RESEARCH STUDY

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Diabetes Mellitus as a Risk Factor for Pulmonary Tuberculosis

ARTICLE INFORMATION

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ABSTRACT

Background: In the past, an association between Tuberculosis (TB) and Diabetes Mellitus (DM) was widely accepted, today the potential public health and clinical importance of this relationship seems to be largely ignored. The national clinical and policy guidance in the UK on the central of TB, for example, does not consider the relationship with DM.
Objectives: To determine the risk of association between diabetes mellitus and pulmonary TB.
Methods: A retrospective study conducted in Ibn Zuhr hospital for chest diseases from Jan 2008 – sep 2010 , included in the study 402 patients with TB divided into diabetic & non diabetic, 96 (23.8%) were diabetic while other 306 were TB not diabetic.
Results: Risk of TB among DM patients were clear through its percentage (23.8), female patients increased in compares with non DM, also their age become older with mean change from 36.7 to 46.3 years in diabetic.
Conclusions: DM is a big problem worldwide and efforts to diagnose, detect, and treat DM may have a beneficial impact on TB control.

Introduction:

The global burden of diabetes is increasing and recent estimates high light the importance of this disease [1, 2]. It is possible that in areas of high diabetes prevalence the impact of this diabetic epidemic on tuberculoses (TB) could be as great as that of HIV [3], however, the overall importance of diabetes as risk factor for TB is still largely unknown [4], although a recent analysis in Mexico concluded that, in the population studies, 25 % of pulmonary TB was attributable to diabetes [3], other studies measure the strength of association do vary [5-8], also reported effect of age, gender and ethnicity upon the strength of association [9]. In deciding on which study to use for the relative risk estimates we searched thoroughly for studies describing the association between TB and DM, and have critically reviewed these studies elsewhere with an overall increased risk around 1.5 to 8 times higher like study in Korea [10].

In the past, an association between TB percent and DM was widely accepted [11], today the potential public health and clinical importance of this relationship seems to be largely ignored, and for example, the national clinical and policy guidance in the UK on the central of TB does not consider the relationship with DM [12].

The WHO new “” Stop TB Strategy “” refers to the problem of TB “” in high risk group “” including people with diabetes [13], but WHO has not yet made specific recommendations concerning the relationship between the two conditions. The recently published international standards for TB care give only cursory mention to diabetes [14, 15]. There are however some guidelines, such as those from American thoracic society [16], which recommend screening for TB in patients with diabetes.

Although the majority of studies identifies and discusses the presence of diabetes as a risk factor for TB, the relation between TB and DM is posited to be bidirectional. Early studies by Eugelbock et.al and Nichols et.al, reported that not only could having diabetes increase incidence of TB, but that having TB could lead to the presentation of diabetes [17, 18]. Work carried out by Karachunkii et.al, showed that individual with TB can develop changes in carbohydrate metabolism such as hyperglycemia and increase risk of DM [19]. Nigeria study found an increased DM among TB patients [20, 21].

Although uncertainty remain around whether TB is a risk factor for DM, it is clear that TB as with other infections complicates diabetes. It is known that diabetes makes TB management more difficult and that chronic stimulation of the inflammatory system by TB may affect diabetes management outcome.

Hyperglycemia has been assumed to favor the growth, viability of TB bacilli [22]. Furthermore, it was thought that the concomitant increase in dextrose in the tissues resulted in increased resistance to infection in situ and also in impaired repair capacity predilection to infection was also attributed to local tissue acidosis and imbalance of electrolytes, increased availability of glycerol, and nitrogenous substances which aid the growth of tubercle bacilli [23]. Dysfunction of pituitary gland may also have a

role in the increased susceptibility to tuberculosis and interfere with normal defense mechanism of mesenchymal tissue, corticosteroids are insulin antagonist, and their over production may result in insulin resistance diabetes [24-26].

Adverse effects and drug interaction of anti tuberculosis therapy, including Rifampicin, accelerates the metabolism of oral hypoglycemic agents and is a potent enzyme inducing agent. It was also known to cause early hyperglycemia in non diabetic and augment intestinal absorption of glucose, INH and pyrezinamide attributed to the increased insulin requirement. Malabsorption of Rifampicin was reported in poorly controlled diabetes mellitus [27].

The aim of the present study is to determine the risk of association between diabetes mellitus and pulmonary TB.

