Study of Risk Factors for the High Prevalence of Type 2 Diabetes in the People of Jammu

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ABSTRACT The study was carried out to identify the contribution of risk factors to the susceptibility to T2DM among the people of Jammu region of Jammu and Kashmir state in North India. For this, a total of 250 diabetic patients (140 male, 110 female) and 150 non- diabetic controls (90 male, 60 female) were recruited from Jammu. A general health questionnaire was used to collect information about age, sex, onset of diabetes, smoking, alcohol intake, diet pattern, physical activity, household information and family history of diabetes. Anthropometric measurements of height, weight, waist and hip circumference were also taken on all subjects. In our study mean age of diagnosis of T2DM was 53.28 ± 9.98 years. The average duration of diabetes was longer in males than in females ($10.16\pm11.37yr$) *vs.* ($7.17\pm 5.05yr$). The mean BMI value did not vary among diabetic and non-diabetic subjects (25.91 ± 3.82 *vs.* 24.91 ± 3.65; $P = .011$) but male diabetics have higher BMI as compared to females. Diabetic complications are higher in T2DM subjects than in Control population (28 percent CHD, 32 percent Hypertension, 40 percent Ocular Problem). It is concluded that the Jammu population in North India is at a higher risk of developing diabetes and its related complications.

INTRODUCTION

Type 1 diabetes (T1D) is a chronic autoimmune disease, characterized by autoimmune destruction of the insulin secreting b-cells of the islets in the pancreas (Mehra et al. 2007). Whereas in type 2 diabetes, body does not produce enough insulin or the cells are not able to utilize the insulin. Type 2 diabetes (T2DM) poses a major global health threat both in the developed and developing countries (Wild et al. 2004). The World Health Organisation has predicted that the major burden of T2DM will occur in the world and there will be a 42 percent increase in the developed countries and 170 percent increase in the developing countries. The countries with largest number of diabetic patients are and will be in the year 2025, India, China and United States (King et al. 1998; Ramachandran et al. 2002, 2007). The prevalence of T2DM in Asian Indians ranges from 2.7 percent in rural India to 14 percent in urban India and in the range 16-22 percent in migrant Indians living in Europe, USA, Africa and Fiji (Knight et al. 1992; Dhawan et al. 1997; Simmons et al. 1995; Chandalia et al. 1999). It has been suggested that the increase in prevalence of diabetes among Asian Americans is due to ageing of the population, urbanization and increased prevalence of obesity and lack of physical inactivity (Marguerite et al. 2004). It was reported that the prevalence of type 2 diabetes is on the rise more in urban areas compared to rural areas (Sayeed et al. 2003; Hussain et al. 2005).Type 2 diabetes mellitus is a multifactorial disease with both genetic and environmental factors contributing to its development (Khan et al. 1996). Besides urbanization, other risk factors of particular importance are: - obesity, increased abdominal fat, hypertension, ethnic background and lack of physical exercise (De Fronzo et al. 1997).Various studies on the prevalence and risk factors associated with T2DM have been carried out in India in the past but most of them have been confined to south Indian populations (Shobhana et al. 2000). A few authenticated reports have been published on populations residing in Delhi (Ahuja et al. 1996; Misra et al. 2001; Ramachandran et al. 2001; Sadikot et al. 2004) and Kashmir by (Zargar et al. 2000). Jammu region of Jammu and Kashmir State in north India is facing rapid urbanization. However, to the best of our knowledge scarcely any information is available on the prevalence and risk factors associated with T2DM in the Jammu population taken up during the present study. The objectives of this study are to investigate risk factors associated with the T2DM in the selected population.

Table 1: Demographic and socio-economic characteristics of the diabetes study participants

S. No.	Characteristics		Type 2 diabetes (percent)			Controls (percent)		
			Male (n=140)	Female (n=110)	Total (n=250)	Male (n=90)	Female (n=60)	Total (n=150)
1	Economic Status	High class	28.57	10.90	20.8	33.3	23.3	29.33
		Middle Class	60.71	60.90	60.8	52.2	56.6	54.00
		Low Class	10.71	28.18	18.4	14.4	20.0	16.60
2	Education	Literate	82.85	74.54	79.25	66.6	75.0	70.00
		Illiterate	17.14	24.45	20.8	33.3	25.0	30.00
3	*Alcohol Consumption		62.85		35.2	33.3		20.00
	*Smoking		10.71		6.0	16.6		10.00
	*Both		26.42		14.8	11.1		6.66
4	Tea/ Coffee	Moderate	59.28	30.00	46.4	58.8	36.6	50.00
		Heavy	40.71	70.00	53.6	41.4	63.3	50.00
5	Cooking Media	Mustard/ Refined	25.71	30.90	28.0	22.2	20.0	21.30
		Desi ghee	14.28	9.09	12.0	15.5	16.6	16.00
		Mixed	60.00	60.00	60.0	62.2	63.3	62.60
6	Eating Habits	Non- vegetarian	76.42	29.09	55.6	35.5	33.3	34.60
		Vegetarian	23.57	70.90	44.4	64.4	66.6	65.30
7	Physical Exercise	Regular	58.57	40.00	50.4	75.5	71.6	74.00
		Sedentary	41.42	60.00	49.6	22.0	28.3	26.00

