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Clinical Correlation of Metabolic Syndrome in Indian Type – 2 Diabetics Patients with Their Socioeconomic Status Under Different Age Group

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Abstract The metabolic syndrome is a complex condition in which numerous aspects of normal metabolism are perturbed. The syndrome represents a cluster of the major risk factors for cardiovascular disease i.e. obesity, insulin resistance / hyperinsulinemia, impaired glucose tolerance / diabetes, dyslipidemia and hypertension. The syndrome is also described by a procoagulant state that is attributed, in part, to an elevation in circulating lipoprotein, fibrinogen and plasminogen activator inhibitor one levels. This in turn contributes to the metabolic abnormalities that lead to cardiovascular disease. Several hypothesis have been proposed for the etiology of the metabolic syndrome, and the potential role of insulin resistance, leptin resistance, and other disturbances as major contributing factors. Hyperinsulinemia and insulin resistance are predictors of type 2 diabetes and are key factors in the development of the metabolic syndrome. A survey was conducted to study the clinical correlation of metabolic syndrome in Indian type –2 diabetic patients with their socioeconomic status (high income group, middle income group & low income group) under different age group (upper age group, middle age group & low income group) in western Uttar Pradesh, India. Four hundred five type 2 diabetic patients aged 52 ±17 year including 215 (53.09%) males and 190 (46.91%) females were surveyed for this purpose. Of these hypertension & diabetics were simultaneously diagnosed in 196 (48.39%) & 152 (37.53%) patients. Family history of these patients showed the occurrence of diabetes , hypertension & concurrent hypertension with diabetes mellitus in about 59 (14.0%), 56 (13.8%) & 77 (19.1%) respectively. The frequencies of individual component of the metabolic syndrome were as follows: dyslipidemia - 68.4%, systemic hypertension – 54.3% , obesity – 42.5% microalbuminuria – 44.9% & hyperuracemia 58.3% . Ischemic heart disease (myocardial infarction) occurs in – 2.4%. Of these 405 diabetic studies, 278(68.2%) had metabolic syndrome victims occurs in the high income group & the low income group.

Keywords Clinical Correlation, Metabolic Syndrome, Type – 2 Diebtics, Socioeconomical Status.

1. Introduction

The metabolic syndrome is a convoluted condition in which several aspects of normal metabolism are perturbed. The syndrome represents a clustering of the major risk factors for cardiovascular disease i.e. obesity, insulin resistance / hyperinsulinemia, impaired glucose tolerance / diabetes, dyslipidemia and hypertension [1]. Additional risk factors are hyperhomocysteinemia, hyperuricemia and hyperleptinemia. The syndrome is also characterized by a procoagulant state that is attributed, in part, to an elevation in circulating lipoprotein, fibrinogen and plasminogen activator inhibitor one levels [2]. This in turn contributes to the metabolic abnormalities that lead to cardiovascular disease [3]. Several theories have been proposed for the etiology of the metabolic syndrome, and the potential role of insulin resistance, leptin resistance, and other disturbances as major contributing factors. Hyperinsulinemia [4,5] and insulin resistance are predictors of Type 2 diabetes and are key factors in the development of the Metabolic Syndrome. Insulin resistance in adipose tissue and muscle, a defect in b-cell function, [1] and an increase in hepatic triglyceride (TG) and glucose output, lead to the metabolic disturbances in glucose and lipid metabolism that create the metabolic milieu for cardiovascular disease [6]. However, epidemiological studies do not provide a consistent association between insulin resistance and some other facets of the syndrome such as hypertension. In 1980, 1st time describes a link of type 2 diabetes, unhealthy blood Cholesterol, blood pressure & problem that could lead to cardiovascular disease, premature canary diseases, artery disease, heart stroke & peripheral vascular disease [7]. In 1998 WHO was the 1st to publish an International accepted definition for Metabolic Syndrome on the basis of the third report of the national cholesterol education program expert

panel on detection , evolution & treatment of high blood cholesterol in adults. According to definition, metabolic syndrome as involve in three or more of the following metabolic risk factors given bellow in table: 1.

