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A Pilot Study on Estimation of Serum Uric Acid Level among Euglycemic With Family History of Diabetes and no Family History of Diabetes

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ABSTRACT

Background: Type II Diabetes mellitus has emerged as a global public health problem with more effect on developing world. India is considered to become epicentre of DM in near future. Serum uric acid is a by-product of purine metabolism. Most of the studies provide a positive relationship between hyperglycemia & hyperuricemia.

Objectives: To co-relate the level of serum uric acid in euglycemic persons having family history of DM and in persons having no family history of DM and to assess the level of HbA1c among these two groups.

Materials and Methods: Present study was undertaken at MGM Medical College, Jamshedpur and Sadar Hospital, Jamshedpur with a sample size of 60 (30 in each group).

Results: The present study didn't find any significant difference in serum uric acid between two groups although a significant difference was observed in HbA1c in both groups.

INTRODUCTION

Diabetes mellitus, a chronic disorder, commonly known as diabetes is a group of metabolic disorders characterized by high blood sugar levels over a prolonged time. It occurs when secretion of insulin by pancreas or effective utilization of insulin by human body is impaired. Poorly controlled diabetes is associated with severe chronic complications affecting all the organs of human body mostly nervous system, renal system, cardiovascular and eye.[1] Epidemiologically, it has been estimated in 2017, approximately 451 million adults with diabetes, with a rise to 693 million by 2045 globally.[2] There is an increase in global prevalence of diabetes among adults over 18 years of age from 4.7% in 1980 to 8.5% in 2014. The overall prevalence of Diabetes is on rapid increase with maximum impact in middle- and low-income countries.[2] South East Asia is now considered as a capital of people living with diabetes mellitus. Serum uric acid (SUA) is the final breakdown product of purine metabolism. Abnormalities in uric acid metabolism result in hyperuricemia.[3-5] Various studies suggest that hyperuricemia is now a well-established risk factor for the development of diabetes.[6-9]

The Rotterdam Study demonstrated that SUA at baseline was a strong and independent risk factor for diabetes.[6] The Framingham Heart Study, which was conducted in two generations, suggested that individuals with higher uric acid were at a higher future risk of type 2 diabetes.[7] In addition, a retrospective cohort study in America showed that hyperuricemia was associated with excess risk for developing diabetes.[8] Data from the Atherosclerosis Risk in Communities Study also found that uric acid level was associated with an increased risk of diabetes after adjustment for other risk factors.[9]

Available data among the Indian population on this is scarce, as most of the studies are from other countries and very few have studied the association in type 2 diabetes mellitus patients. In the modern era of 21st century, it was observed that hyperuricemia has a role in the development of metabolic syndrome, coronary artery disease, and DM.[8]

An increasing number of studies have provided evidence that Uric acid is positively associated with serum glucose in healthy and diabetic individuals.[7-9]

OBJECTIVES

1. To co-relate the level of serum uric acid in euglycemic persons having family history of DM and in persons having no family history of DM
2. To assess the level of HbA1c among these two groups.

MATERIALS & METHODS

The present cross sectional study was approved by ICMR as a pilot study. The study was undertaken at designated clinics of MGM Medical College Hospital, Jamshedpur and Sadar (District) Hospital, East Singhbhum district of Jharkhand State. The study subjects were selected in two groups. Thirty samples were selected from each study groups.

The study groups were divided in two groups on the basis of the family history of diabetes mellitus of the study subjects. All the study subjects were euglycemic (normoglycemic). The first group was having a family history of diabetes mellitus and the second group was not having any family history of diabetes mellitus.

Total Number of Study Subjects: 60 (30 in each group).

Study Area: OPD of MGM Medical College Hospital, Sakchi, Jamshedpur and Sadar Hospital, Khashmahal, East Singhbhum.

Study Period: April 2019 to June 2019.

Inclusion Criteria: Individuals of age group 30-40 years attending OPD for check-up with no history of diabetes. Written consent has been obtained from the study subjects.

Exclusion Criteria: Any individual within history of Diabetes mellitus, suffering from any chronic disease, hyperuricemia, or on any chronic treatment. Those individuals who refused to give consent were also excluded from the study.

The individuals were asked about the personal details as per the pre-designed and pre-tested proforma. Blood samples were drawn and tested for uric acid, random blood sugar and HbA1C. Serum uric acid was estimated by Trinders reaction method, random blood sugar (RBS) was estimated by the GOD-POD (Trinders Method) Method and HbA1c was estimated by Immuno turbidimetric Method was estimated by using an Auto Biochemistry Analyzer Reader by Transasia.

The data was analysed on SPSS. The study was approved by Ethical Committee of Medical College and Local research advisory committee (RAC) of ICMR.

RESULTS

Age Profile

All study Subjects were in the age group of 30 to 40 years with a notion that Type 2 diabetes mellitus usually develops after 40 years of age. The Mean age group of the group one having family history of diabetes was 34.93 (±0.618) years whereas the mean age group of another group having no such family history of diabetes mellitus was 34.80 (±0.667) years. There was no difference in the age group of both the study group.

Residence Wise Distribution

Most of the study subjects (86.7%) were residing in urban areas in comparison to rural inhabitation in both the groups. It may be explained by the location of both medical college hospital and sadar (district) hospital in the urban areas by catering mostly urban population.

Gender Wise Distribution

Approximately two-third of the study subjects were females in both the groups.

