Original Article

Frequency of Metabolic Syndrome in Newly Diagnosed Type II Diabetes Mellitus Patients

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Abstract

Background: Diabetes mellitus can cause disturbances in the body's metabolism and energy utilization from carbohydrates, lipids, and proteins. Metabolic syndrome (MetS) can complicate to diabetes mellitus, cardiovascular diseases and stroke.

Methods: It was a cross-sectional study, conducted at Medical Unit III, Services Hospital Lahore from 26/04/2018 to 25/10/2018. This study involved 194 patients of both genders aged between 16-60 years diagnosed of type II diabetes for at least 6 months. These patients were assessed for the presence of metabolic syndrome (according to IDF definition). A written informed consent was obtained from every patient.

Results: The mean age of the patients was 49.2±10.9 years. There were 106 (54.6%) male and 88 (45.4%) female patients in the study group with a male to female ratio of 1.2:1. The mean BMI of these patients was 28.4±3.9 Kg/m2. 61 (31.4%) patients were obese while 89 (45.9%) patients were smoker. Metabolic syndrome was diagnosed in 129 (66.5%) patients with type-II diabetes. It was significantly higher in females (79.5% vs. 55.7%; p-value<0.001) as compared to males while there was no statistically significant difference in the frequency of metabolic syndrome across various subgroups of type-II diabetic patients based on age (p=0.789), BMI (p=0.173) and smoking status (p=0.579).

Conclusion: We observed that a substantial proportion of patients with newly diagnosed type II diabetes suffered metabolic syndrome which warrants routine screening of such patients for metabolic syndrome so that timely diagnosis and management may improve the case outcome.

Key Words: Type-II Diabetes, Metabolic Syndrome, Dyslipidemia

Introduction

Metabolic syndrome (MetS) can complete to diabetes mellitus, cardiovascular diseases and stroke. It activates various pathways involved in development of atherosclerosis, which may end up with fatal conditions like acute coronary syndrome.[1] MetS comprises of central obesity, insulin resistance/glucose intolerance, low levels of high-density lipoprotein cholesterol (HDL-C), hypertriglyceridemia and hypertension. The incidence of MetS has markedly increased over past few years across the globe especially in developing countries, e.g., 35.9% in Ghana. These patients have three to five fold more chance of developing type II diabetes mellitus.[2-4]

Diabetes mellitus can cause disturbances in the body's metabolism and energy utilization from carbohydrates, lipids and proteins. Due to increased insulin resistance, glucose transportation into body cells is impaired resulting in diabetes mellitus and obesity. Insulin resistance in metabolic syndrome is caused by lack of exercise, poor diet, sedentary life style, alcohol intake, smoking etc.[2] According to International Diabetes Federation (IDF) and World Health Organization (WHO), prevalence of diabetes mellitus in 2014 has increased more than 314 million as compared to 1980. In one study conducted at Nepal, prevalence

of MetS using WHO and IDF criteria was 69.9% and 66.8% respectively among patients having type II diabetes mellitus.[5] Another study conducted at Ghana showed overall prevalence of MetS as 63.58% in type II diabetes mellitus patients using WHO criteria.[6]

Various studies have been done in Pakistan on association of metabolic syndrome with newly type II diabetes mellitus patients. Results of these studies were conflicting. One study conducted in Islamabad showed prevalence of MetS in type II diabetes mellitus as 83%,[7] while another study from Karachi showed that its prevalence (IDF Criteria) as 66.5%8. In another study conducted at Agha Khan University Karachi, MetS (IDF Criteria) was found in 91.9% of patients with type II diabetes mellitus.[8]

Rationale for this study was clear the disparity in prevalence of metabolic syndrome in type II diabetic patients in Pakistan and find out an estimate its exact prevalence as being carried out at a large tertiary care hospital with a large sample size.

Methods

It was a cross-sectional study, carried out at Medical Unit III, Services Hospital Lahore from 26/04/2018 to 25/10/2018. Patients were selected by Non-Probability, Consecutive Sampling and sample size of 194 cases was calculated with 5% level of significance and 7% margin of error while taking expected frequency of metabolic syndrome to be 66.5% in newly diagnosed type II diabetic patients[9].

Inclusion Criteria

- Patients of both gender with age ranging between 16 and 60 with type II diabetes for at least 6 months.
- Willing to participate in the study.

Exclusion Criteria

- Patients with known chronic renal disease (creatinine ≥ 1.3 mg/dl), congestive cardiac failure, any infection and COPD.
- Hepatocellular carcinoma or other tumours with known short life expectancy.
- Patients with known unstable cardiopulmonary, neurological, or psychiatric disease and pregnancy or on contraceptive pills.

