Section A-Research paper

Assessment of metabolic syndrome in type 2 diabetes mellitus

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Abstract

Patients who suffer from diabetes and who have hyperglycemia are at a greater risk of having complications, which contributes to their overall morbidity. People who have diabetes have a higher risk of experiencing complications due to a mix of risk factors, some of which may be changed and others of which cannot. The phrase "metabolic syndrome," which refers to a cluster of risk variables that may accurately predict cardiovascular disease and type 2 diabetes mellitus, is attracting a lot of attention these days. Some of the primary features of this illness include hypertriglyceridemia, low levels of high density lipoprotein cholesterol (HDL), central adiposity (abdominal) obesity, hypertension, and related insulin resistance/glucose intolerance (hyperinsulinemia). It is associated with a three to five times increased likelihood of developing type 2 diabetes mellitus, a condition that has now reached major proportions in a majority of places across the world. The goal of this study is to identify the most significant risk factors for metabolic syndrome (MetS) that place these groups at a higher risk for developing prediabetes and type 2 diabetes mellitus, as well as the impact that MetS has on the progression of diabetes. In addition, the researchers want to determine how MetS affects the progression of diabetes.

Keywords: Metabolic syndrome (MetS), diabetic patients, hypertension, cardiovascular disease

Introduction

Patients with hyperglycemia have an increased risk of developing complications, which contributes to their overall morbidity. People who have diabetes are more likely to experience complications due to a combination of adjustable and unchangeable risk factors. The term "metabolic syndrome", which refers to a cluster of risk variables that can accurately predict cardiovascular disease and type 2 diabetes mellitus [1] is receiving a lot more attention these days. Hypertriglyceridemia, low

levels of high density lipoprotein cholesterol (HDL), central adiposity (abdominal) obesity, hypertension, and associated insulin resistance/glucose intolerance (hyperinsulinemia) are some of the key hallmarks of this condition [2]. It is related with a three to five-fold greater chance of acquiring type 2 diabetes mellitus [3, 4], which has now reached significant proportions in a lot of countries [3]. The prevalence of metabolic syndrome ranges from 7.9% to 43% in males over the world, and from 7% to 56% in females [5]. It is generally accepted that 4% of the adult population across the globe is affected by diabetes mellitus. Insulin resistance, or obesity coupled to insulin resistance, is thought to be the root cause of metabolic syndrome (MetS). Insulin resistance is a disease in which the cells of the body are unable to absorb glucose from the blood. Insulin resistance, which can lead to obesity, is brought on by eating poorly and not getting enough exercise on a regular basis. In the same way, the contributions of other genetic or behavioural risk factors or predictor variables to metabolic MetS are the same. These risk factors include growing older (over the age of 40), smoking cigarettes or using alcohol, being overweight, adopting a sedentary lifestyle, and having a family history of type 2 diabetes [9].

The development of type 2 diabetes mellitus has been linked to an uptick in the overall death toll over the past few decades. On the other hand, there is not a lot of information available about the aetiology of MetS on a regional level because there are not many published statistics on the frequency of MetS and its connection with type 2 diabetes mellitus. The purpose of this research is to identify the most significant risk factors for metabolic syndrome (MetS) that place these groups at a higher risk for developing prediabetes and type 2 diabetes mellitus, as well as the impact that MetS has on the course of diabetes.

Materials and Methods

Diabetes is defined as having an HBA1C of 6.5% or more, and the procedures and reasoning behind the study was communicated to all patients. Informed written agreement was obtained from patients whenever possible in their native language. On a Performa that has a semi-structured format, the gathering of socio-demographic data and clinical information was done. There were a total of one hundred (100) people who participated in the study at the Diabetic Centre of the Teaching Hospital amongst which there were 33 males and 67 females. The ages of the people who took part in the study ranged from 20 to 86 years. Before having their blood drawn, the participants fasted for a whole day. Participants with type 1 diabetes and women who were pregnant were not included in the study. After receiving an in-depth description of the purpose of the study, each of the participants gave their informed consent to take part in the investigation. The patients' medical records were used to collect information on demographic and clinical characteristics, such as age, gender, the age at which diabetes was first diagnosed, and whether or not there was a history of diabetes in the patient's family. A sphygmomanometer was utilised in order to determine the subject's blood pressure. The right arm was used to obtain a reading of the patient's blood pressure while they were seated. Two readings of the patient's blood pressure were separated by 5 minutes, and the average of the two was used for

the calculation. The individual's height was measured using a stadiometer to the nearest 0.1 centimetre with no shoes on, and their weight was measured with a bathroom scale to the nearest 0.1 kilogram with only light clothing on. The body mass index (BMI) was determined by dividing the subject's weight in kilogram by the square of their height in metres. A measuring tape was placed halfway between the inferior angle of the ribs and the suprailiac crest in order to take a measurement of the subject's waist circumference to the nearest 0.1 cm.

