Pulmonary Tuberculosis in Salah-Al-Deen province in 2007

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Abstract

Three hundreds thirty patients studied in Salah-Al-Deen consultant clinic for respiratory disease from 1st January to 1st December-2007. Pulmonary tuberculosis found in 114 of them, and falls in to two groups; 57.9% of them were negative sputum smear, and 42.1% of them had positive sputum smear. Regarding the mycobacterium load in the sputum smear, most of pulmonary tuberculosis cases had as following: 17 (14.9%) had ++, 20 (17.5%) had +++ of M. tuberculosis rodsand two patients (4.2%) had very little rods. Positive pulmonary tuberculosis was more common amongpatients aged ≤18 years old which found in seven (46.7%) and male constitute 48.5% of them and the odd ratio for male sex was 1.3. Regarding residence, positive pulmonary tuberculosis, 27 (38%) of patients were from rural areas in comparison to 21 (48.8%) of urban area. The odd ratio for urban area was 1.3 and for rural 0.8. Tuberculosis case detection rate was lower than expected, and the working group is mostly affected. Improvement in management of tuberculosis and rehabilitation programs needed.

Keywords: *Pulmonary tuberculosis in Salah Al-Deen, TB epidemiology.*

Introduction

Tuberculosis (TB) remains a major health problem worldwide, but it is more prevalent in under developed and developing countries, in which over 95% of cases occur [1, 2]. M TB causes around 3 million deaths annually. TB control policies emphasize the importance of case finding and treatment, particularly of smear-positive cases, aiming for a cure rate of 85% [3]. Directly observed treatment, short course (DOTS), is a strategy for TB care that includes improved drug supply, diagnosis and program monitoring and a 6-month multidrug regimen with direct observation to ensure that the drugs have been taken to improve treatment adherence and outcome [2]. Successful completion of treatment of active TB cases is the single most important way to control and prevent new cases[4].

Iraq has a national TB control program (NTCP) based on WHO recommendations. In Iraq, DOTS introduced in 1998 and the population coverage reached 100% in 2000[5].

Iraq ranks 44th in the world among countries with high TB burden and 7th among the countries of the Eastern Mediterranean Region. The estimated

incidence of all TB cases was 135 per 100 000 population in 2001 [6].

The case-detection rate (CDR) was 23% in 2000 and 50% of all new pulmonary TB (PTB) cases detected in 2000 were smear-positive. The aim of WHO was to detect 70% of estimated new smear positive PTB cases and successfully treat 85% of them by 2005. [5]

The classification of TB for treatment purposes is based on the presence or absent of tubercle bacilli in sputum. Asmear positive for acid-fast bacilli (AFB) is indicative of high infectiousness[7].

The knowledge of epidemiological and serological factors, that predict positivity of sputum is important in identifying the high risk persons in order for concentrating on them.The identification of high risk factors that predict PPTB and initial bacillary load, which gives an unfavorable outcome, could be used in low-income countries and under program conditions for the screening of the cases to be done among high risk groups.

For the above reasons this retrospective study carried out to analyze the epidemiological and serological factors that predict positivity of sputum AFB and initial bacillary load in PTB patients.

Patents and methods

This retrospective study performed between 1st January -1st December-2007 at consultant clinic of the respiratory and chest disease in Salah Al-Deen where the guidelines of the NTCP are followed which based on the DOTS strategy as per WHO guidelines for the management of TB patients. All patients were interviewed by simple questionnaire contained simple questions about signs, symptoms, demographic, social characteristics, and examined clinically. Chest radiography, ESR and sputum smear were done for them. Semi quantitative method used in grading of the sputum smear examination done as follows: numerous (one or more bacilli/oil immersion field), less numerous (10–99 bacilli/100 fields), and few bacilli (1–9 bacilli/100 fields) according to NTCP booklet for TB laboratories. Diagnosis made depending on the NTCP criteria for the diagnosis of pulmonary TB [8]. Data analyzed by using of the statistical package for social sciences (SPSS version 8). The X2 test used to determine the significance of differences in frequencies of observations in various groups, and a probability of 0.05 considered significant.

Results

Three hundred thirty patients complaining of productive cough and fever examined, and 114 of them found to have PTB (figure 1). Regarding gender: 68 (59.6%) of PTB patients were male in comparison to 46 (40.4%) female. Regarding residence: 43 (37.7%) of them were from urban and 71 (62.3%) from rural area. Their ages as follows; 20 (17.5%) of them were < 20 years, 47 (41.2%) aged between 21-40 years, 26 (22.8%) aged between 41-60 years, and 21 (18.4%) of them aged over 60 years (figure 2).

