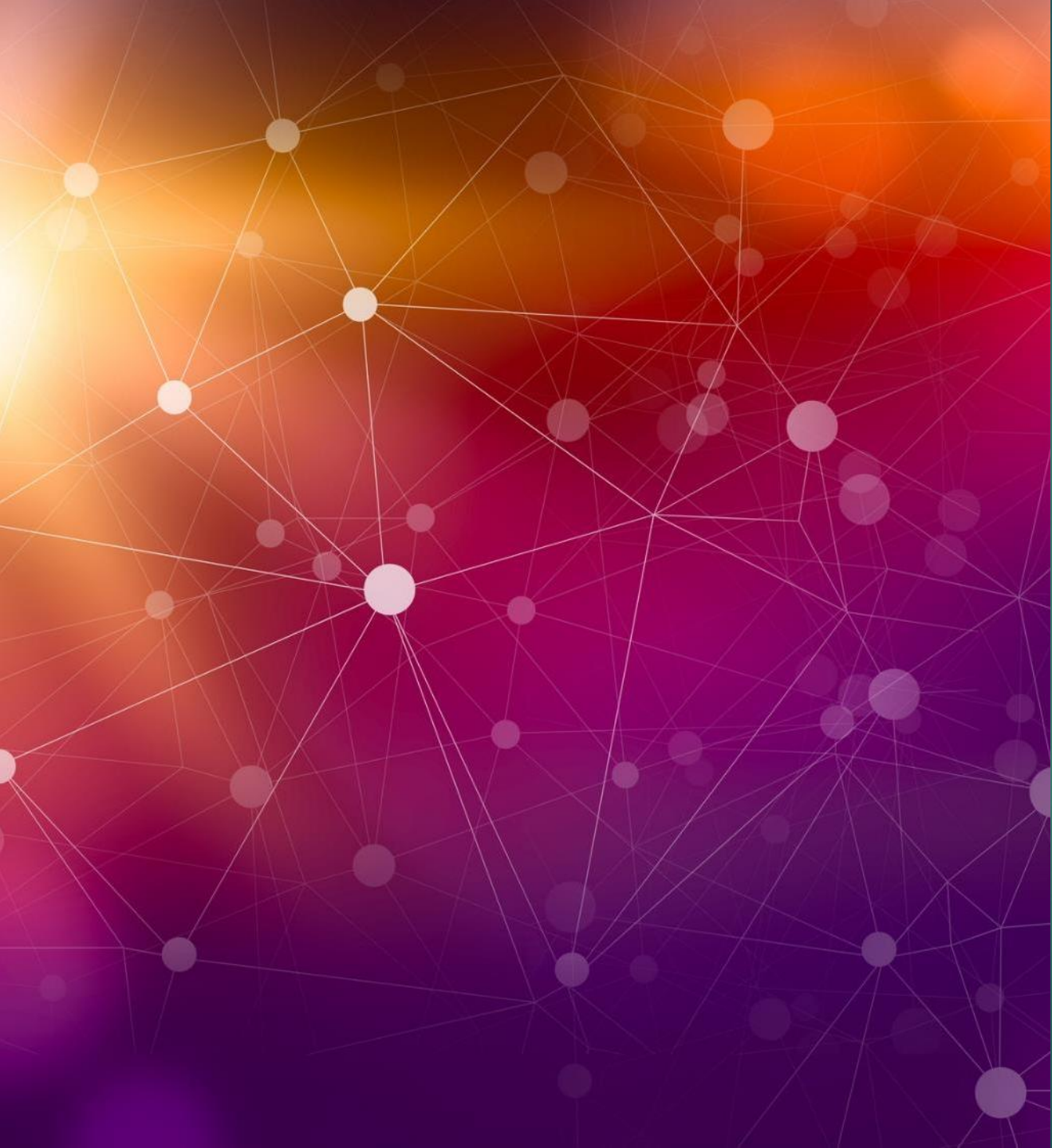




Welcome to Journal Club Presentation

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Uric Acid : The Overlooked Player in Metabolic Syndrome Among Diabetics