* No data were available for female samples in respect to alcohol and smoking.

between diabetic and control subjects (25.91± 3.82 and 24.91± 3.65; *p* = 0.011). However, comparatively higher BMI was observed in male diabetic subjects (25.93± 3.59 for males and 25.89± 4.10 for females; *p* ≥ 0.05). The mean WHR revealed pronounced value in patients (0.97± 0.07) than in controls, (0.94± 0.08) which was statistically significant *p*=0.00). Confirmation of data was done from the new BMI cut-offs advised by WHO Expert Consultation. Ahuja et al. (1996) observed central obesity in both the groups, patients as well as controls.

Most of our male patients were desk workers and others were business class. Apparently, sedentary lifestyle and intake of heavy non- vegetarian diet accounts for the higher BMI in case of male patients.

***Knowledge Profile of the Patients*:** About 75 percent of our diabetic patients were familiar about the disease they were suffering from. About 30 percent were aware of the root cause and 40 percent of our patients were aware of preventive measure and treatment of the disease.

***Associated Health Problems*:** The data on diabetes related complications were also collected from our patients, and was found that nearly about 28 percent had clinically diagnosed CHD (Coronary Heart Disease), 32 percent had hypertension and 40 percent had ocular complications (for example, cataracts, retinal problems and vision loss).10-12 percent of affected individuals suffered from non- healing skin and soft tissue infection or ulcers of leg and foot, many of them had amputated fingers. Significantly higher frequency of hypertension, ocular problems and CHD were observed in T2DM patients than in controls. On the other hand, no significant differences were observed in the frequency of nephropathy, paralytic stroke and dental problems between patients and controls.

DISCUSSION

The present case control study was undertaken to establish the association, if any, of the risk factors associated with prevalence of dia-

Table 2: Characteristics of study subjects by sex and disease status

Variables	Type 2 diabetes			Controls			P Value
	Male (n=140)	Female (n=110)	Total (n=250)	Male (n=90)	Female (n=60)	Total (n=150)	
Age (Years)	54.5 ±9.86	51.73±9.96	53.28±9.98	48.94±5.31	47.81±5.31	48.27±7.28	0.000
BMI (kg/m2)	25.93±3.59	25.89±4.10	25.91±3.82	24.93±3.44	24.89±3.98	24.91±3.65	.011
WHR	0.99±0.07	0.94±0.06	0.97±0.07	0.97±0.06	0.91±0.07	0.94±0.08	0.000

betes in Jammu in North India. Asian Indians have been identified as one of the ethnic groups with a high prevalence (Ramachandran et al. 2001; Sadikot et al. 2004) and familial aggregation with type 2 diabetes (Vishwanathan et al. 1996). The findings of this study helps in extending our knowledge about the present epidemic and associated risk factors of T2DM in people of Jammu. Nearly 67 percent of our diabetic subjects showed family history with one or both of the parents affected with the disease in Jammu population.

Physical activity has a great impact on many of the components of the metabolic syndrome of T2DM. The population in Jammu region is facing rapid globalization, and is changing as a result of developmental activities raising the socio- economic status of the population. These improved socio-economic conditions have resulted in a decrease in physical activity and an increase in obesity, which has led to an increase in the prevalence of T2DM and its related complications. The data from our study suggests that those leading a sedentary lifestyle or involved only in household work develop diabetes more frequently than those whose occupation or routine life involve more physical work. Similar findings were reported by Williams et al. (1994) and Hughes et al. (1990).

Age related prevalence of diabetes and its complications are high in both men and women inhabiting Jammu. Our study reports that most of the subjects developed T2DM in their productive years of age but exact age of onset was not clear because many individuals of our study do not undergo regular checkups until symptoms appear thus diabetes remain undiagnosed for some years. Votey et al. (2004) had made similar observations in their study.

Obesity is an established risk factor for type 2 diabetes, and a significant association was found between higher BMI ≥ 25 and occurrence of the disease in the present study as reported earlier Sayeed et al. 1998.The association of WHR and diabetes was also evident in our study reported by (Hussain et al. 2005).

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