Erectile dysfunction in pulmonary tuberculosis: is it a common association?

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Background Genital tuberculosis (TB) has negative influences on the reproductive function, and pulmonary TB causes disruption of the sexual function as well. The purpose of this study was to estimate the influence of pulmonary TB on male sexual function and sex hormones.

Patients and methods Of the 55 newly diagnosed male patients with pulmonary TB (40 pulmonary and 15 extrapulmonary: six with TB lymphadenitis and nine with TB pleuritis), 20 healthy volunteers served as control. All patients were evaluated: full clinical data, sputum smear examination, chest radiography, serum testosterone levels, and The International Index of Erectile Function (IIEF-5) questionnaires.

Results Of the studied TB cases 78.1% had erectile dysfunction, with a higher prevalence in pulmonary TB (67.2%) when compared with the 10.9% in extrapulmonary TB. As regards radiographic patterns, the patients presented with consolidation/cavitary lesion had the highest prevalence (60%). According to the IIEF questionnaires, the total score in the pulmonary group was significantly lower than that in the extrapulmonary group (10.8±2.05 vs. 20.2±3.09) (P=0.000*). The mean testosterone level was significantly decreased in pulmonary TB cases. Sputum grading of acid-fast bacilli in patients with pulmonary TB showed that the testosterone level was significantly decreased among patients with '3+' (>10 acid-fast bacilli/field) sputum smears (3.23±2.88 ng/ml) when compared with sputum negative. A significant correlation was found between bacillary load and the total score of IIEF and serum testosterone levels (r=−0.323, P=0.000*).

Conclusion Pulmonary TB has a negative impact on male sexual function. Thus, sexual problems should be in mind during the assessment and evaluation of patients with TB.

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Introduction

Tuberculosis (TB) remains a highly prevalent infectious disease at epidemic levels. It is responsible for a higher mortality rates than other infectious diseases [1]. Approximately, 10% of tuberculous patients are under 20s, with the most affected age group being from 20 to 49years. Men are three times more affected than women. The possible explanation for this predominance has been related to the biological differences such as immunity, exposure to *Mycobacterium tuberculosis* associated with different features of social embezzlement and social habits such as smoking [2].

Sexual life is an integral aspect of the quality of life that TB may disrupt.

Both genital TB and pulmonary TB have negative impacts on sexual function. Erectile dysfunction (ED) is one of the common sexual disorders affecting men. TB is a chronic infection that disturbs patients mentally and physically. The etiology of ED in patients with pulmonary TB is multifactorial. Hence, chronic infection, prolonged isolation, and taking not less than four anti-TB drugs simultaneously result in sexual dysfunction and infertility. Despite a normal genitourinary system, patients with pulmonary TB tends to experience deterioration in all components of copulatory act, starting from sexual desire to orgasm [3,4].

The objective of this work was to demonstrate the influence of pulmonary TB on sexual function and to address the prevalence of ED.

Patients and methods

This comparative study included 55 patients diagnosed with pulmonary TB who were admitted to the TB clinic of Assiut University Hospital, Assiut, Egypt, between January 2017 and December 2017. Twenty age-matched healthy volunteers served as a comparison group.

All participants in both groups have given written consent which was approved by the medical ethics committee of the Faculty of Medicine, Assiut University.

Inclusion criteria

The selection criteria include all patients who were recruited to the TB clinic of Assiut University Hospital

and diagnosed as pulmonary TB with an age group of 25–45 years.

Diagnosis of tuberculosis

Diagnosis of TB was confirmed by any of the following: isolation of *M. tuberculosis* from a culture of the sputum or other body samples; biopsy specimen was taken and showed caseating granuloma with or without acid-fast bacilli (AFB).

All patients were treated with short-term daily chemotherapy with first-line anti-TB drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol for 2 months, followed by isoniazid and rifampicin for another 4 months) according to the WHO guidelines [5].

Exclusion criteria

Patients who use medication that may interfere with serum hormone levels (such as sildenafil and other oral agents for ED) and patients with malignancy, significant renal, hepatic, or neurological diseases were excluded.