Introduction

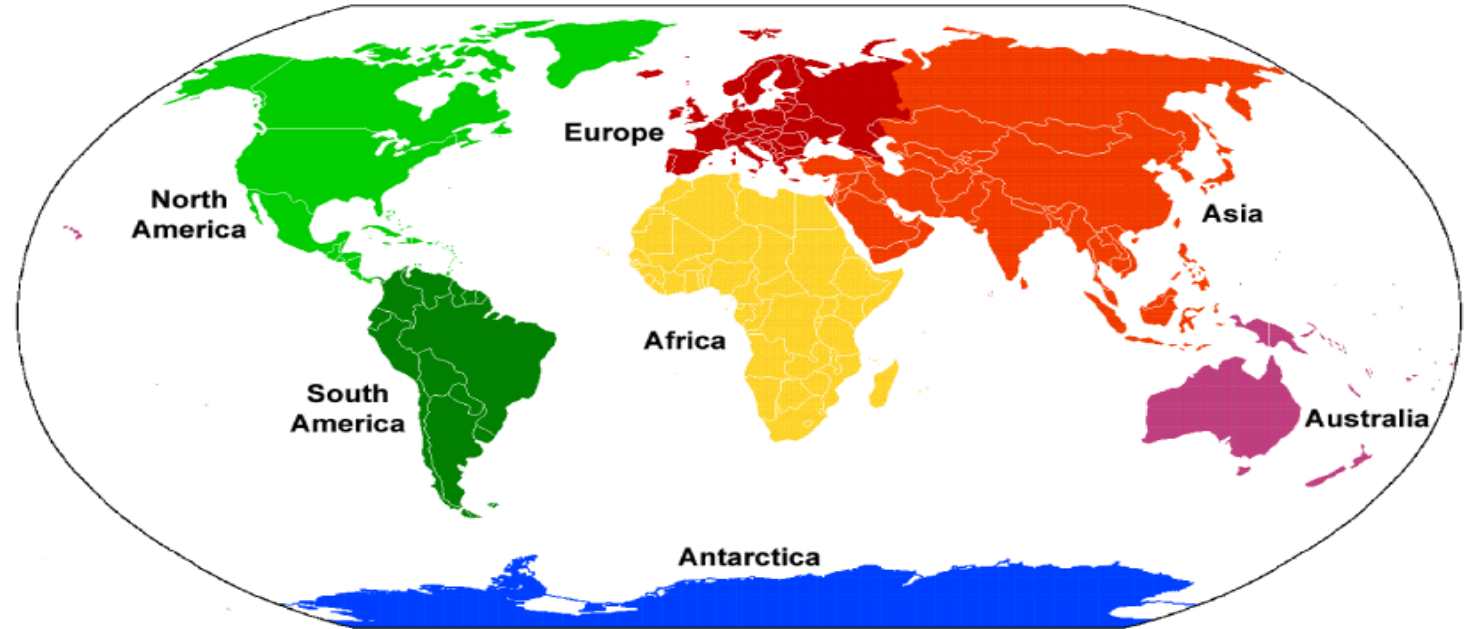
- Metabolic Syndrome And Type 2 Diabetes —
A growing global burden
- **Type 2 Diabetes Mellitus (T2DM)** is a chronic metabolic disorder characterized by insulin resistance and hyperglycemia.

Metabolic Syndrome

What is Metabolic Syndrome?