Negative PTB (NPTB) was found in 66 (57.9%) of TB patients and 48 (42.1%) of them had active PTB. Positive PTB (PPTB) found more frequently among the following groups; male patients 33 (48.5%), urban patients 21 (48.8%), and patient aged ≤ 18 years (figure 3). Sputum smears examination revealed that, 66 (57.9%) of patients had negative smear, 9 (7.9%) had few bacilli, 17 (14.9%) had less numerous bacilli, 20 (17.5%) had

numerous bacilli, and two patients (1.8%) had very little bacilli. Numerous bacilli found more frequently among 77.8% (7) of female patient, and 73.3% (11) of patient aged >18 years old (figure 4).

The univariate odd ratio for getting active PTB among the following groups; age group ≤ 18 years old was 1.2; male group was 1.3 and 1.3 for urban patients. Multivariate odd ratio for age was 1.2, for sex was 2 and 1.3 for residence area (table 1). The univariate odd ratio for getting numerous bacilli smear among the following groups were as follows; 1.2 for patients > 18 years old; 1.6 for female group and 1.2 for urban patients. Multivariate odd ratio for age was 0.4, for sex was 0.5 and 1.5 for residence area, as shown in table 2. ESR investigation done in 112 patients revealed that mean ESR for NPTB were 86.9, and for PPTB were 85.8 and this relation was not significant (pvalue=0.594), as shown in table 3.

Logistic regression of smear positive result and bacillary load in smear were significant for ESR level (p value=0.04), while it was not significant for age, sex, and residence results. Categorical logistic regression was significant for age group 21-40 years (p value=0.004) and 41-60 years old (p value=0.03).

Discussion

In general TB is more frequent among male patients 68 (59.6%) versus female patients 46 (40.4%), and this agree with Marzook AA and Hashim DS [5], and Liberato I R et al [9]. In this study, active TB was more frequent among male patients than females. This agree with Singla R et al who found thatmale (62.8%) more frequently affected than females (37.2%)[10], and the univariate odd ratio for getting active TB was 1.3 for males (male has 1.3 increased risk than female to get active TB), but the logistic regresion for the sex was not significant. This can be explained by the prevalence of TB is similar in males and females until adolescence, when it increases in males. In high prevalence countries, however, women of reproductive age have higher rates of progression to disease in comparison to men.

Gender differentials exist in reporting and diagnosing of TB cases, and passive case finding likely leads to failure to diagnose TB in women. The stigma associated with TB causes women to be divorced or to be unlikely to become married. A study in India found that male patients with TB expected their wives to take care of them but infected wives rarely received care. Thus, married women may try to hide their symptoms instead of seeking help [11]. TB in women also has an adverse effect on child survival and family welfare. Socioeconomic factors also have an impact on TB control efforts, especially for women who suffer from disproportionate poverty, low social status, less education (which impedes seeking diagnosis), and barriers to health care.

Women may find it more difficult to comply with treatment once symptoms subside. HIV epidemic is also increasing the burden of TB for women, who seem to have a higher risk of developing TB during their reproductive years than that faced by men [11]. Thus, TB control programs should be gender sensitive.

Present notification rates of both sexesin many developing countries are similar to those of industrialized countries in the middle of the century, although sex and age pattern are similar to that in industrialized countries at present, with men's disease rates exceeding women's after the age of 15. These findings raise

the possibility that TB cases among women are being under-reported in developing regions. This supported by the Holmes CB et al who compares active and passive case finding in which women with TB were under-notified to public health authorities when relying on passive case finding, and that the elevated frequency of progression among women now coincides with a peak in HIV prevalence among women of the same age [12]. Therefore, NTCP must assess possible sex differences that exist in their countries.

While Borgdorff MW et al explain this in different way that sex differences in notification rates may be largely due to epidemiological differences and not to differential access to health care [13]. In Iraqi situation, there is under reporting of women, as TB is a stigma for women and because the bacillary load was high for women more than males, which indicate that females not seek treatment until they are severely ill.

Positive PTB were most frequent among urban patients, with odd ratio of 1.3 and this agree with Donald A et al, who found that, the incidence rates have declined steadily in the rural area, they have not done so in the urban area[14].

