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Studies on impact of diabetes mellitus on tuberculosis in coastal region of Andhra Pradesh

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ABSTRACT

The present work conducted showed that the prevalence of diabetes among the coastal region of Andhra Pradesh, India is as high as 14.5% of the total patients screened around six hundred. During the survey it was observed the 2% of the patients suffering with tuberculosis in all the age groups. In the age group among 31- 40 years the prevalence of tuberculosis along with the diabetes is of 2% where estimation of HbA1c is very high. Normally, the prevalence of recognized diabetes mellitus below the 20 years age group is around 06% but between 21-30 years 16%, the highest incidence 30% was observed between 31-40 years. Further with the increase of the age of the people the incidence of diabetes mellitus abnormality reduced from 24% to 4% between 41-60 years of age. In the Group-C all the 50 patients 15 are identified with the diabetes mellitus with highest incidence of 30%. HbA1c in the group-C patients 8.92% having mean blood glucose 270 mg/dl gives a chance of reducing the immune system gives an opportunity to the TB germs to the establish. In the patient C13 age about 38 years and the intensity of tuberculosis is also high.

Key words: Diabetes mellitus, Hb A1c, Tuberculosis, Blood glucose.

INTRODUCTION

Current studies available in BMC public health (2007) propose that an extensive percentage of occurrences of tuberculosis in India are attributable to diabetes. A large amount as 14.8% of pulmonary tuberculosis and 202 % of smears–positive i.e. infectious tuberculosis may be directly linked to diabetes [1]· Diabetes is also probably accountable for the urban incidence of smear positive tuberculosis being 15.2% higher than that in rural areas. One underlying risk factor for tuberculosis is that may not be equally distributed between those with and without diabetes in India is poverty. Consistent with this, a recent case control study from India of risk factors for TB found a univariate odds ratio of 1.8 for previously diagnosed diabetes, which strengthened to 2.44 when controlling for other risk factors, including low socio- economic status [2]. In India in 2000, there were an estimated 481,573,000 people over the age of 25 years [3]. Among these, 4.3% i.e. around 20,707,639 had diabetes [4] and 939,064 developed pulmonary tuberculosis, of which 575,900 were smear-positive and hence infectious. The recent studies expect that in India 18.4% (12.5% to 29.9%) of people with pulmonary tuberculosis (both smear-positive and smear-negative) have diabetes and that in the smear-positive group diabetes prevalence is 23.5% (12.1% to 44%).

MATERIALS AND METHODS

1 Selection of patients for Diabetes mellitus: For this the patients are selected are given; Group-A – < 20 years, Group-B – 21-30 years, Group-C – 31-40 years, Group-D – 41-50 years, Group-E – 51- 60 years, Group-F - > 60 years.

2. Selection of patients for tuberculosis
The fourth group consists of 31-40 years. It is the convenient age group for the tuberculosis disease attacks. So, these fourth group samples were processed for tuberculosis by polymerase chain reaction. The following codes are given for convenience sake to the Third group- C members is as: C1 - C15 was given by serial number to twenty-four patients**.** (C1, C2, C3, C4, C5---C15).

3. Determination of Blood sugar: was done according to the method given by Trinder, P (1969).

4. Estimation of Oral glucose tolerance test: (O.G.T.T) by standard method.

5. Determination of HbA1c: The separation of HbA1c is performed rapidly and precisely, without interference from Schiff base, lipemia or temperature fluctuations by HPLC.

6. Determination of tuberculosis: Tuberculosis is determine in different methods
1. Acid fast bacilli (slide)
2. Mauntoux test (skin test)
3. Anti bodies estimation by Elisa (IgM, IgG, IgA).
4.Mycobacterium tuberculosis –DNA detection by PCR.