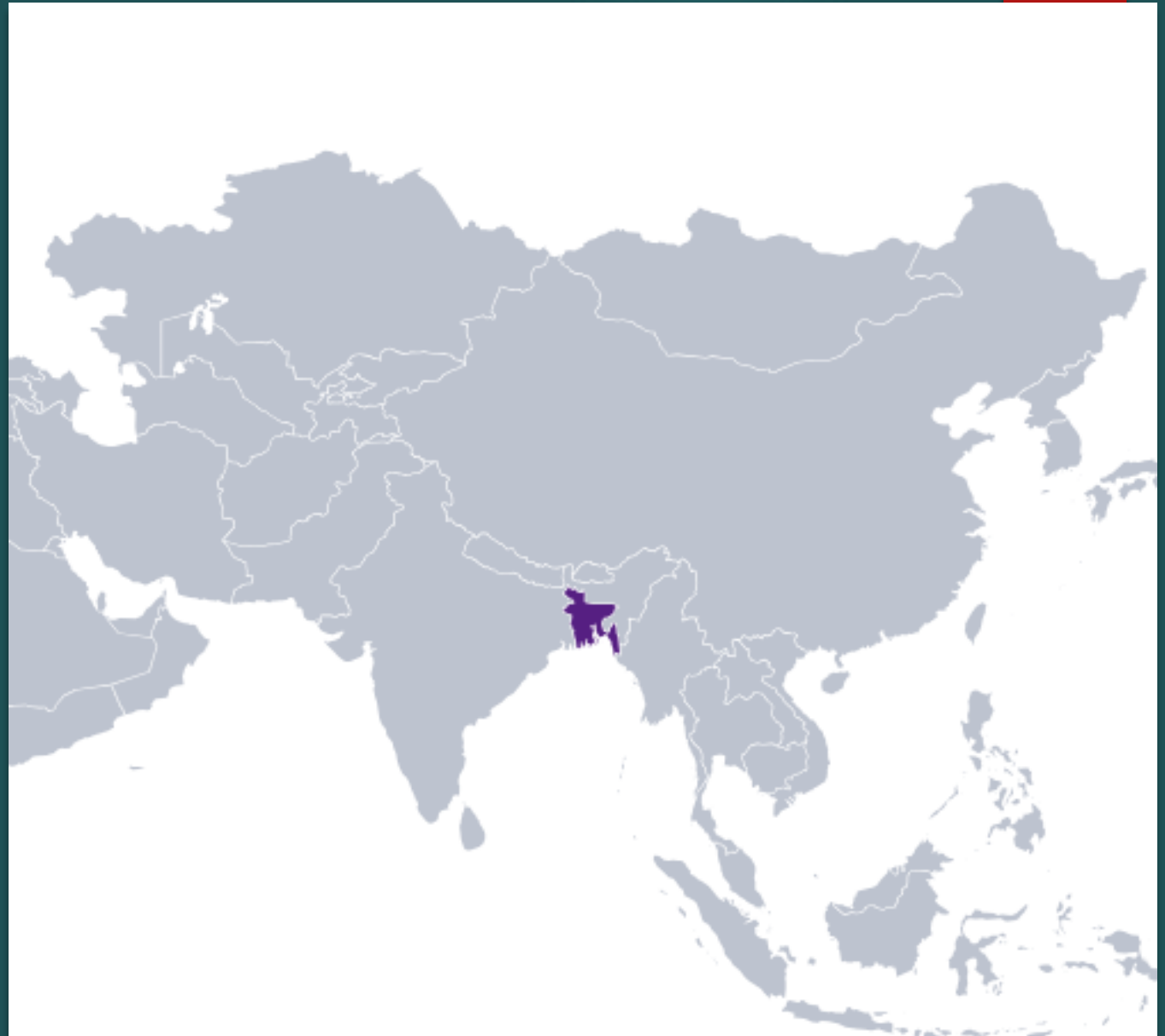
Global picture of Metabolic Syndrome



- Asia – Total 31%: 20.9% in Men- 15.5% in women
- Africa – 26.6% Men, 32.2% in Women
- Australia – 48.2% in men, 29.9% in Women
- Antarctica – 20%
- Europe – 30-80% in Adults, 20% in Children
- South America – 34%
- North America – 35%

Diabetes in Bangladesh (2024)

- Total adult population
- 13.2% prevalence
- 13,877,400
- Total cases of diabetes



The Overlooked Piece in the Metabolic Puzzle

Uric acid

Uric acid was long considered as a marker, for gout and renal stone but not a metabolic risk factor

