Research Article

Trend of TB pleural effusion in Iraq from 2015 -2019

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ABSTRACT

INTRODUCTION: Tuberculosis is an infectious disease that is a major cause of ill health, worldwide TB is the 13th leading cause of death and the 2nd leading infectious killer after COVID 19 infection. Pleural effusion (PE) is the excessive accumulation of fluid in the pleural space, resulting from an imbalance between pleural fluid formation and removal, which could be a primary manifestation or a secondary complication of certain disorders. TB is one of the causes of pleural effusion, TB pleural effusion could be a primary or secondary infection.

OBJECTIVE: The aim of the present study was to investigate the epidemiological features of patients with pleural TB over the years 2015 -2019.

METHODS: A record-based cross-sectional study reviewing the database of the notified patient in Iraq for the period 2015-2019.

RESULTS: Total TB patients were 37084 of which 3488 were diagnosed as TB pleural effusion (9.4%) with the incidence rate 2/100000,was more common among persons aged 15-34 years, and males being significantly more than in females and the treatment success rate was 89.6 %.

CONCLUSION: TB pleural effusion is still encountered in Iraq with a slight decrease in the incidence from 2015 to 2019. It is more reported in young adults and males. The success rate of treatment was 89.6 %.

Key words: Tuberculosis, pleural effusion, trend, Iraq.

INTRODUCTION

Mycobacterium tuberculosis is one of the oldest and most important human pathogens and infection with a high global mortality rate.[1] According to the World Health Organization, tuberculosis is an infectious disease that is a major cause of ill health; worldwide tuberculosis (TB) is the 13th leading cause of death and the 2nd leading infectious killer after COVID 19 infection.[2] Iraq is a relatively high TB burden country and ranks 7th in the WHO-Eastern-Mediterranean Region (WHO-EMR) with an incidence rate of 42/100,000 cases reported by the World Health Organization in 2019.[3]

Pleural effusion (PE) is an excessive accumulation of fluid in the pleural space, resulting from an imbalance between pleural fluid formation and removal.[4] It is a common clinical problem that can be a primary manifestation or a secondary complication of many disorders.[5]

Pleural TB is considered a primary manifestation resulting from haematogenous or lymphatic dissemination from a pulmonary focus; first infection.[6-8] The secondary form, which occurs years after the first infection, is considered as a consequence of the reactivation of pulmonary foci contaminating the pleural space.[9]

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Globally and in Iraq, TB pleural effusion is the second most common form of extrapulmonary tuberculosis (EPTB) after TB lymph node.[10,11] TB is a common cause of pleural effusion worldwide, 30-60%. Globally, 2-3 billion person estimated to be infected with *Mycobacterium tuberculosis* worldwide, of which 5-15% will develop tuberculosis during their lifetime.[12] The mean annual prevalence of pleural TB is 3–5 % in areas with low TB prevalence and up to 30% in endemic areas.[13]

Tuberculosis is one of the most important causes of exudative effusion in many areas of the world. It is believed that tuberculosis pleural exudation is a presentation of primary TB and is seen mainly in adolescents and adults.[14] Patients with pleural effusion can be asymptomatic or present with dyspnea, cough, or pleuritic chest pain.[15]

The gold standard for the diagnosis of tuberculous pleuritis is the detection of *Mycobacterium tuberculosis* bacilli in the pleural fluid by microscopy, molecular methods and culture , or the histological demonstration of caseating granulomas in the biopsy specimen. The diagnosis of pleural tuberculosis has dramatically improved by using biochemical markers; these are rapid and sensitive.[16]

Postero-anterior (PA) view of chest X ray shows abnormal blunting of the sharp lateral costophrenic angle when pleural fluid exceeds 200 mL. In addition, the lateral radiography may show blunting of the sharp posterior costophrenic angle when the fluid exceeds 50 mL. Increasing amounts of the effusion form a meniscus, opacify the lung, and obscure the diaphragmatic margin.[17] Thoracic ultrasonography (TUS) will detect the presence of as little as 5-50 mL of pleural fluids and is 100% sensitive for effusions.[17] CT scan is also used in the detection of pleural effusion.[17]

This study aimed to show the trends of pleural TB reported to the National tuberculosis Institute in Baghdad and registered at the electronic nominal recording system (ENRS) from 2015 to 2019. Also, to show the distribution of pleural TB cases according to age, gender, and outcomes of treatment

METHODS

Setting and study design: The study setting is the National tuberculosis institute (NTI) which is the core of the national tuberculosis control program (NTP) in Iraq. This is a record-based cross-sectional study reviewing the database of the notified patient in Iraq for the period 2015 to 2019.