Table 1. Screaning factor for metabolic syndrome. JAMA, 2001.

Characteristics	Screening factors for metabolic syndrome
Obesity	35 inches or higher in male 40 inches or higher in female
Blood pressure	130/85 mmHg or higher
Tri Glycerids	150 mg/dl or higher
LDL	130 mg/dl or higher
HDL	50 mg/dl or lower in female 40 mg/dl or lower in males
Cholesterol	200 mg/dl or higher
Blood Sugar	110 mg/dl or higher

Our purpose of study to describe the metabolic syndrome & its demographic &clinical correlation with socioeconomic status in age group range 35 to 45, 46 to 55 & 56 to above.

2. Material & Methods

2.1. Demographic and Clinical Data

An research was conducted to know the metabolic syndrome in Rohalkhand region, Uttar Pradesh, India. Patients with hypertension, hepato-biliary disease and hypothyroidism were excluded from the study. Patients taking lipid altering drugs, including lipid-lowering agents, were excluded from the study. Demographic and clinical data, including occupational / educational status; family history of diabetes and / or hypertension; socioeconomic status was stratified into lower, middle and upper classes using the British Registrar General Scale [8]. Diabetes was diagnosed using the World Health Organization (WHO) diagnostic criteria [9]. Sitting blood pressure was measured with aneroid mercury sphygmomanometer (Accoson), size 13.5 x 103 cm, using the patient's nondominant arm and after 10 minutes of rest. Three readings were taken, and the average of the last two was taken as the blood pressure. Systolic blood pressure (Korotkoff phase I) of =140 mmHg and/or diastolic blood pressure (Korotkoff phase V) of =90 mmHg [10]. Anthropometric indices, including weight, height, waist and hip circumferences were measured by patients lightly clothed and without shoes. A body mass index of =30 kg/m2 and a central obesity of =40 inches (for females) & =35 inches (for males) constituted respectively (World Health Organization 1997). Weight status was classified using body mass index, into the following categories: lean (<18.5 kg/m2), normal (18.5–24.9 kg/m2), overweight (25–29.9 kg/m2) and obesity (=30 kg/m2) [9].

2.2. Biochemical Data

The sample analysis was conducted at the Pathology & Biochemistry Department Clara Swain Hospital Barielly (UP). About10 ml of fasting serum was withdrawn into heparinized bottles of fluoride oxalate and centrifuges at 100 RPM for five minutes. The supernatant was separated into the appropriate containers for analysis. Samples were analyzed within 24 hours of collection or stored at a temperature of 4ºC. Fasting blood glucose was measured using glucose oxidase tests [11]. Total plasma cholesterol was determined using ferric per chlorate [12]. High-density lipoprotein (HDL) cholesterol was determined after precipitation of low-density lipoprotein (LDL) cholesterol with phosphotungstate and magnesium [13]. Triglycerides were measured using the calorimetric enzymatic method (Mc Gowan et al 1983). LDL cholesterol was calculated from the following formula: LDL cholesterol = Total cholesterol – HDL cholesterol minus (Triglycerides / 5) [15].

2.3. Statistical Analysis

All data's collected from patients was systematically recorded, & perform Bio-statistical tools for proper analysis of data to reaching any statistical significance of status. Data entry and analysis were done using a statistical software package (SASS), Comparisons of categorical and continuous variables between diabetics with and without the metabolic syndrome were done using Chi-squared tests and the independent sample t-tests (two-tailed), respectively.

3. Results

On the basis of the frequency of patients in hospitals, aged 35 to above (range: 35 to 45, 46 to 55, & 56 to above) and socioeconomic status High income group, a Middle income group & a Low income group made up of 52.5% male & 47.5% females were studied. Metabolic syndrome in High income group was estimated 36%, of the total patient population; Age group wise estimation shows that 7.6% was 35 to 45 years old, 16.7% in 46 to 55 year age group & 11.7% was in 56 to above age group. The demographic, clinical & biochemical characteristics of the patient were shown in table : 2.