Ingested Nucleic acid

Tissue destruction

Uric acid metabolism

Breakdown

Liver

Purines → Adenosine + Guanine

Converted into

Plasma

Uric acid

More soluble in:
1. Plasma
2. Synovial fluid
3. Urine

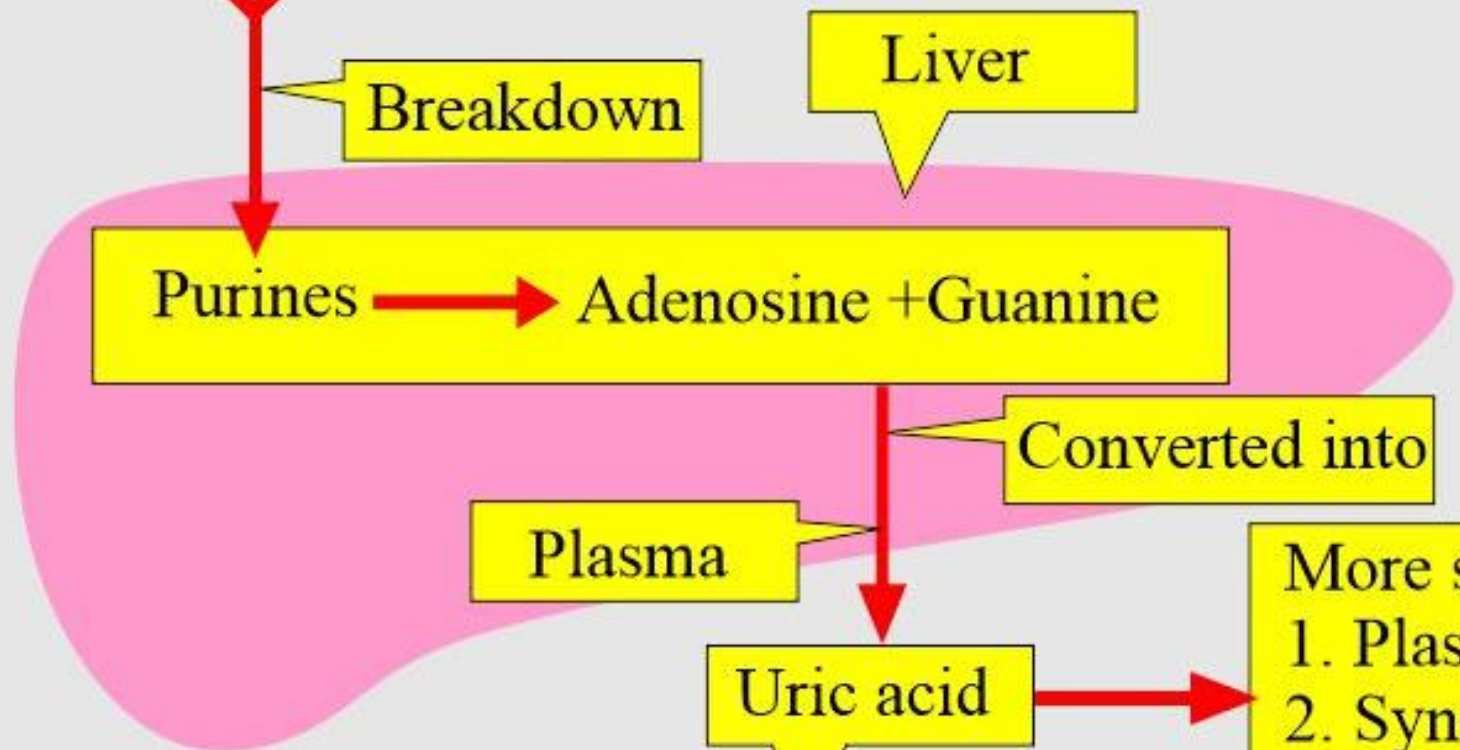
Kidney

GIT

Uric acid excreted in

In urine

Uric acid + Bacterial enzyme



Why Focus on Uric Acid?