All patients were subjected to the following:

(1) Full medical history (age, sex, smoking habit, marital status).
(2) Sputum smear examination: baseline sputum microscopy of AFB was performed and density of AFB was graded as 1, 2, or 3+ according to standard protocols [6].
(3) Chest radiography: a standard posterioanterior chest radiograph was obtained for all patients at the time of TB diagnosis. Interpretation of each radiographic film was performed by experienced chest clinicians [7].
(4) International index of erectile function (IIEF-5): self-reported five questions were used to evaluate erectile function. The maximum score is 25 points, and classification is as follows. 1–7: severe ED; 8–11: moderate ED; 12–16: mild to moderate ED; 17–21: mild ED; 22–25: no ED [8].
(5) Serum total testosterone.

Venous blood samples were obtained from all patients to measure the total testosterone levels. The levels of testosterone were measured by chemiluminescent enzyme immunoassay using Immulite 1000 (Catalog number LKTW1, Los Angeles, California, USA) [9].

Statistical analysis

The statistical package for the social sciences (SPSS, version 16; SPSS Inc., Chicago, Illinois, USA) was used for statistical analysis. χ^2 or Fisher's exact tests were used to determine the significance of differences in frequencies of observations in groups. The *P* value is considered significant if it is equal to or less than 0.05.

Results

As shown in Table 1, the mean age of the TB patients was 36.7±11.5 years and of the control was 35.6±6.6 years. Of the 55 TB cases studied, 40 had pulmonary TB and 15 had extrapulmonary TB (six with TB lymphadenitis and nine with TB pleuritis). No significant differences were found in age and BMI when compared with the control group.

In this study, 78.1% of the TB cases studied had ED, with a higher prevalence in pulmonary TB (67.2%) when compared with (10.9%) extrapulmonary TB. The mean testosterone level among the TB cases was 4.95 ±1.24 ng/dl and among controls was 6.84±1.16 ng/dl (Table 1). There were significant differences in mean testosterone levels between pulmonary TB cases and the studied extrapulmonary TB cases (Table 2).

According to the results of IIEF questionnaires to demonstrate erectile function, a significant decrease was observed in TB cases as compared with the control group. The total score of the IIEF scale in the

Table 1 Sociodemographic characteristics of the studied subjects (*n*=75)

	Patients (*n*=55)	Control (*n*=20)
Pulmonary/ extrapulmonary	40 (72.72)/15 (27.27)	–
Age (years)	36.7±11.5	35.6±6.6
BMI (kg/m^2)	26.3±3.8	26.9±4.08
Parity		
Yes	40 (72.7)	17 (85)
No	15 (27.2)	3 (15)
Smoking status		
Nonsmoker	11 (20)	5 (25)
Current smoker	29 (52.7)	10 (50)
Former smoker	15 (27.2)	5 (25)
Marital status		
Married	50 (90.9)	17 (85)
Divorced/single	5 (9.09)	3 (15)
Hypertension		
Yes	20 (36.3)	8 (40)
No	35 (63.6)	12 (60)
Diabetes mellitus		
Yes	12 (21.8)	5 (25)
No	42 (76.3)	15 (75)
Prevalence of ED	43 (78.1)	4 (20)
Serum testosterone (ng/dl)	4.95±1.24*	6.84±1.16
Total score of IIEF-5	12.9±6.7*	22.9±4.3

Values expressed as mean±SD or number (%). ED, erectile dysfunction; IIEF-5, The International Index of Erectile Function.
*Significant difference.

Table 2 Prevalence of erectile dysfunction and serum testosterone level among patients with pulmonary and extrapulmonary tuberculosis (*n*=55)

	Pulmonary (*n*=40)	Extrapulmonary (*n*=15)
Prevalence of ED	37 (67.2)	6 (10.9)
Total score of IIEF-5	10.8±2.05*	20.2±3.09
Serum testosterone (ng/dl)	4.26±1.21*	5.27±1.09

Values expressed as mean±SD or *n* (%). ED, erectile dysfunction; IIEF-5, The International Index of Erectile Function. *Significant difference.

pulmonary group was significantly lower than the extrapulmonary group (10.8±2.05 vs. 20.2±3.09), respectively (P=0.000*) (Table 2).