This may explained by the striking relation between TB incidence and socioeconomic level. Incidence of TB in the poorest census tracts did not decline as rapidly as in other areas [14].

In this study, PPTB were most frequent among patient aged ≤ 18 years old with odd ratio of 1.2 and with significant categorical logistic regression for this age group ($p < 0.005$). Categorical logistic regression for the age was significant for both age groups 21-40 years and 41-60 years ($p < 0.005$), and this agree withPeter M. Small P Mwho found that, patients under 60 years of age (mean age 40.8 years) had an (odds ratio, 3.3; $P = 0.02$) [15].

Numerous bacilli sputum smear found more frequently among females (77.8%) in comparison to males (65%), with odd ratio 1.6. This agree with Connolly M and Nunn P, who found that women are at increased risk of progression to disease during their reproductive yearsand the socioeconomic consequences of TB in women leading to later presentation, which leads to a poor prognosis [11]. This also agree with Holmes CB et al, who found that the epidemiological evidence from the pre-human immunodeficiency virus (HIV) era shows that young to early-middle-aged women progress from infection to disease with greater frequency than do men[12]. Numerous bacilli sputum smear found more frequently among urban group with odd ratio 1.2, and this may be due to the relation explained previously. Numerous bacilli sputum smear found more frequently among age group >18 years with odd ratio 1.2 which may be due to that PPTB incidence increased with poverty and civil unrest.

Logistic regression for initial bacillary load was significant ($p<0.05$) for ESR level among PPTB.

Risk factors for initial bacillary load are important because there is direct influence of initial bacillary load on the absence of sputum conversion at 2 months. This agree with Rieder HL who found that, sputum conversion at the end of 2 months of DOTS among patients with initial weakly positive sputum was 90.9%, while it was respectively 77.9% and 61.7% among patients with initial moderately positive and strongly positive sputum[16]. The same thing found by Lienhardt C et al, Hiyama J et al, and Feng-Zeng Z, that treatment failure was associated with

increasing initial bacillary load [17, 18, and 19].

Conclusions & recommendations

The risk factors for getting active PTB were males, urban origin, patients aged 21-60 years and, screening for the cases could be done among these risk groups. The risk factors for initial bacillary load were female, urban, and patients aged >18 years, and therefore, concentration on the follow up of these risk groups must be done because they are more liable for delayed sputum conversion. There is underdetection of TB among children, and female group. TB CDR was lower than expected by WHO, and the working group is mostly affected. There is an urgent need for Improvement in TB management and rehabilitation programs.

References

1-Dye C, Scheele S, Dolin P, Pathania V, Raviglione MC. Consensus statement-global burden of tuberculosis. Estimated incidence, prevalence, & monitoring project. JAMA 1999; 282(7): 677-86.

2-Use DOTS more widely: WHO report on the tuberculosis epidemic 1997. Geneva, WHO, 1997 (WHO/TB/97.224).

3-Kochi A. The global tuberculosis situation and the new control strategy of the World Health Organization,1991. Bull World Health Organ. 2001;79(1):71-5.

4-Bass JB Jr, Farer LS, Hopewell PC, O'Brien R, Jacobs RF, Ruben F, et al. Treatment of tuberculosis and tuberculosis infection in adults and children. American Thoracic Society and The Centers for Disease Control and Prevention. Am J RespirCrit Care Med. 1994 May;149(5):1359-74.

5-Marzook AA and Hashim DS. Tuberculosis annual report in Iraq 2004. 5th issue, 2005.

World Health Organization. Global Tuberculosis Control:

6-Surveillance, Planning, Financing. WHO Report 2002. Geneva, Switzerland,WHO/CDS/TB/2002.295.

7-Heymann D. L. Control of communicable disease manual.18th ed. Washington : American public health association; 2004.P. 561.

8-Mankhee AA. Laboratory working guide for TB progarme in Iraq: 9-22.

9-Liberato IR, de Albuquerque Mde F, Campelo AR, de Melo HR. Characteristics of pulmonary tuberculosis in HIV seropositive and seronegative patients in a northeastern region of Brazil.Rev Soc Bras Med Trop. 2004 Jan-Feb;37(1):46-50. Epub 2004 Mar 19.