Methods:

A Retrospective study was conducted in Ibn Zuhr Hospital for chest diseases in Baghdad, during the period from Jan 2008 to Sep2010.

A review was made of the record of all patients with pulmonary TB admitted over this period, including in the study patients with TB who's their diagnosis confirm by bacteriology direct or smear or clear x ray and clinical picture, and exclude in the study patients who not have pulmonary TB and those who's their diagnosis not clear.

We divided the patient into diabetic and non diabetic and confirm the diagnosis of DM through fasting blood sugar at least 3 times, also exclude from diabetes those who have no history of DM and develop transient hyperglycemia that disappeared within two weeks (Temporary hyperglycemia).

Total number of patients included in the study through this period were 402; 96 of them were diabetic while other 306 non diabetic.

Age distribution included any age appears in this study. Mean for all 39.1±12.3 years with range from 16-85 years, in which diabetic mean age was 46.3±11.5 years while in non diabetic was 36.7±14.7 years. Also gender was studied and most of admitted cases were males representing 64%, this percent in diabetic patients decreased to 53%.

Results:

Of the 402 patients with TB, 96 (23.8%) were diabetic, so the prevalence of diabetes among TB patients who were admitted to Ibn Zuhr Hospital 23.8%.

In Iraq a survey done by Iraq family health survey report of chronic illness [28], diabetes prevalence in general population represent 21.8/1000, mean 2.18/100, as in Table 1.

Table1: Distribution of DM in Pulmonary TB patients.

DM	non DM	Total	Risk
96	306	402	23.8%
2	98	100	2%

Considering gender, as in the Table 2, the number of female with diabetes increases as compared to non diabetic, so the percentage of female with diabetes represent 46%, while in non diabetes was 33%.

Table 3 show the age distribution in 402 patients with TB, 96 of them were diabetic In diabetes the age was range from 34-84 years with mean of 46.3 ±11.5 years, while in non diabetes the range was 14-74 years. The mean age on onset of the disease in diabetic patient becomes older.

Table2: Gender distribution of Pulmonary TB patients with and without DM.

Groups	Female No. (%)	Male No. (%)	Total No. (%)
DM	45 (47)	51 (53)	96 (23.8)
Non DM	99 (33)	207 (67)	306 (76.2)
Total	149 (36)	258 (64)	402 (100)

Table3: Age distribution of Pulmonary TB patients with and without DM.

Age (Years)	Non DM No. (%)	DM No. (%)	Total No. (%)
<20	32 (10.5)	0 (0)	32 (8)
20-29	69 (22.5)	0 (0)	69 (17)
30-39	81 (26.5)	15 (15.7)	96 (24)
40-49	66 (21.5)	17 (17.7)	83 (20.5)
50-59	16 (5.2)	23 (24)	39 (10)
60-69	35 (11.5)	28 (29)	63 (15.5)
>70	7 (2.28)	13 (13.5)	20 (5)
Total	306 (100)	96 (100)	402 (100)
Mean±SD	36.7±14.7	46.3 ±11.5	39.1±12.3
Range	14-74	34-84	14-84

Discussion:

In table 1 shows the percentage of DM among TB patients (23.8%) from the total TB patients so this factor (DM) have a clear effect on TB represent about ¼ of the cases, while DM among general population represent about 2% .

DM have many effect on the body specially the immune system (defective lung defense), the lung of diabetics with tuberculosis show defective defense mechanism in the form dystrophy of alveolar macrophages, generalized affecting of pulmonary vessels. Intensive fiber formation and disorganization of the pathological process, DM and TB also increase the likelihood of severe laryngeal injury.

TB bacteria spread through air when patient with active TB cough or sneeze and most infective people never become ill (third of the world's population is actually infected with M. tuberculosis) because the human immune system usually contains the infection. However, the bacteria remain dormant within the body and can cause disease many years later if host immunity declines because of many cause one of them diabetes, so good controlling of diabetes result on decrease of incidence of TB. This study agrees with several studies [1-6] that have suggested that DM increases the risk of active TB. The rising prevalence of DM in TB endemic areas may

adversely affect TB control, so peoples with DM may be important targets for interventions such as active case finding.

Conclusions:

DM is a big problem worldwide and efforts to diagnose, detect, and treat DM may have a beneficial impact on TB control.

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