smokers, 14% had diabetes mellitus, and the same percentage had renal diseases (Table 4).

Table (4): Percentage of drug resistance and risk factors

Drugs resistance	No. %	Male No.%	Female No.%	Smoking No.%	Diabetes M No.%	Renal Dis No.%
Drugs Combination	---	----	---	---	---	------
Rifampin	-	---	---	----	----	-----
Isoniazid	25 (14)	18(71)	7(29)	8(30)	4(14)	4(14)

Site of TB: The study showed that 54% had pulmonary TB below 50 years and 46% over 50 years while 29% had extrapulmonary TB below 50 years and 71% over 50 years with statistical significance with age (Table 5).

Table (5): Distribution between site of type of TB and age

Age	Pulmonary	Extrapulmonary	Total	* x^2, df, p-value
Years	No.%	No.%	No.	
<50	62 (54)	18 (29)	80	
>50	52 (46)	44 (71)	96	
Total	114	62	176	26, 4, 1, 0,001

***Significant using Pearson Chi-square test at 0.05 level of significance**

4. DISCUSSION

Most of the patients were males, over 40 years old, and married, this agreed with studies done in Kampala and Uganda which found that TB cases were higher in adult male contacts [24,25].

Another study in Gambia revealed that TB disease status increased with age ≥40 years [24].

In our study, we found that the majority of the patients were low-income, and ungraduated with a statistical significance, this agreed with a study done in sub-Saharan Africa which found that low education, nonworking, low-income, smoking, and alcohol intake were shown to be associated with TB, and in Gambia the socio-economic status was associated with increasing risk of TB[26]. In our study, most extrapulmonary TB occurred over 50 years and the severe forms appear more frequently in old age because of underdeveloped or low immunity [27]. Our study showed that less than half were smokers which increased the progression of the disease while in another study the prevalence of tobacco smoking in TB patients was 22.5% [28]. We found that more than a quarter were hypertensive while in a study done in Taiwan, the prevalence reached 38.7%. Across-sectional studies reported that the prevalence of hypertension in TB patients ranged from 0.7% to 38.3% [29]. Our study found that diabetes mellitus formed 15%. Diabetes mellitus is one of tuberculosis-ending barriers that the patients are at a higher risk of developing complications. Diabetes mellitus formed 11% in Bangladesh but increased to 24% in Sri Lanka [30,31]. Regarding the knowledge about the mode of transmission, the study showed that more than a quarter said by crowding but less said by direct contact, coughing, family history, and others didn't know with a statistical significance with education. People have a general idea about TB, but there are gaps in knowledge on transmission. [32] In other studies, people mentioned that the transmission mode was contaminated food, drinking raw milk, and a dusty environment [33]. Among those 100 patients, a small percentage (14%) was reported as secondary line resistant to isoniazid drug, most of them males, more than a quarter were smokers, and some of them had diabetic and renal diseases. There was no multi-drug resistance while in other studies, TB multi-drug resistance was 11.6%, and mostly against isoniazid and rifampicin [34].

5. CONCLUSION

Middle-aged males with low income were most affected, a small number had secondary line resistance to isoniazid drug. There was a moderate knowledge of the transmission mode affected by education. The most common risk factors were smoking and hypertension.

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