10-Singla R, Osman MM, Khan N, Al-Sharif N, Al-Sayegh MO, Shaikh MA. Factors predicting persistent sputum smear positivity among pulmonary tuberculosis patients 2 months after treatment. Int J Tuberc Lung Dis 2003; 7 (1): 58–64.

11-Connolly M, Nunn P. Women and tuberculosis. World Health Stat Q1996; 49 (2): 115-9.

12-Holmes CB, Hausler H, Nunn P. A review of sex differences in the epidemiology of tuberculosis.Int J Tuberc Lung Dis 1998; 2 (2): 96-104.

13-Borgdorff MW, Nagelkerke NJ, Dye C, Nunn P. Gender and tuberculosis: a comparison of prevalence surveys with notification data to explore sex differences in case detection.Int J Tuberc Lung Dis 2000; 4 (2): 123-32.

14-Enarson DA, Wang JS, Dirks JM. The incidence of active tuberculosis in a large urban area. Am J Epidemiol. 1989 Jun;129(6):1268-76.

15-Small PM, Hopewell PC, Singh SP, Paz A, Parsonnet J, Ruston DC, et al. The epidemiology of tuberculosis in San Francisco. A population-based study using conventional and molecular methods. N Engl J Med 1994; 330 (24): 1703-9.

16-Rieder H L. Sputum smear conversion during directly observed treatment for tuberculosis. Tubercle Lung Dis1996; 77: 124–9.

17-Lienhardt C, Manneh K, Bouchier V, Lahai G, Milligan PJ, McAdam KP.Factors determining the outcome of treatment of adult smear-positive cases in The Gambia. Int J Tuberc Lung Dis 1998; 2: 712–8.

18-Hiyama J, Marukawa M, Shiota Y, Ono T, Mashiba H. Factors influencing response to treatment of pulmonary tuberculosis. Acta Med Okayama 2000; 54: 139–45.

19-Zhao FZ, Levy MH, Wen S. Sputum microscopy results at two and three months predict outcome of tuberculosis treatment. Int J Tuberc Lung Dis 1997; 1: 570–2.

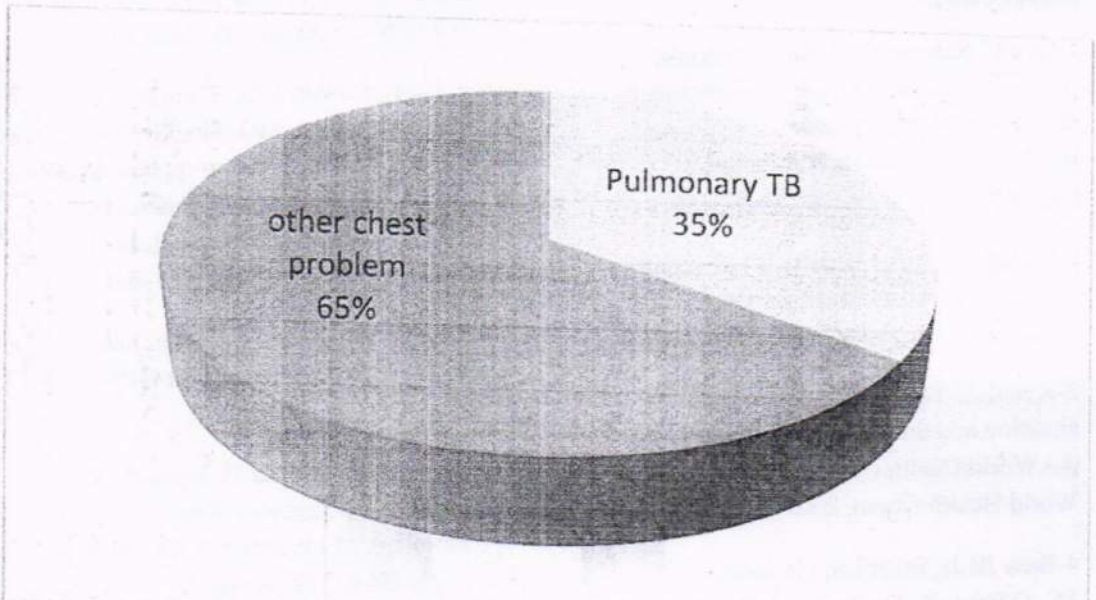

Figure (1): The results of sample examination.