Results

Table 1: General Characteristics of the Studied Population

Parameter	Total (n=100)	Female (n= 33)	Male (n=67)	p
Age	51.93±0.20	52.03±1.73	50.39±12	0.2588
Anthropometry and BP				
WC	91.20±1.92	89.48±1.38	92.93±1.9	0.2838
BP (systolic)	135.39±1.93	134.39±2.3	136.39±1.93	0.5101
BP (diastolic)	79.3±1.73	78.30±2.64	79.17±0.37	0.4394
BMI	26.2±0.3	25.39±0.38	27.93±0.64	0.0244
Socio-demographic				
Smoking				
--	None			
Alcohol				
Consumed	47	25	22	0.3542
Never consumed	53	8	45	0.0012
Biochemical Indices				
FBS	9.30±0.2	9.76±0.64	9.78±0.44	0.9782
TG	1.9±0.39	1.49±0.15	1.57±0.08	0.6291
HDL	1.29±0.93	1.27±0.06	1.35±0.06	0.4445

Table 2: Prevalence of the individual components of MetS

Parameter	Female (N=33)	Male (N=67)	Total (N=100)	P
High WC	6	43	49	0.001
Elevated FBS	33	67	100	0.691
Elevated TG	8	25	33	0.110
Lowered HDL	9	32	41	0.019
Elevated systolic BP	19	41	60	0.480
MetS	13	45	58	

Discussion

Because of the rise in the prevalence of metabolic syndrome, the incidence of non-communicable diseases such as type 2 diabetes mellitus and cardiovascular diseases has also increased proportionally. In contrast to the findings of Felix-Val *et al.* [8], the present study discovered that type 2 diabetics had a high prevalence (58%) of MetS. According to prior studies conducted by Felix Val *et al.* [8] and Ford *et al.* [4], females

had a higher prevalence of MetS (77%) and had more risk factors linked with it than males (23%). This finding was consistent with other findings [10]. It is possible that the cause is related to the women's largely sedentary lifestyles, given that the majority of the women in this part of the world are traders or unemployed, but it is also possible that the cause is genetic.

People who have type 2 diabetes and impaired glucose tolerance also have hypertriglyceridemia and accelerated HDL catabolism, both of which lower HDL levels [20]. This is due to the fact that type 2 diabetes causes HDL levels to be broken down more quickly. The negative association between hypertriglyceridemia in insulin resistant situations and accelerated HDL catabolism, which results in low plasma HDL concentrations, could be explained by a range of different potential pathways. This link is thought to lead to low plasma HDL concentrations. One of the possibilities is a reduction in the activity of lipoprotein lipase (LPL), which would have an impact on how efficiently HDL particles develop. The normal insulin-mediated activation of LPL activity has been shown to be attenuated in patients who have insulin resistance [12], as evidenced by the aforementioned research. LPL activity is lowered in type 2 diabetes, particularly in patients who have poor glycemic control and those who are slightly insulin deficient [13]. This is especially true in individuals who have been diagnosed with insulin resistance. Obesity is a severe risk factor that needs to be addressed so that other issues, such as type 2 diabetes mellitus or the stopping or slowing down of their development, can be avoided.

In a study that was conducted in 2007, Moebus and colleagues found that the prevalence of MetS was significantly higher among diabetics who had a lower level of educational attainment [12]. The prevalence of diabetes was higher among people who had completed elementary school education (15%) and those who had completed junior high school (56%), in comparison to diabetics who had completed senior high school education (4%), and those who had completed tertiary level education (13%). This may be due to their lack of understanding of good eating practises, such as the consumption of excessive amounts of saturated fats and high-carbohydrate diets, as well as their irregular exercise and inactivity. Another possible cause is that they are not physically active enough. It was shown that the use of fast food (13% of the sample) and soft drinks (2% of the sample) did not significantly contribute to the development of metabolic syndrome in the sample that was used for this investigation. It has been hypothesised that a history of the disease in one's family may speed the onset of MetS [15].

Conclusión

Obesity was highly prevalent, accounting for forty percent of the total diabetes population that was studied. The insulin resistance that is brought on by obesity is made worse by the fact that obesity leads the liver to create more very low density lipoprotein, which in turn causes excessive quantities of triglycerides to be discharged into the bloodstream.

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