Uric acid

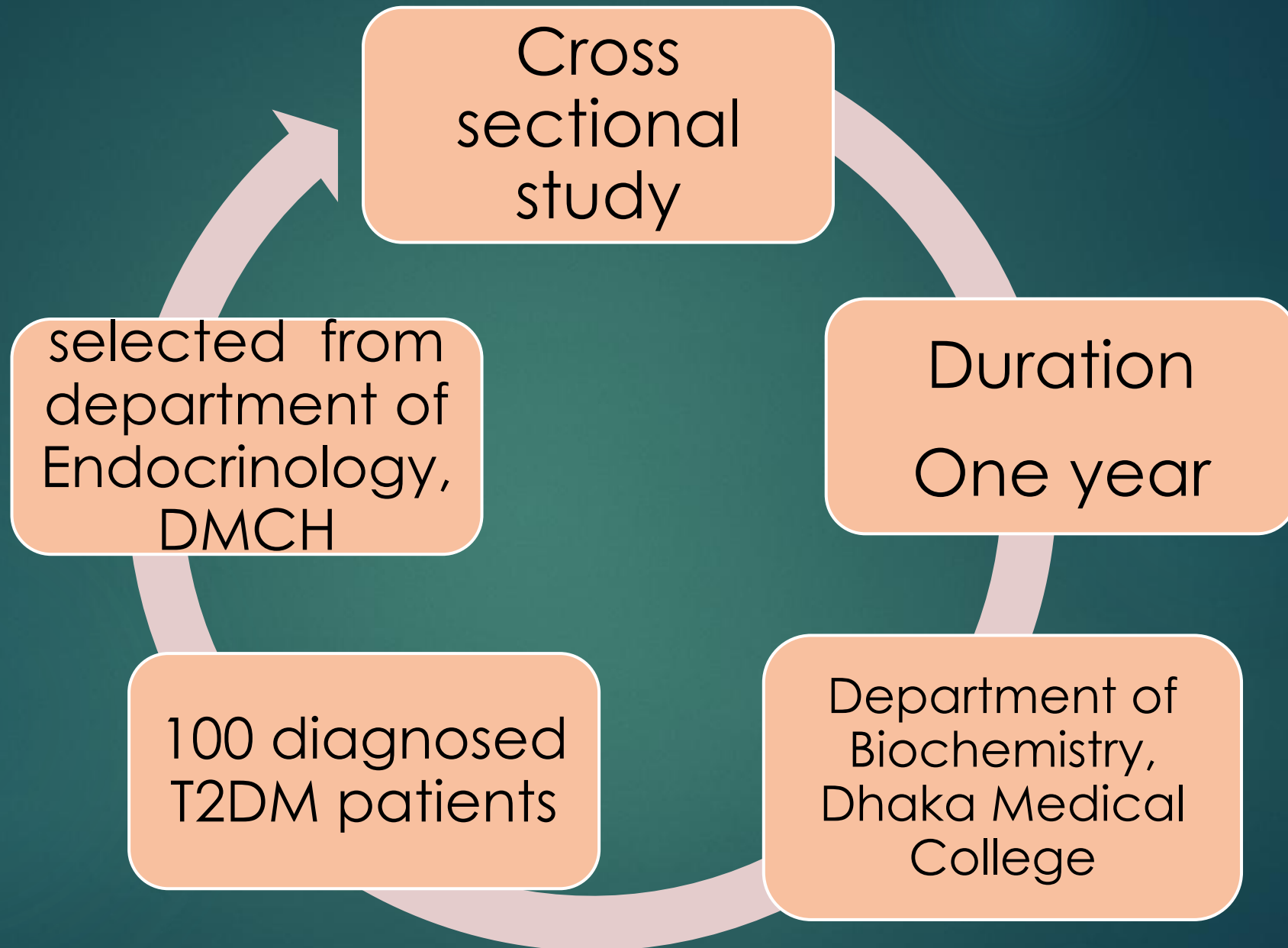
- leads to oxidative stress
- endothelial dysfunction and inflammation
- interferes with insulin signaling and insulin resistance

Research Method



Study Objective

- ▶ To explore the association of serum uric acid with metabolic syndrome components in Type 2 DM