Regarding the radiographic patterns of lung parenchymal lesions in TB cases, this study revealed that a higher prevalence of ED was among patients presented with consolidation/cavitary lesion (60%) (Table 3).

On grading the baseline sputum microscopy of AFB in patients with pulmonary TB, we found that the testosterone level was significantly decreased among patients with '3+' (i.e. >10 AFB per field) sputum smears (3.23±2.88 ng/dl) when compared sputum negative pulmonary TB (5.60±1.32 ng/dl).

The association between cavitation and bacteriological measures is well known. Additionally our study demonstrated a relationship between bacillary load and total score of IIEF (r=−0.343, P=0.000*). Further correlation was found between bacillary load and serum testosterone levels (r=−0.323, P=0.000*).

Discussion

The problem of the influence of pulmonary TB on sexual function in men has been covered insufficiently in studies and that most literature was devoted to urogenital TB and its adverse effect on reproduction and infertility. Sexuality and sexual function is a point out of discussion among male patients with pulmonary TB. Hence, the purpose of this study was to study the influence of pulmonary TB on male sexual function and sex hormones.

The present study has shown that 78.1% of the studied TB cases had ED, and that patients with pulmonary TB had a higher prevalence of ED when compared with extrapulmonary. Similarly, a retrospective study to evaluate sexual function in 98 pulmonary TB male patients found that 14.3% of patients had ejaculatory disorders [10].

Table 3 Prevalence of erectile dysfunction according to the radiographic patterns of lung parenchymal lesions in patients with tuberculosis

	Number of patients	Prevalence of ED [*n* (%)]
Consolidation/cavitation	35	33 (60)
Miliary shadow	3	3 (5.45)
Hilar or mediastinal lymphadenopathy	6	2 (3.63)
Pleural affection	9	4 (7.27)
Bronchiectasis	1	1 (1.81)
Calcification	1	0

ED, erectile dysfunction.

Also, our study observed lower testosterone level and total score of IIEF in patients with pulmonary TB. These findings were in agreement with Kulchavenya *et al.* [4] who studied 105 newly diagnosed patients with pulmonary TB (62 was infiltrative pulmonary TB, while 43 of them was cavernous pulmonary TB. The authors reported that the total score of IIEF was significantly lower in the infiltrative pulmonary TB group when compared with the cavernous pulmonary TB group (24.7 vs. 37.2 scores), respectively (P<0.0001). Patients with infiltrative type of pulmonary TB had a higher prevalence of sexual dysfunction than those patients with small lesions. They postulated that, despite normal urogenital system, pulmonary TB results in disruption in all dimensions of copulatory act, starting from sexual desire to orgasm. This was contributed to severe intoxication syndrome. Furthermore, anti-TB chemotherapy had a role in improvement in sexual function by arresting the systematic inflammation and reducing intoxication [4].Regardless of the recent molecular techniques in mycobacteriology, smear microscopy is still the widely used method for quantifying bacterial burden in the initial diagnosis of TB [11]. We examined the relationship between testosterone level and total IIEF score and the grade of the AFB smear. We reported that there was an inverse relationship between increasing AFB smear grade and testosterone level and total score. Also, Kulchavenya *et al.* [4] demonstrated a strong correlation between total score and intoxication.

One of limitations of our study was the small number of TB population examined in this study. The authors are looking forward in the future direction to study the effect of treatment on ED among tuberculous patients.

Conclusion

Pulmonary TB had a negative influence on male sexual function as well on the reproductive one. Thus, the physicians should keep in mind that patients with TB

are in need for comprehensive evaluation, including sexual life.

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Conflicts of interest

There no conflicts of interest.

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