Patients, after informed consent, who were newly diagnosed with type II diabetes mellitus presenting to Services Hospital OPD, included in study according to inclusion and exclusion criteria. Particular of patients were noted on predesigned proforma. Detailed history and examination of all patients was done including waist circumference. Fasting lipid profile was sent. Data was recorded in proforma. All the collected data was entered and analyzed through SPSS version 21. Numerical variables i.e., age and BMI were presented by mean ±SD. Categorical variables i.e., gender and presence of metabolic syndrome were presented as frequency and percentage. Data had been stratified for age, gender, BMI and smoking (>5 packs/year) to address effect modifiers and chi-square test had been applied taking p≤ 0.05 as significant.

Results

The age of the patients ranged from 16 years to 60 years with a mean of 49.2±10.9 years. Most of the patients were aged between 39-60 years (85.6%) followed by 18-38 years (14.4%). There were 106 (54.6%) male and 88 (45.4%) female patients in the study group with a male to female ratio of 1.2:1. The Body mass Index (BMI) of these patients ranged from 21.6 Kg/m^2 to 35.0 Kg/m^2 with a mean of 28.4±3.9 Kg/m2. Sixty one (31.4%) patients were obese while 89 (45.9%) patients were smoker as shown in table 1.

Metabolic syndrome was diagnosed in 129 (66.5%) patients with type II diabetes as shown in table 1. It was significantly higher in females (79.5% vs. 55.7%; p-value<0.001) as compared to males while there was no statistically significant difference in the frequency of MetS across various subgroups of type II diabetic patients based on age (p=0.789), BMI (p=0.173) and smoking status (p=0.579) as shown in table 1.

Discussion

Metabolic syndrome has become a big public health concern resulting in grave morbidity and mortality[1]. Metabolic syndrome (MetS) can complete to diabetes mellitus, cardiovascular diseases and stroke.[1-2] It activates various pathways involved in development of atherosclerosis which may end up with fatal conditions like acute coronary syndrome[1]. Its pathophysiology is not clearly understood yet though obesity, old age, sedentary life style and insulin resistance are present in most of the patients with MetS.[1,2,4] Other important contributors are genetics, diet, antipsychotic drugs, and excessive alcohol intake.[1] American Heart Association reported multiple associated factors with MetS and diabetes including family history, smoking, physical inactivity, high-sugar drinks, gestational diabetes and poverty.[1,2]

Type II diabetes mellitus accounts for more than 90% of patients of the total diabetes burden worldwide and leads to microvascular and macrovascular complications.[10-11] Despite increasing knowledge of risk factors for type II diabetes and evidence for successful prevention programs, its prevalence of the disease continues to rise[12]. Recent literature claimed increased frequency of MetS among these patients with variable results.[13-21] The objective of this study was to find

frequency of metabolic syndrome in newly diagnosed type II diabetes mellitus patients.

In the present study, the mean age of the patients was 49.2±10.9 years. Mohsin et al. reported similar mean age of 49.7±11.1 years among type II diabetic patients presenting at Pakistan Institute of Medical Sciences, Islamabad.[20] A similar mean age of 51.6±8.9 years and 51.9±11.3 years has been reported by Naveed et al. and Ahmed et al. among type II diabetic patients presenting at Jinnah Postgraduate Medical Centre, Karachi and Combined Military Hospital, Lahore respectively, while Ali et al. reported as 47.6±11.6 years at Aga Khan University Hospital, Karachi.[8,18,21] A similar mean age of 48.2±11.2 years has been reported among Indian patients by Jain et al. while Hossain et al. reported it to be 47.1±11.9 years in Bangladesh.[15,17]

We observed that there were 106 (54.6%) male and 88 (45.4%) female patients in the study group with a male to female ratio of 1.2:1. A similar male predominance among such patients has been reported by Ashraf et al. who observed as 1.2:1 at Ziauddin Medical University Hospital, Karachi.[14] Sawant et al. observed similar male predominance with male to female ratio of 1.2:1 in Indian type II diabetic patients[22] while Hossain et al. reported it to be 1.3:1 in Bangladesh.[15]

In the present study, the mean BMI of patients was 28.4±3.9 Kg/m^2 (31.4%) patients were obese. Ahmed et al. reported similar mean BMI of 29.0±3.5 Kg/m^2 among such patients at Combined Military Hospital, Lahore[9] while Jain et al. reported it to be 28.3±2.2 Kg/m^2 in Indian patients.[17] Our observation is also in line with that of Ali et al. and Ashraf et al. who reported similar frequency of 32.0% and 30.0% for obesity among such patients at Aga Khan University Hospital, Karachi and Ziauddin Medical University Hospital, Karachi respectively.[14,18]

