ORIGINAL RESEARCH PAPER
Volume-9 | Issue-3 | March-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A STUDY OF PREVALENCE OF HYPERURICEMIA & METABOLIC SYNDROME & THEIR ASSOCIATION IN TYPE 2 DIABETES MELLITUS IN DSP HOSPITAL

Medicine

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ABSTRACT

Diabetes is a syndrome of hyperglycemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion.
To find our correlation between hyperuricemia and Metabolic Syndrome in Type 2 Diabetes Mellitus.
300 patients of type 2 diabetes were selected at Department of Medicine , DSP hospital from October 2017 to September 2018.
The results demonstrate the prevalence of metabolic syndrome in type 2 diabetes as 55%.Increased serum uric acid levels were also significantly associated with occurrence of metabolic syndrome in diabetic patients.
Physicians should recognize the metabolic syndrome and hyperuricemia as a frequent co-morbidity of Diabetes and treat it to prevent serious complications.

KEYWORDS

Type 2 diabetes mellitus, hyperuricemia and Metabolic Syndrome

INTRODUCTION

Diabetes is a syndrome of hyperglycemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion. Type 2 diabetes mellitus (type 2 DM) is associated with cardiovascular complications, of which metabolic syndrome (Mets) plays a prominent role.[1]

Uric acid is a final enzymatic product in the degradation of purine nucleosides and it has the ability to scavenge oxygen radicals and protect the erythrocyte membrane from lipid oxidation. Hyperuricemia or elevated serum uric acid levels (SUA) is a biochemical entity that is gaining increasing importance as it is found by some researchers to be not only a cardiovascular risk factor but also plays a role in development of renal and metabolic diseases [2-4].

Metabolic syndrome (MetS) represents a cluster of physiological and anthropometric abnormalities characterized by abnormally elevated glucose level, obesity, hypertension, elevated triglycerides and low high-density lipoprotein-cholesterol (HDL-c) [5]. These abnormalities are also characteristic of persons with hyperinsulinemia and hyperuricemia. Metabolic syndrome is a major contributor to the development of type 2 diabetes, and other conditions which are similar to the associates of gout and hyperuricemia, including oxidative stress [6, 7] mild kidney disease, endothelial dysfunction and chronic inflammation [8].

Apart from the well-known causal associations of hyperuricemia leading to gout and of metabolic syndrome leading to diabetes, both hyperuricemia and metabolic syndrome are associated with hyperinsulinemia.Patients with both gout and type 2 diabetes diseases exhibit a mutual inter-dependent effect on higher incidences. The relationship is complex but insulin resistance is possibly a common link.

Some reports on Serum Uric Acid (SUA) and the metabolic syndrome have noted that increased SUA concentration is associated with an increased prevalence of some of the parameters - obesity, dyslipidemia and hypertension of the metabolic syndrome. In these reports carried out in non DM subjects the documented prevalence rates of hyperuricemia ranged from 13-19% [9-11].

The main objective of this study was to determine the prevalence of hyperuricemia and metabolic syndrome in Type 2 DM. We also set out to determine the prevalence of hyperuricemia in DM subjects with the metabolic syndrome and also to evaluate possible associations of hyperuricemia with metabolic syndrome.

AIMS AND OBJECTIVES

1. To find out prevalence of hyperuricemia in Type 2 Diabetes Mellitus.
2. To find out prevalence of hyperuricemia in Type 2 Diabetes Mellitus with Metabolic Syndrome.
3. To find our correlation between hyperuricemia and Metabolic Syndrome in Type 2 Diabetes Mellitus.

MATERIALS AND METHODS

Study Area

300 patients of type 2 diabetes were selected at Department of Medicine , DSP hospital from October 2017 to September 2018.

Inclusion Criteria:

1. Consecutive patients of type 2 Diabetes Mellitus attending out-patient / in-patient department of Medicine, Durgapur Steel Plant Hospital, Durgapur.
2. Willingness to give informed written consent

Exclusion Criteria:

1. Pregnancy
2. Patients on thiazides, O.C. pills, A.K.T. Cytotoxic drugs
3. Patients on salicylates
4. Patients on xanthine oxidase inhibitors
5. Uricosuric drugs
6. Lymphoma
7. Leukaemia
8. Organ transplant
9. Alcoholics
10. Smokers
11. Drugs causing dyslipidemia
12. Nephrotic syndrome

Statistical Analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software ver. 25 for analysis. Qualitative data was presented as frequency and percentages and analysed using chi-square test of fisher's exact test (in case of 2x2 contingency tables). Quantitative data was presented as mean and SD and compared by unpaired t-test or Man Whitney U test (in case of non-normal distribution). A p-value < 0.05 was taken as level of significance.

RESULTS

Most of the patients belong to age group of 51 to 70 years with mean age of 59.45 years. Out of total 300 patients, 55.7% were males. No significant association was observed between age and gender

distribution (p>0.05). Out of total 300 patients, hypertension was present in half of the patients. No significant association was observed between HT and gender distribution (p>0.05).