Determination of TB antibody (IgM):
The Diagnostic Automation, Inc. Mycobacterium tuberculosis IgM antibody test kit is based on the principle of the enzyme immunoassay (EIA). (Bloom BR, Murray CJL, 1992)

Determination of Mycobacterium tuberculosis –DNA detection by PCR

RESULTS AND DISCUSSION

1. Prevalence of diabetes
The present work conducted showed that the prevalence of diabetes among the coastal region is as high as 14.5% of the total patients screened around six hundred. During the survey it was observed the 2% of the patients suffering with tuberculosis in all the age groups. But it was found they don't have any other ailments. But in the age group between 31- 40 years the prevalence of tuberculosis along with the diabetes is of 2% where estimation of HbA1c very high. (Table-4). In C5 patient (age forty-three years) blood glucose level was found abnormal (228 mg/dl). Where HbA1c 8.34%.which indicates the higher level of Diabetes mellitus, which was found high incidence of disease (Table-4).In the case of C13 patient the intensity of diabetes is more and blood sugar level is also high. Normally, the prevalence of recognized diabetes mellitus below the twenty years age group is around 06% but between twenty-one to thirty years 16%, the highest incidence 30% was observed between thirty-one to forty years. Further with the increase of the age of the people the incidence of diabetes mellitus abnormality reduced from 24% to 4% between forty-one to sixty years of age (Table-1).

Table-1: Screened Diabetic patients by using HbA1C

S.NO	*GROUP*	*AGE LIMIT*	*% of DIABETIS by Hb A1C*
1	A	< 20 years	06%
2	B	21-30 years	16%
3	C	31-40 years	30%
4	D	41-50 years	24%
5	E	51-60 years	08%
6	F	>60 years	04%

Table-2 indicates out of 50 patients screened only three patients of different age groups (eight months, twelve years and nineteen years) were identified as diabetes patients starting with low profile to higher level of diabetes.

Table –2: Diabetic patients among the age group of <20 years
Group A: (<20 years)

S.NO	*PATIENT CODE*	*AGE(years)*	Hb-A1C %	*MBG mg/dl*
1.	A1	8months	7.80	192
2.	A2	12	7.12	154
3.	A3	19	8.32	201

In the Group 'B' patient's age between twenty-one to thirty years (Table-3) a study maintenance of disease condition was observed.

Table –3: Diabetic patients among the age group of 21- 30 years
Group B: (21-30 years)

S.NO	*PATIENT CODE*	*AGE(years)*	Hb-A1C %	*MBG mg/dl*
1.	B1	21	7.15	151
2.	B2	22	6.92	142
3.	B3	24	8.45	220
4.	B4	25	7.36	165
5.	B5	25	8.83	211
6.	B6	27	6.29	135
7.	B7	29	8.56	230
8.	B8	30	7.67	189

In the Group-C all the 50 patients 15 are identified with the diabetes mellitus with highest incidence of 30% (Table-1). HbA1c in the group-C patients 8.92% having mean blood glucose 270 mg/dl gives a chance of reducing the immune system (Moser,1999) gives an opportunity to the TB germs to the establish in the patient C13 age about thirty-eight years and the intensity of tuberculosis is also high (Table-4).

Table –4: Diabetic patients among the age group of 31- 40 years With TB IgM
Group C: (31-40 years)

S.NO	*P.I.D*	*AGE (years)*	Hb-A1C%	*MBG mg/dl*	*IgM-TB*
1.	C1	31	6.84	145	0.65
2.	C2	31	8.01	200	0.42
3.	C3	32	7.84	189	0.55
4.	C4	33	7.24	152	0.73
5.	C5	34	8.34	228	**2.08**
6.	C6	34	7.56	160	0.41
7.	C7	34	7.51	156	0.76
8.	C8	35	7.36	148	0.61
9.	C9	35	6.89	139	0.53
10.	C10	36	7.82	195	0.44
11.	C11	36	8.45	245	0.91
12.	C12	37	8.65	268	0.65
13.	C13	38	8.92	270	**1.69**
14.	C14	38	10.2	306	0.32
15.	C15	39	8.45	225	0.76

Whereas other patients screen between 31-40 years does not show any symptoms of tuberculosis. In the Group-D the prevalence is reduced to 24 % among the coastal region of A.P. (Table-5).

Above fifty-one years very less incidence were identified with diabetes mellitus. Which indicate the four members between 51-60 years, above sixty years only two are identified among 50 patients screened (Table-6, 7).