Table 1: Residence wise distribution of study subjects

Residence	FDM	NFDM
Rural	4(13.3%)	4(13.3%)
Urban	26(86.7%)	26(86.7%)
Total	30(100%)	30(100%)

Table 2: Gender wise distribution of study subjects

Gender Distribution	FDM	NFDM
Male	11(36.7%)	10(33.3%)
Female	19(63.3%)	20(66.7%)
Total	30(100%)	30(100%)

Table 3: Religion wise distribution of study subjects

Religion	FDM	NFDM
Hindu	23(76.7%)	20(66.7%)
Muslim	7(23.3%)	9(30%)
Sikh	0 (0%)	1(3.3%)
Total	30 (100%)	30 (100%)

Table 4: Marital Status of study subjects

Marital Status	FDM	NFDM
Married	27(90%)	29(96.7%)
Unmarried	3(10%)	1(3.3%)
Total	30(100%)	30(100%)

Table 5: Education Status of study subjects

Religion	FDM	NFDM
Primary	5(16.7%)	8(26.7%)
Secondary	7(23.3%)	8(26.7%)
Senior Secondary	12(40%)	5(16.7%)
Higher	3(10%)	4(13.3%)
Illiterate	3(10%)	5(16.6%)
Total	30 (100%)	30 (100%)

Table 6: Occupational Status of study subjects

Occupation	FDM	NFDM
Employed	2(6.7%)	1(3.3%)
Housewife	16(53.3%)	19(63.4%)
Self-employed	12(40%)	10(33.3%)
Total	30 (100%)	30 (100%)

Table 7: Dietary pattern of study subjects

Dietary Pattern	FDM	NFDM
Vegetarian	3(10%)	4(13.3%)
Non-vegetarian	27(90%)	26(86.7%)
Total	30(100%)	30(100%)

Religion Wise Distribution
Approximately three fourth of the study subjects were Hindu in the group of family history of diabetes whereas two third of study subjects were Hindu in another group with no such family history of diabetes. One participant in the group of no family history of diabetes (3.3%) was Sikh whereas rests were Muslims in both the groups.

Marital Status
Majority of study subjects (>90%) were married in both the groups whereas only one (3.33%) and 3 (10%) were unmarried in group without family history of diabetes and group with family history of diabetes.

Education Status
Most of the participants were educated except few (10% and 16.6%) in group FDM and NFDM respectively. In group FDM majority (40%) were up to senior secondary (up to +2) whereas in NFHD most of them were (26.7%) were up to Secondary.

Occupational Status
Approximately more than half (53.3%) of the study subjects in FDM were house-wife whereas two third (63.4%) of study subjects were in another group with NFDM. Other occupations included Self-employed (40%) and employed (service) 6.7% of the study subjects in FDM and one third (33.3%) was self-employed & 3.3% were in service of study subjects were in another group with NFDM.

Dietary Pattern
Majority of study subjects (>85%) were non-vegetarian in both the groups whereas less than 15% were vegetarian in both the groups. Higher intake of dietary protein may be a factor for high uric acid.

Comparison of Random Blood Sugar among Study Subjects
Level of Random blood sugar of both the groups was analyzed by unpaired "t" test. The mean RBS of FDM was 110.58±39.70 mg% whereas mean RBS of NFDM was 109.38±30.79 mg%. There was no significant difference (p>0.5) among these two groups.

Comparison of Serum Uric Acid among Study Subjects
Level of Serum Uric Acid of both the groups was analyzed by unpaired "t" test. The mean Serum uric acid of FDM was 4.12±2.18 mg% whereas mean serum uric acid of NFDM was 3.75±0.93 mg%. There was no significant difference (p>0.5) among these two groups.

Comparison of Hb1Ac among Study Subjects
Level of Hb1Ac of both the groups was analyzed by unpaired "t" test. The mean Hb1Ac of FDM was 6.22±0.30 whereas mean Hb1Ac of NFDM was 5.31±0.98. There was significant difference (p>0.0001) among these two groups.

DISCUSSION
The present findings suggest that there is no significant difference (p>0.5) among these two groups in comparing RBS and Serum Uric Acid.

Various studies such as done by Srivastava and Dixit[10], Kumari and Sankaranarayana[11] reported higher serum uric acid levels in Type 2 diabetics than in normal controls.

Seraj Ahmed Khan et al.[12] in their study demonstrated that serum uric acid level was significantly higher in diabetic and pre diabetic groups as compared to euglycemic control.

Kamran M A Aziz[13] reported in his study uric acid was significantly and inversely correlated and associated with HbA1c.

In contrast to the above findings, Sabana S et al.[14] found that the serum uric acid levels in the diabetic males and females were marginally lower as compared to those in the controls, although this was not statistically significant. In the similar study, a negative correlation was observed between the fasting plasma glucose and the serum uric acid levels in both male and female diabetic patients.

A significant difference (p<0.0001) was observed in HbA1c among both the groups. The study proves that the hyperuricemia is not associated with euglycemic (normoglycemic) individuals despite the presence of family history of diabetes mellitus.

LIMITATIONS
The study includes the subset of population which may not represent the entire population with respect to region or ethnicity. This study is a descriptive cross-sectional study. Even though there is a correlation found between SUA levels and Hb1Ac, further studies to be carried out to establish uric acid as an independent risk factor for euglycemic.

FINANCIAL SUPPORT

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Conflict of Interest: None Declared.