Out of total 300 patients, metabolic syndrome was present in 55% of the patients.

Significant association of MS was observed with male gender (67.1% vs 43.6%; p<0.05).

Out of total 300 patients, Hyperuricemia was present in 26.7% of the patients. Significant association of Hyperuricemia was observed with male gender (35.9% vs 15%; p< 0.05).

Out of total 300 patients, metabolic syndrome and hyperuricemia was present in 23.3% of the patients.

Significant association of Hyperuricemia + MS was observed with male gender (29.3% vs 15.8%; p< 0.05).

Normal BMI was observed in 45.7% patients while 47.3% were overweight and 7% were obese. A significant association was observed between MS and hyperuricemia with a high prevalence (60.6%) of hyperuricemia in MS cases (p< 0.01; OR- 5.2).

Mean age, waist circumference, BMI, S. Uric acid and Triglyceride were significantly higher in patients with metabolic syndrome while HDL was significantly lower (p< 0.01)

Mean BMI was significantly high in patients with hyperuricemia while HDL was significantly lower (p< 0.01).

Mean age, waist circumference, BMI, S. Uric acid and Triglyceride were significantly higher in patients with metabolic syndrome and Hyperuricemia while HDL was significantly lower (p< 0.01). On performing multivariate regression analysis we observed that increased duration of DM and serum uric acid levels were significant predictors of occurrence of metabolic syndrome in diabetic patients.
On performing multivariate regression analysis we observed that presence of MS was a significant predictor of occurrence of hyperuricemia in diabetic patients.

DISCUSSION

A hospital based observational Study was conducted for duration of 1 year to find out the prevalence and co-relation of hyperuricemia and metabolic syndrome in Type 2 Diabetes Mellitus patients. A total of 300 consecutive patients fulfilling the inclusion & exclusion criteria, with type 2 DM during the study period were taken up for study.

The national cholesterol education program's ATP III report identified the metabolic syndrome as a specific entity deserving more clinical attention. People with the syndrome have risk of developing cardiovascular disease, beyond the risk associated with individual components of the syndrome alone. In this study, metabolic syndrome was defined using the new International Diabetes Federation (IDF) definition with specific cut off for waist circumference. In the present study, prevalence of metabolic syndrome in type 2 diabetes mellitus is 55% using the new International Diabetes Federation (IDF) definition.

The present prevalence is higher than in the study conducted by Ramachandra et al, which found prevalence to be 41% in non-diabetic subjects [13]. Misra A et al noted the prevalence to be 29.9% [14] .Eliaesson B, Cederholm J, Nilsson P et al noted higher prevalence of 77% in diabetic patients [15]. Ogebra A et al. noted the prevalence in diabetic patients to be 60% [12].

Most of the patients belong to age group of 51 to 70 years with mean age of 59.45 years. The present study showed significant association of MS was observed with male gender (67.1% vs 43.6%; p< 0.05).In a similar study by Mundhe AS et al. metabolic syndrome was diagnosed in 68 patients (45.3%) with higher prevalence in males (53.4%) than females (33.9%) [16]. Ogebra et al. the mean age of study subjects was 59.9 years and the frequency of occurrence of MS was comparable in both genders (p = 0.3) [12]. In this study we found that prevalence of metabolic syndrome is significantly associated with increased duration of diabetes. The long standing diabetic mellitus probably allows for more time for other components of MS to develop [12].

The role of hyperuricemia in DM has been a subject of much debate as some researchers report it to be a resultant effect of DM and others have reported it to be a risk factor for the development of type 2 DM. Hyperuricemia has also been found to be associated with insulin resistance and components of the MS such as obesity, dyslipidemia, hyperglycemia and hypertension. The purpose of our study was to investigate the prevalence of hyperuricemia and its association with metabolic syndrome in patients with diabetes. Elevated levels of SUA or hyperuricemia have been reported to be predictors of cardiovascular diseases in non-diabetic patients and those with type 2 diabetes [17,18].

In present study hyperuricemia was present in 26.7% of the patients. Significant association of hyperuricemia was observed with male gender (35.9% vs 15%; p< 0.05). In a study by Mundhe AS et al. hyperuricemia was found in 38 patients (25.3%) with higher prevalence in males (33%) than females (14.5%) [19]. Bonakdaran S et al. found the prevalence of hyperuricemia 12.7% [20], while Ogebra OA et al. found the prevalence as 25% with comparable frequency in both genders [21].

Both metabolic syndrome and hyperuricemia were present in 23.3% of the patients with higher prevalence in males (29.3% vs15.8%). In a study by Mundhe AS et al. both hyperuricemia and metabolic syndrome was found in 32 (21.3%) patients with higher prevalence among males (27.3%) than females (12.9%) [19].These findings correlate with the study conducted by Anthonia O Ogbera and Alfred O Azenabor (prevalence 25%), but the prevalence was comparable in both genders [21].