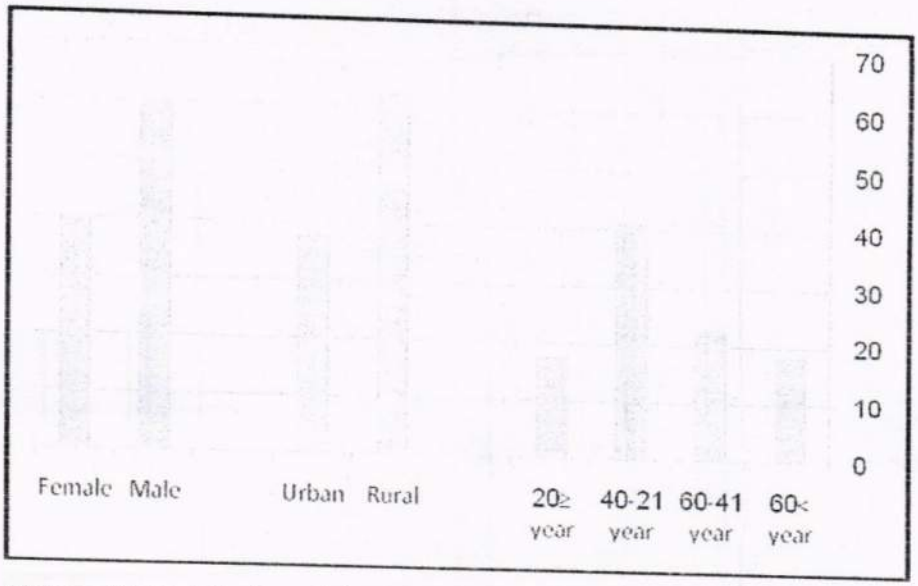

Figure (2): Distribution of the pulmonary tuberculosis in general patients according to sex, residence and age.

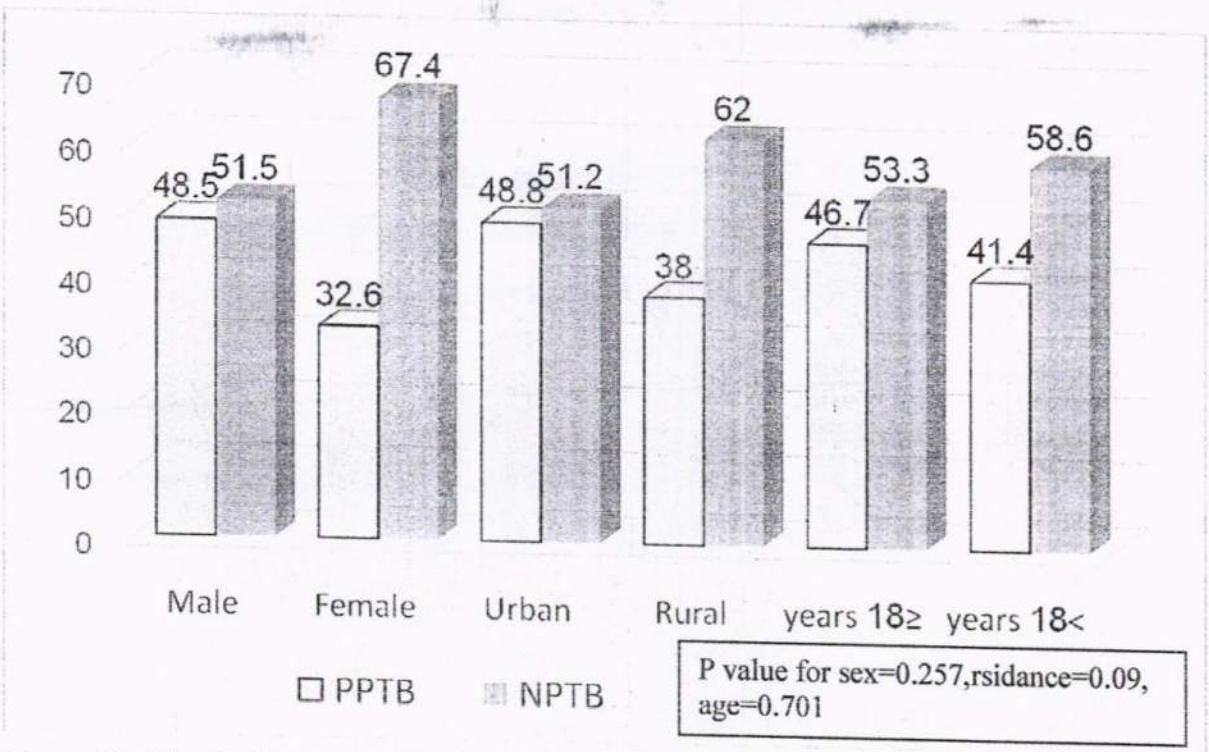

Figure (3): The distribution of pulmonary tuberculosis type according to sex residence and age.