Ethical consideration: The study proposal was approved by the ethical research committee , and agreement from the administration of the NTI was obtained to use the registered data. Anonymity and confidentiality of patients' data are highly considered during data analysis and presentation.

Definition of the cases: A case of tuberculosis is any patient entered in the TB surveillance system as a TB patient whether the affected site is pulmonary or extrapulmonary, and whether this diagnosis is clinical or laboratory-confirmed. A case of tuberculosis pleural effusion: any patient entered in the TB surveillance system as a pleural TB patient whether this diagnosis is clinical or laboratory-confirmed.

Sampling methods: The sampling technique is comprehensive sampling, in that data of all eligible patients were used in this study.

Data extraction: In Baghdad, the National Tuberculosis Institute (NTI) runs the national tuberculosis control program (NTP) Iraq. Electronic surveillance data in NTP is in the form of a structured format excel file that collects case-based data including age, gender, residence, site of disease, results of X-ray and lab investigations, follow-up data, and treatment outcome data for TB patients reported in Iraq. This data format is called the electronic nominal recording system (ENRS). This study reviewed ENRS data for the years 2015-2019, and data related to pleural effusion patients (age, gender, and treatment outcome) were extracted to an SPSS file (version 25 for Windows) for data analysis.

Data analysis: Data are presented according to the year of registration, extrapolating the rate

Table 1 | Distribution of the Pleural Effusion patients according to Year in Iraq.

The year	Population	Total TB	Pleural Effusion	% of PE to Total TB	Incidence of PE
2015	36,181,576	8255	790	9.6%	2 per 100,000
2016	36,417,874	7317	697	9.5%	2 per 100,000
2017	37,234,254	7707	734	9.5%	2 per 100,000
2018	38,124,182	7142	664	9.3%	2 per 100,000
2019	39,127,889	6663	603	9.1%	1 per 100,000
Total		37084	3488	9.4%	

of incidence per year giving the time trend of TB pleural effusion occurrence over time, then the age trend and gender trend were plotted, then the treatment outcomes were calculated. The Chi-square test for independence was used to test the significance of association between discrete variables and the level of significance was set at 0.05.

RESULTS

The ENRS data for 2015-2019 included showed the reporting of 37084 TB patients. Tuberculous pleural effusion cases constituted 9.4% (N=3488) out of all reported cases.

The distribution of pleural effusion among TB cases was as follow: In 2015, 790 patients had TB pleural effusion out of 8255 patient with TB (9.6 %). In 2016, 697 patients had TB pleural effusion out of 7317 who had TB (9.5 %). In 2017, 734 out of 7707 (9.5 %), and in 2018 664 out of 7142 (9.3 %), and in 2019, 603 out of 6663 (9.1%). See table 1.

Regarding Gender distribution in Tuberculous pleural effusion, reviewing the national data of NTP showed that in 2015 the recorded cases were 448 males and 342 females with a male to female ratio of 1.3, in 2016, pleural effusion patients were 407 males and 290 females with a ratio of 1.4, in 2017, pleural effusion patients were 426 males and 308 females with a ratio of 1.4, in 2018, pleural effusion patients were 413 males and 251 females with a ratio of 1.6, and in 2019, pleural effusion patients were 371 males and 232 females with a ratio of 1.6. See table 2.

We found that the commonest age group who have TB Pleural Effusion are 25-34 year and 15-24 year, 21.4% and 20.6% respectively, while the least recorded in under age of five years, 0.4 %. See table 3.

Table 4 shows the outcome of treatment of patients with TB pleural effusion. The treatment was successful in 3124 out of 3488 (89.6%). Death was reported in 176 patients (5%). For outcomes of overall years and for each year see table 4.

DISCUSSION

This study represents the epidemiology of pleural TB in Iraq, We observed that the incidence trend for all forms of TB shows a progressive decline in the period analysed, including the incidence of pleural TB . in Spain

Table 2 | Distribution of Pleural Effusion TB patients according to gender and year, Iraq, 2015-2019.

