

MAGNITUDE OF THE PROBLEM

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INTRODUCTION

Tuberculosis (TS) is now the worlds foremost cause of death from a single infectious agent with nearly 90 million new cases and 30 million deaths annually. The economic impact of disease by way of direct and indirect costs of contact investigations, costs of TB screening and preventive therapy programs, costs of hospital and institutional infection control programs and costs to patients in lost income, is enormous. An increasing number of cases converting to multidrug resistant tuberculosis could escalate these costs dramatically. [1]

The common risk factors for tuberculosis includes poor social circumstances, alcoholism, diabetes mellitus, immigrant population, no previous BCG vaccination and HIV infection.[2]

The frequency of tuberculosis occurrence in patients of diabetes mellitus (DM) is reported to be 3-4 times than that in non-diabetics. Some of the studies conducted in the west have shown that relative risk of tuberculosis is 2.0-3.6 times more than those without diabetes. The common causal factors attributed to such an occurrence are age sex, race malnutrition and duration of illness. Pulmonary complications of diabetes mellitus are not as well recognised as those involving the cardiovascular, renal, ophthalmologic and neurologic systems.[3]

The risk of tubercular infection in diabetes is difficult to assess because of lack of prospective studies. Furthermore, the predisposition of diabetic patients to tubercular infection is not yet well documented. The determinants causing the illness will be discussed further in assessing the magnitude of the risk of tubercular infection in diabetes mellitus.

TUBERCULAR INFECTION IN DIABETES MELLITUS (DM)

Root reviewing the history of DM and tuberculosis noted that in the later half of the 19th century, the therapeutic measures lacked safety for the diabetics who were doomed to die of pulmonary tuberculosis (PTB). In 1920's TB was a serious problem for the diabetics p4]. In Philadelphia study, the incidence of PTB was 8.4% in diabetics. In a report by Halden and Hiltz [5] on 106 patients in whom both diseases were present, DM appeared first in 48, PTB was detected

first in 40 and the two conditions were diagnosed concomitantly in 48. A study conducted by Banyai in 1931 reported an incidence of 1.6-8.4% in diabetes patients with TB while it was 0.3-9.7% in TB patients with diabetes. [6] The prevalence of TB in diabetics in a Korean group varied from 9.6-21.8% depending upon age, sex and duration of illness and sampling [7]. An African study in Tanzania reported 4% prevalence of tuberculosis in DM patients. [8]

In India, the prevalence of DM is reported to be between 4.1% to 5.6% in PTB patients. TAI research committee noted prevalence of DM to be 9.7% in 935 patients of PTB [9]. Jain et al., refute the higher incidence of diabetes in pulmonary tuberculosis due to lack of a specific radiological picture. They observed an incidence of 6.9% of diabetes in pulmonary tuberculosis in their study.[10].

Table 1: Incidence and prevalence of diabetes mellitus in pulmonary tuberculosis in India and elsewhere.

Author/Year/Reference	Prevalence(%)	Incidence(%)
Root et al., 1934,[4]		8.4
Banyai et al., 1927-1931[6]		2.6
Kim et al., 1995 [7]		1.6
Mugushi et al., 1990 [8]	4.0	
TAI Research Committee, 1987 [9]	9.7	
Chowdary & Mitra, 1964[11]		2.3
Deshmukh et al., 1966[12]		14.0
Khanna et al., 1968 [13]		6.6
Nanda & Tripathy, 1968 [14]		12.0
Kishor et al., 1973 [15]		20.9
Lahari & Sen, 1974 [10]		7.5
Bahulkar & Lokhandwalla, 1975 [17]		26.3
Bhatia et al., 1976 [18]		22.7
Goyal et al., 1978 [19]		22.7
Roychowdary & Sen, 1978 [20]		20.7
Surya Kirani KRL et al., 1998 [21]		16

AGE

Age of patient and severity of DM is a significant factor favouring TB. Philips noted in 1960's that about half of the new cases of PTB occurred in those who were at least 45 years old, and the relative incidence was highest in those who were more than 65 years of age [22]. In a Korean, study, diabetes was found in 0.02% of those aged 20 to 29, 0.17% of

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those aged 30-39, 0.92% of those aged 50-59 and 3.88% of those aged 60 years and over. Relative risks of developing PTB among diabetics however, was higher in younger age groups i.e., 9.88 and 4.72 in the 30-39 years and 40-49 years age groups, somewhat lower in older age groups, 2.30 to 1.76 in those over 49 years[7]. Jain et al reported an incidence of 69% tuberculosis diabetics above the age of 40 years, while the overall prevalence of pulmonary tuberculosis was far below this.

SEX

Diabetes was found to be more common in males than in females in the ratio of 7:1 as compared to non-diabetics where the ratio was only 2.2:1[10]. Kin et al., reported 0.2% prevalence in females as compared to 1.2% in males [7].

RACE

Racial factors may also affect the clinical features PTB in patients with DM, as it is observed that cavitary disease and sputum positivity was significantly higher in Asian immigrants[2].

MALNUTRITION

In all diabetics, there is some degree of malnutrition of the cellular level due to metabolic defects. Perhaps the hepatic dysfunction with its consequent hypovitaminosis plays a major role in the causation of pulmonary tuberculosis in diabetics. There are no reports on the incidence and prevalence of PTB in DM due to malnutrition.[2].

DURATION OF ILLNESS

Root in his classic study observed an increased incidence of pulmonary TB with the duration of diabetes mellitus[4]. He stated that the development of tuberculosis in juvenile diabetics is ten times more frequently than among non-diabetic patients. In 85%, the development of TB followed the onset of DM.[23]. A severe form of tuberculosis seems to develop far more frequently among diabetics as compared to non-diabetic controls. The proportion of moderately advanced or far advanced tuberculosis was 41% in newly developed cases amongst diabetic subjects, compared to 24% in non diabetic subjects [24].

Numerous reports on the higher prevalence of tuberculosis re-affirms that diabetes predisposes to the development of tuberculosis and the risk is 3.4 times higher than in non-diabetic controls[3]. Such an association between diabetes and tuberculosis indicates that the two diseases do not coexist

incidentally, but rather that diabetes predisposes to the development of pulmonary tuberculosis or vice-versa[7]. Jain et al, on contrary, report that whatever higher incidence of diabetes observed in tuberculosis patients is rather a chance factor than a definite predisposition.[10].

PREVENTION / PROPHYLAXIS

All patients of diabetes should have radiological examination of the chest at least once a year. If any diabetic patient shows a loss of weight, complains of cough or needs an increase in insulin dose, chest radiographs and sputum examination for acid fast bacilli should be carried out promptly to exclude tuberculosis. All patients of diabetes are at moderate risk of developing tuberculosis and those patients having a strong tuberculin reaction (more than 15 mm), or recent converters should be considered for chemoprophylaxis [23]. In summary, with proper and adequate anti-TB chemotherapy, the clinical course and prognosis of TB patients whose diabetes are well under control, will in no way differ from the non-diabetics[23].

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