We observed that 89 (45.9%) patients with type II diabetes were smoker. A similar frequency of smoking among type II diabetic patients has been reported by Hossain et al. (36.9%) in Bangladesh and Lira et al. (50.8%) in Brazil.[15,16]

In the present study, metabolic syndrome was diagnosed in 129 (66.5%) patients with type II diabetes. It was significantly higher in females (79.5% vs. 55.7%; p-value<0.001) as compared to males while there was no statistically significant difference in the frequency of MetS across various subgroups of type II diabetic patients based on age (p=0.789), BMI (p=0.173) and smoking status (p=0.579). Our results are similar to those of Ahmed et al. who reported similar frequency of MetS (66.5%) among type II diabetic patients presenting at Combined Military Hospital, Lahore[8].

They too observed a similar significantly higher frequency of metabolic syndrome in female diabetic patients as compared to males (84.7% vs. 44.3%; p-value<0.001). Ali et al. reported similar frequency of 63.7% at Aga Khan University Hospital, Karachi[18]. In another study involving local population, Mohsin et al. also observed significantly higher frequency of metabolic syndrome in female diabetic patients as compared to males (95.5% vs. 71.4%; p-value <0.001)[20]. A comparable frequency of 69.9% has been reported by Nsiah et al. in Ghana, West Africa.[5]

The present study adds to the already published research evidence on the topic. The strengths of the

Table 1: *Comparison of Metabolic Syndrome in Patients with Type-II Diabetes across Age Groups, Gender, Smoking Status and BMI (n. 194)*

Characteristics	Metabolic Syndrome		Total	P-value
	Yes	No		
	(n=129)	(n=65)		194
Age (years) 49.2±10.9				
16-38 years	18	10	28	
	64.3%	35.7%		0.789
39-60 years	111	55	166	
	66.9%	33.1%		
Gender				
Male	59	47	106	
	55.7%	44.3%		<0.001 *
Female	70	18	88	
	79.5%	20.5%		
Smoking Status				
Smoking	61	28	89	
	68.5%	31.5%		0.579
Nonsmoking	68	37	105	
	64.8%	35.2%		
BMI (Kg/m^2) 28.4±3.9				
20-25 Kg/m^2	26	20	46	
	56.5%	43.5%		
25-30 Kg/m^2	58	29	87	0.173
	66.7%	33.3%		
30-35 Kg/m^2	45	16	61	
	73.8%	26.2%		

Chi-square test, observed difference was statistically insignificant; * observed difference was statistically significant

present study were its large sample size of 194 patients and stratification of data to address effect modifiers. In the present study, we observed that a substantial proportion of patients with newly diagnosed type II diabetes suffered metabolic syndrome which warrants routine screening of such patients for metabolic synd-

rome so that timely diagnosis and management may improve the case outcome.

A very strong limitation to the present study was that we didn't consider the effect of metabolic syndrome on the glycemic control of these patients. Nor we considered the effect of good glycemic control in

Table 2: *Reported Frequency of Metabolic Syndrome in Type-II Diabetic Patients in Existing Literature*

Author	Year	Population	Metabolic Syndrome (%)
Peer et al. [13]	2015	Africa	43.5%
Ashraf et al. [14]	2006	Pakistan	46.0%
Hossain et al. [15]	2012	Bangladesh	47.0%
Lira et al. [16]	2017	Brazil	50.7%
Jain et al. [17]	2018	India	55.0%
Osei-Yeboah et al. [6]	2017	Africa	63.6%
Ali et al. [18]	2012	Pakistan	63.7%
Ahmed et al. [8]	2010	Pakistan	66.5%
Nsiah et al. [5]	2015	Africa	69.9%
Imam et al. [19]	2007	Pakistan	79.7%
Kiani et al. [7]	2016	Pakistan	83.0%
Mohsin et al.[20]	2007	Pakistan	85.8%
Ahmed et al. [9]	2012	Pakistan	91.9%
Naveed et al. [21]	2016	Pakistan	96.1%
Present Study	**2018**	**Pakistan**	**66.5%**

these patients on the progression of metabolic syndrome which could have helped in the management planning of these patients. Such a study is highly recommended in future research.

Conclusion

We conclude that a substantial proportion of newly diagnosed type II diabetic patients suffered metabolic syndrome which warrants routine screening of such patients for metabolic syndrome so that timely diagnosis and management may improve the case outcome.

Conflict of Interest

None

Funding Source

None

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