Metabolic syndrome in the middle income group was estimated 55.6%, of the total patient population. Age group wise estimation focused that, a 10.1 % result was estimated in 35 to 45 year age group, 21.6% was in 46 to 55 year age group & 23.9%was in 56 to above age group. The demographic, clinical & biochemical characteristics of the patient were shown in table: 3

Metabolic syndrome in LIG was estimated 8.4%, of the total patents population. Age group wise estimation elicited that 35 to 45 year old patients are not found; 46 to 55 year age group 3.1% & 56 to the above age group was 5.3%. The demographic, clinical & biochemical characteristics of the patients were shown in table: 4.

Table 2. The demographics, clinical & biochemical characteristics of the patient.

Age group (years)	35 to 45	46 to 55	56 to above
Patients (%)	7.6	16.7	11.7
Male (%)	3.2	8.1	6.2
Female (%)	4.4	8.6	5.5
Family history +ve	5.2	10.8	5.1
Family history -ve	2.4	5.9	6.6
	Mean±SD	Mean±SD	Mean±SD
Systolic blood pressure (mmHg)	125 ±21	132±9	146±2
Diastolic blood pressure (mmHg)	83±11	78±13	72 ±8
B.M.I. (kg/m2)	28±4	30 ±3	25 ±4
Obesity in male (inches)	38±2	42 ±3	43 ±5
Obesity in female (inches)	40±4	46 ±3.5	45 ±6
Blood sugar (mg/dl)	112±20	169 ±29	125 ±25
Total cholesterol (mg/dl)	187±28	190 ±17.2	186 ±26
HDL male (mg/dl)	40±7	36 ±12.7	32 ±3
HDL female (mg/dl)	32±3	23±8	39±18
LDL (mg/dl)	142±23	182 ±8	138±40
Triglycerides (mg/dl)	158±40	172±23	160 ±31

Table 3. The demographics, clinical & biochemical characteristics of the patient

Age group (years)	**35 to 45**	**46 to 55**	**56 to above**
Patients (%)	10.1	21.6	23.9
Male (%)	4.2	11.8	14.8
Female (%)	5.9	9.8	9.1
Family history +ve	6.8	11.8	15.3
Family history -ve	3.3	9.8	8.6
	Mean±SD	**Mean±SD**	**Mean±SD**
Systolic blood pressure (mmHg)	120±5	133±2	130±12
Diastolic blood pressure (mmHg)	78±7	80±5	78±13
B.M.I. (kg/m2)	20±3	28±4	22±3
Obesity male (inches)	33±4	40±4	34±5
Obesity female (inches)	40±2	43±6	40±4
Blood sugar (mg/dl)	112±24	130±21	168±38
Total cholesterol (mg/dl)	181±26	196±20	178±22
HDL male (mg/dl)	50±6	43.3±12	39±11
HDL female (mg/dl)	38±10	28±14	39±7
LDL (mg/dl)	137±27.5	168±19	120±25
Triglycerides (mg/dl)	136±19	178±21	153±20

Table 4. The demographics , clinical & biochemical characteristics of the patients.

Age group (years)	35 to 45	46 to 55	56 to above
Patients (%)	-	3.1	5.3
Male (%)	-	1.8	2.4
Female (%)	-	1.3	2.9
Family history +ve	-	2.4	3.9
Family history -ve	-	0.7	1.4
	-	mean±SD	mean±SD
Systolic blood pressure (mmHg)	-	125±12	122±8
Diastolic blood pressure (mmHg)	-	78±3	83±10
B.M.I. (kg/m2)	-	23±4	21±3
Obesity male (inches)	-	36±2	34±4
Obesity female (inches)	-	42±4	46±2.5
Blood sugar (mg/dl)	-	168±23.8	212±36
Total cholesterol (mg/dl)	-	201±30.5	198±22
HDL male (mg/dl)	-	45±12	48±7.8
HDL female (mg/dl)	-	38±8	41±12
LDL (mg/dl)	-	119±40.2	156±8
Triglycerides (mg/dl)	-	148±135	158±27

The frequency of individual components estimated from patients was about 68.4% were dyslipidemic, 58.3% were hypertensive, 62.5% were obese, 4.3% were heart disease (myocardial infarction) , 1% kidney disease , & diabetes occurred in 68.3% of patients.