Year	Male number	Female number	Male/ Female ratio	Total Number
2015	448	342	1.3	790
2016	407	290	1.4	697
2017	426	308	1.4	734
2018	413	251	1.6	664
2019	371	232	1.6	603
Total	2065	1423	1.45	3488
P value	0.168			

Table 3 | Distribution of the reported Pleural Effusion TB cases according to year of registration and age group, Iraq 2015-2019

Age (years) Group	2015	2016	2017	2018	2019	Total	% of Age Group Total to Grand Total
0-4	3	1	4	3	3	14	0.4%
5-14	19	34	22	24	30	129	3.7%
15-24	174	157	149	131	108	718	20.6%
25-34	175	142	156	155	120	748	21.4%
35-44	130	95	128	108	114	575	16.5%
45-54	95	97	104	86	70	452	13.0%
54-64	86	72	78	62	58	355	10.2%
65+	109	99	92	96	100	496	14.2%
Grand Total	790	697	734	664	603	3488	100.0%
P value			0.004				

Table 4 | Treatment outcomes of treated Pleural Effusion TB patients, Iraq, 205-2019.

Year	Treatment Success	Death	LFU †	NE ‡	No response §	Total
2015	724	41	14	11	0	790
2016	621	24	16	36	0	697
2017	638	41	28	23	5	734
2018	618	23	11	10	2	664
2019	524	47	23	9	0	603
Total	3124 (89.6%)	176 (5.0%)	92 (2.6%)	89 (2.6%)	7 (0.2%)	3488 (100.0%)

† Loss to follow-up
‡ Not evaluated (missing data/transferred out)
§ No clinical response to anti-TB treatment

16.3% of TB cases were TBPE and the mean annual decrease in TBPE incidence was 6.9 %, the number, and incidence of TBPE decreased significantly during the study period, with no changes in epidemiological characteristics, with trends similar to the total number of TB cases.[18]

We found that the annual proportion of pleural TB was relatively stable as compared to pulmonary TB; the percentage of extrapulmonary forms reported in Iraq out of all TB cases were 9.7 %, 9.8 %, 9.8 %, 9.7%, and 9.5% in 2015, 2016, 2017, 2018, 2019 respectively. The CDC report in 2006 and Baumann Study have shown that in countries where there was a reduction in the incidence of TB, the reduction in the incidence of the extrapulmonary forms was found to be less pronounced.[19, 20]

The distribution of pleural TB in males is significantly higher than in females for all years. Male to female ratios was 1.3, 1.4, 1.4, 1.6, and 1.6 in the years 2015, 2016, 2017, 2018, and 2019 respectively. This fact is reported also in epidemiological aspects of pleural tuberculosis in the state of São Paulo, Brazil from 1998 to 2005 in a study conducted by Márcia Seiscento where male coefficient being twice as high as the female's.[9] This can be explained that male is more active than female so will be more liable to get an infection with TB.

Regarding age, we found that the incidence of TB pleural effusion is more in the age group of 15-34 years and the least in age below 15 years. This could be explained by the fact that this age group is the most active age group so they will be more liable to getting the infection, however, a study of pleural TB conducted in Brazil revealed that age presents low sensitivity (73%) and low specificity (46%).[21] In Spain, TBPE mainly affected males (63.5%), precisely 61.2% of young males were between 15 and 44 years.[18] Al-Alusi F. reached to a similar finding in 1986 by saying that in Iraq tuberculous pleural effusion is mainly a disease of adoles-

cents and young adults.[22] However, TB pleural effusion can present in the older age group (more than 35 years) and this fact emphasizes that the diagnosis of pleural effusion secondary to TB should be considered regardless of the age of the patient.[21,23] In the United States from 1993 to 2003, there is a higher percentage of cases of pleural TB in patients older than 65 years probable due to reactivation of a previous infection.[20] Light RW in 2007 stated that in general, patients with tuberculous pleural effusion are younger than patients with parenchymal tuberculosis.[24]

The majority of the patients included in our study had a successful treatment outcome of 89.6% and this is similar to a study carried out in Uzbekistan[25] and in Barcelona in Spain where the success rate was 90% and 91%, respectively, and higher than the 78% reported by an Indian study. [25]

CONCLUSION

One-tenth of TB patients have been registered at the NTI in Baghdad was TB pleural effusion with an incidence rate of 2/100000. The trend of TB pleural effusion showed a progressive decline, although small, over the years 2015 -2019. Pleural effusion was more common among those aged 15-34 years, and in males than females. The success rate of treatment is very good reaching up to 89.6 %.

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Abbreviations list: Centers for Disease Control and Prevention (**CDC**), Computed tomography (**CT**), Coronavirus disease (**COVID-19**), Electronic nominal recording system (**ENRS**), Extrapulmonary tuberculosis (**EPTB**), National Tuberculosis Institute (**NTI**), Pleural effusion (PE), Statistical package for social sciences (**SPSS**), Thoracic ultrasonography (**TUS**), Tuberculosis (**TB**), WHO-Eastern-Mediterranean Region (**WHO-EMR**), World health organization (**WHO**).

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