Table –5: Diabetic patients among the age group of 41- 50 years
Group D: (41-50 years)

S.NO	*P.I.D*	*AGE (years)*	Hb-A1C %	*MBG mg/dl*
1.	D1	41	7.25	168
2.	D2	42	7.56	179
3.	D3	43	8.54	251
4.	D4	43	6.97	139
5.	D5	44	7.67	189
6.	D6	45	7.56	168
7.	D7	45	7.45	170
8.	D8	46	7.36	160
9.	D9	47	8.42	268
10.	D10	48	8.56	279
11.	D11	49	8.13	212
12.	D12	50	7.05	148

Table –6: Diabetic patients among the age group of 51- 60 years
Group E: (51-60 years)

S.NO	*P.I.D*	*AGE (years)*	Hb-A1C %	*MBG mg/dl*
1.	E1	54	7.65	165
2.	E2	55	8.92	285
3.	E3	57	11.0	326
4.	E4	59	8.03	221

Table –7: Diabetic patients among the age group of > 60 years
Group F: (> 60 years)

S.NO	*P.I.D*	*AGE (years)*	Hb-A1C %	*MBG mg/dl*
1.	F1	65	8.56	218
2.	F2	71	7.42	169

Figure 1, 2 shows Agarose gel photographs gives an idea of the presence of tuberculosis disease in C5, C13 patients. Which was corresponding bands at 237 base pair was clearly observed. Consecutive outpatients from the medicine department were screened and an independent comparison of physical signs against diabetes mellitus assay (blood sugar, HbA1c) was performed. Out of the total six hundred patients screened for diabetes, eighty eight were found eligible for the present study which shows, six patients were aged below 20 years, sixteen patients were aged between 21-30 years, thirty patients were aged between 31-40 years, twenty four patients were aged between 41-50 years, eight patients were aged between 51-60 years, four patients were aged above 60 years were diagnosed diabetes (Table- 1).The risk of microalbuminuria also increased wih the level of haemoglobin A-1this pattern was almost identical in each category of disease duration except for that spanning 25 – 32 years (Andrzej.s. et al.(1995).

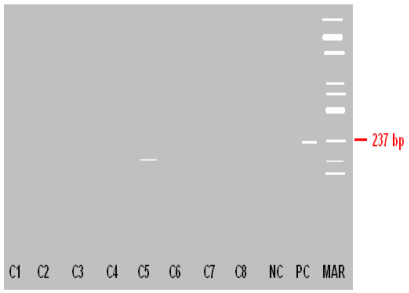

FIGURE-1: Comparative study of TB banding pattern by PCR in agarose gel electrophoresis.
C1 to C8 : GROUP 'C' SAMPLES, NC : NEGATIVE CONTROL, PC : POSITIVE CONTROL
MAR : MARKER

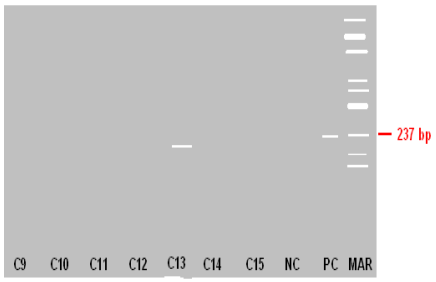

FIGURE-2: Comparative study of TB banding pattern by PCR in agarose gel electrophoresis
C9 to C15 : GROUP 'C' SAMPLES, NC : NEGATIVE CONTROL
PC: POSITIVE CONTROL, MAR : MARKER

The prevalence of insulin-dependent and non insulin-dependent diabetes mellitus among adults revealed that 0.2% and 1.6% respectively. Patients with tuberculosis among the diabetics were 1.7% which was greater than the normal populations. Boarder line carbohydrate metabolic disorder in adolescents identified 10.8% among the sample surveyed in the present work. A trend for tuberculosis to run less favorably was found in-patients with carbohydrate metabolic disturbances than in those without those disorders. However there was no significant difference than in those without three disorders. Few tuberculosis patients with diabetes mellitus were followed up and the course of tuberculosis was poor.

CONCLUSION

Diabetic patients are not only more susceptible to infection but when infections do occur they are more severe as the diabetic is a compromised host. Tuberculosis infection in diabetes mellitus is usually due to reactivation of an old focus rather than through fresh contact. Patients with diabetes mellitus and tuberculosis present with more advanced disease and have more changes in the lower lobes. Tuberculosis in Type II is not uncommon either, as 5-10% has pulmonary tuberculosis in developing countries. Though tuberculosis is more prevalent in Type I diabetes mellitus, the magnitude of the problem in Type II diabetes mellitus should be considered with no less concern in the purview of Type II diabetes mellitus affecting an overwhelming larger number of people and also emerging as a serious public health problem in developing countries.

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