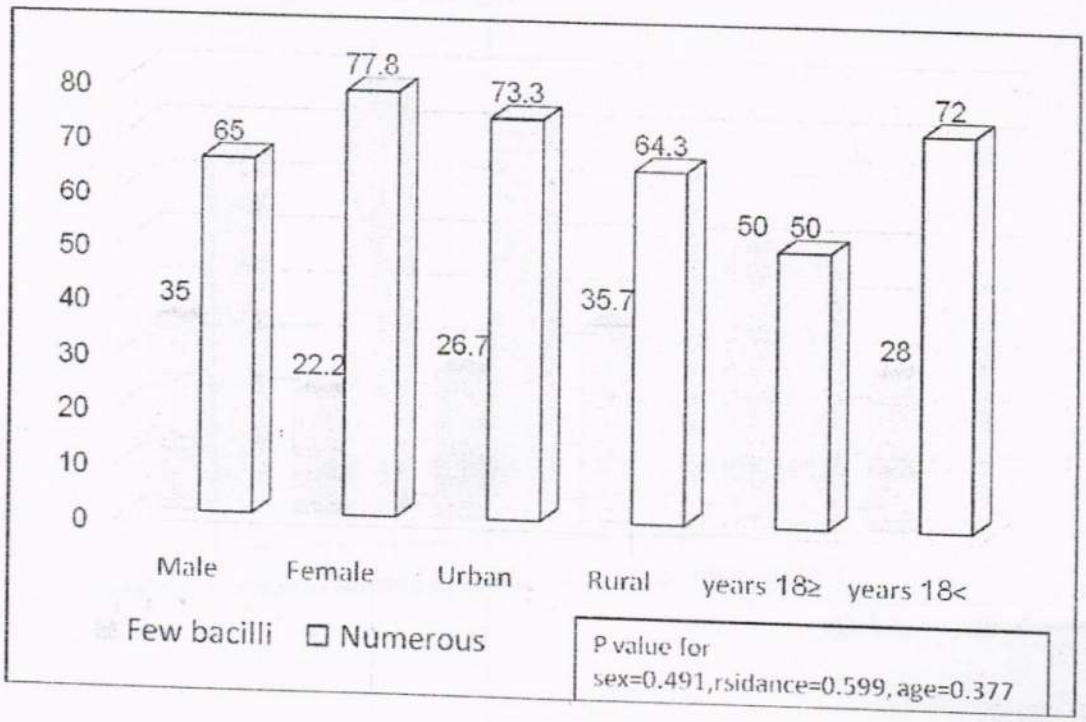

Figure (4): The initial bacillary load according to sex residance and age.

Table (1): Factors predicting smear positivity (active TB).

Risk factor	positive smear/total	univariate odd ratio OR	multivariate odd ratio OR	95%CI	p-value
Age					
≤18	7/15	1.203	1.238	0.416-3.683	0.701
>18	41/99	0.972			
Sex					
Male	33/68	1.296	1.949	0.895-4.425	0.091
Female	15/46	0.665			
Residence					
Urban	21/43	1.313	1.556	0.723-3.347	0.257
Rural	27/71	0.844			

Table (2): Factors predicting initial bacillary load.

Risk factor	numerous /total	univariate odd ratio OR	multivariate odd ratio OR	95%CI	p-value
Age					
≤18	2/4	0.5	0.4	0.05-3.3	0.377
>18	18/25	1.2			
Sex					
Male	13/20	0.8	0.5	0.1-3.3	0.491
Female	7/9	1.6			
Residence					
Urban	11/15	1.2	1.5	0.3-7.4	0.699
Rural	9/14	0.81			

Table (3): Mean ± SD of ESR level according to type of pulmonary tuberculosis.

ESR	N	Mean	Std. Deviation
NPTB*	65	86.9	17.9
PPTB**	47	85.8	20.5
Total	112	86.4	19.0

*negative pulmonary tuberculosis

**Positive pulmonary tuberculosis