4. Discussion

This report describes clustering of cardiovascular risk factors consistent with the metabolic syndrome found in Indian patients. The age-adjusted prevalence of the metabolic syndrome in an Indian urban population was 24.9% [15]. The prevalence of the syndrome is lower than values ranging from 70–80% among Caucasians with type-2 diabetes mellitus [16,17]. It is, however, higher compared to the recently reported prevalence of 25.2% among metabolic patients in southern Nigeria [18] but similar to the data from Zimbabwean urban metabolic patients [19], West bank population an urban rural comparison [16] & Indian urban population [15]. Disparities in the prevalence of metabolic syndrome are largely due to differences in lifestyles, age of the study populations and non application of uniform diagnostic criteria [20, 21]. In the present report, metabolic syndrome is not associated with HDL hypercholesterolemia, and ischemic heart disease is a relative rarity. These findings are strikingly at variance with the Caucasians [22,23] Metabolic syndrome is diet-related among Africans. Obese Africans, therefore, tend to consume correspondingly high amounts of fiber. Epidemiological studies have linked high fiber-rich food consumption with reduced risk of coronary artery disease [24,25]. Family history of hypertension, type-2 diabetes mellitus and obesity are recognized markers of genetic predisposition to the syndrome [26]. The present study demonstrated that genetic predisposition to the metabolic syndrome is not increased in type-2 diabetics with a family history of concomitant hypertension and diabetes, compared to those with a family history of either of the two conditions occurring in isolation. In addition to insulin resistance, suitable environmental factors are an important prerequisite for the clinical expression of the metabolic syndrome. Variations in these factors partly explain the population differences in the frequency of the syndrome. We recorded a significantly higher percentage of metabolic syndromes among various age groups in the upper/middle socioeconomic class compared to the lower class. Differences in dietary habits largely account for socioeconomic class-related variations in the prevalence of the metabolic syndrome. In the Chennai Indian population, for example, individuals in the middle class had significantly higher monthly income, calorie and fat intake and increased prevalence of metabolic syndrome, compared to those in the lower class [27]. A rural-urban difference in the prevalence of metabolic syndrome has also been documented in the Palestinian West Bank community [16]. Affluent and sedentary lifestyles, characterized by high calorie and fat

intake, are more likely among the urban population than the rural population. In the developing nations, the prevalence of hypertension and diabetes is higher in the urban areas than in rural areas. It is, therefore, not surprising that the percentage of occurrence of metabolic syndrome is significantly higher among urban rather than rural-dwelling type-2 diabetes mellitus patients. Given the increasing urbanization in developing nations, an association of urbanization with the increased clustering of cardiovascular risk factors among type-2 diabetics should be a major public health concern. The effect of gender on the prevalence of metabolic syndrome is uncertain. While some reports showed a higher value among females than males [28]. Others showed no such relationship. The high percentage of the syndrome among female type-2 diabetes mellitus patients in the present report with an Islam-dominated population may be explained by the sedentary lifestyle arising from the practice of purdah, a religious obligation that restricts women to their homes. Data on the specific effects of occupation on the metabolic syndrome are lacking. It is, however, well-documented that type-2 diabetics that engage in physical exercise have decreased clustering of cardiovascular risk factors [29,30].

5. Conclusion

The development of metabolic syndrome in Indian patients is influenced by their socioeconomic class & age group, it's due to family history & environmental factors. Vigilant dietary habit and physical exercise may reduce the chance of metabolic syndrome in diabetic's patients. On the basis critical & genetic aspects of these syndromes on developing model describe total background information about metabolic syndrome & its risk factors below. Metabolic syndrome basically a combined syndrome carrying multiple causes, so health awareness & laborious mode of life are must cross over these abstracts.

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