The prevalence of hyperuricemia in those with metabolic syndrome was 23.3% and it was only 11.1% in those without metabolic syndrome (p <0.001). Mundhe AS et al. also found the prevalence of hyperuricemia, higher in patients of type 2 diabetes with metabolic syndrome [19]. These findings also correlate with the study conducted by Tuomilehto J et al [18] in which hyperuricemia was 27% in melanesian population(male and female) and 22% in asian Indian men,11% in asian Indian women.

Mean BMI was significantly high in patients with hyperuricemia while compared to normouricemic (p< 0.01). A higher proportion of hyperuricaemic subjects with central obesity compared with normouricemic subjects were also noted by Ogebra et al. [93]. We also observed that lipid profile was markedly altered in patients with hyperuricemia (p<0.01). Conen *et al*. [16] and Schachter et al. [17] showed the same results (p<0.01). Hyperuricemia and hypertriglyceridemia are suggested to be associated with insulin resistance syndrome [22] and many investigators are studying the mechanisms of the emergence of this syndrome.

The association between insulin resistance syndrome, hyperuricemia, and hypertriglyceridemia is complicated. This might be expected from the fact that uric acid production is linked to glycolysis and that glycolysis is controlled by insulin. It was also noted that HDL was significantly lower (p< 0.01) in patients with hyperuricemia. This finding was consistent with Rho *et al*. research [23]. The mechanisms of this condition may due to the relationship between decreased HDL-C levels and insulin resistance syndrome [24,25].

CONCLUSION

The results demonstrate the prevalence of metabolic syndrome in type 2 diabetes as 55%.Increased serum uric acid levels were also significantly associated with occurrence of metabolic syndrome in diabetic patients .So it is essential in clinical practice to diagnose metabolic syndrome and monitor serum uric acid levels in them. Physicians should recognize the metabolic syndrome and hyperuricemia as a frequent co-morbidity of Diabetes and treat it to prevent serious complications. These high risk patients are ideal candidates for life style modifications and or pharmacological intervention to prevent or delay macro and or micro vascular complications in a more efficient manner.

TABLE:

Table: Distribution of Age Group, Gender, Hypertension, Metabolic Syndrome (MS), Hyperurecemia, Hyperurecemia + Metabolic Syndrome and BMI (Kg/ m2).

		N	%
Age Group (years)	**< 50**	114	38.0%
	51-70	165	55.0%
	> 70	21	7.0%

Gender	**Female**	133	44.3%
	Male	167	55.7%
Hypertension	**No**	152	50.7%
	Yes	148	49.3%
Metabolic Syndrome (MS)	**No**	135	45.0%
	Yes	165	55.0%
Hyperurecemia	**No**	220	73.3%
	Yes	80	26.7%
Hyperurecemia + Metabolic Syndrome	**No**	230	76.7%
	Yes	70	23.3%
BMI (Kg/ m2)	**</= 25**	137	45.7%
	25.1-30	142	47.3%
	30.1-35	21	7.0%

Table: Association between Hypertension, Metabolic Syndrome, Hyperurecemia, Hyperuricemia + Metabolic Syndrome with Gender and Metabolic Syndrome with Hyperuricemia

Gender						
		Female	**%**	**Male**	**%**	**p-value**
Hypertension	**No**	70	52.6%	82	49.1%	0.54
	Yes	63	47.4%	85	50.9%	
Metabolic Syndrome	**No**	75	56.4%	55	32.9%	< 0.05
	Yes	58	43.6%	112	67.1%	
Hyperurecemia	**No**	113	85.0%	107	64.1%	< 0.05
	Yes	20	15.0%	60	35.9%	
Hyperuricemia + Metabolic Syndrome	**No**	112	84.2%	118	70.7%	< 0.05
	Yes	21	15.8%	49	29.3%	
Hyperuricemia						
		No	**%**	**Yes**	**%**	
Metabolic Syndrome	**No**	120	88.89%	15	11.11%	< 0.01
	Yes	100	60.61%	65	39.39%	

Table: Mean distribution of general examination & laboratory Parameters in MS

Variable	**Metabolic Syndrome**	**N**	**Mean**	**SD**	**p- value**
AGE	**YES**	165	60.24	7.315	**< 0.01**
	NO	135	51.16	7.912	
WC	**YES**	165	93.43	6.322	**< 0.01**
	NO	135	79.39	4.448	
BMI	**YES**	165	27.61	1.782	**< 0.01**
	NO	135	23.95	1.152	
S. Uric Acid	**YES**	165	6.17	1.19	**< 0.01**
	NO	135	3.94	1.566	
HDL	**YES**	165	45.75	8.937	**< 0.01**
	NO	135	53.06	6.854	
TG	**YES**	165	164.55	23.623	**< 0.01**
	NO	135	133.08	19.996	

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