Study subjects

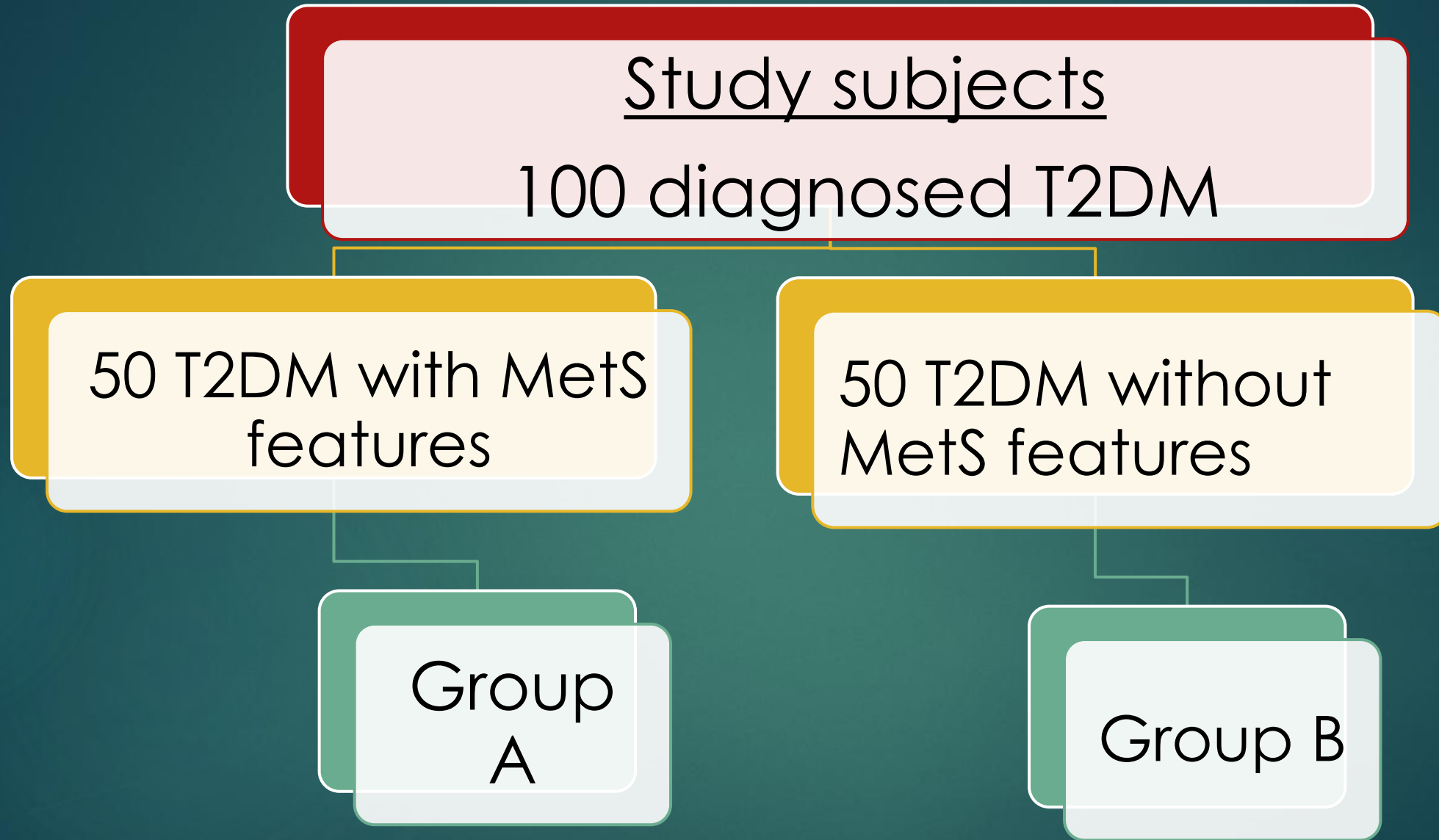
100 diagnosed T2DM

50 T2DM with MetS
features

50 T2DM without
MetS features

Group
A

Group B



Diagnostic criteria of Metabolic Syndrome (Group A) :

- ▶ According to NCEP-ATP III (Modified national cholesterol education program): Adult treatment panel III 2004 criterion

if at least three of the following five factors are positive-

Diagnostic criteria of Metabolic Syndrome

- ▶ i) Waist circumference ≥ 90 cm in males, ≥ 80 cm in females
- ▶ ii) SBP ≥ 130 and/or DBP ≥ 85 mm Hg
- ▶ iii) Triglycerides ≥ 150 mg/dl
- ▶ iv) HDL < 40 mg/dl in males, < 50 mg/dl in female
- ▶ v) Glucose > 110 mg/dl or treatment for diagnosed diabetes



Selection Criteria

Study Population

Inclusion Criteria

Group A

- ▶ Diagnosed type 2 diabetes mellitus patients with metS
- ▶ Age: 30-70 years
- ▶ Sex :both male & female

Group B

- ▶ Age & sex matched T2DM patients without metS

Data collection procedure

- ▶ purposive sampling
- ▶ base line parameters such as BMI, WC,BP, FPG, serum uric acid ,TG, and HDL-C
- ▶ patients of metS were, based on WC, BP, FPG, TG, and HDL-C
- ▶ serum uric acid, fasting plasma glucose



Results

Table I: Age and gender distribution of study subjects (N=100)

Total (100)		Group A 50(100)	Group B 50(100)	p value
Age (Mean± SD)		49.73 ± 6.06	48.5 ± 6.55	0.313
Gender	Male	27	29	0.541
	female	23	21	

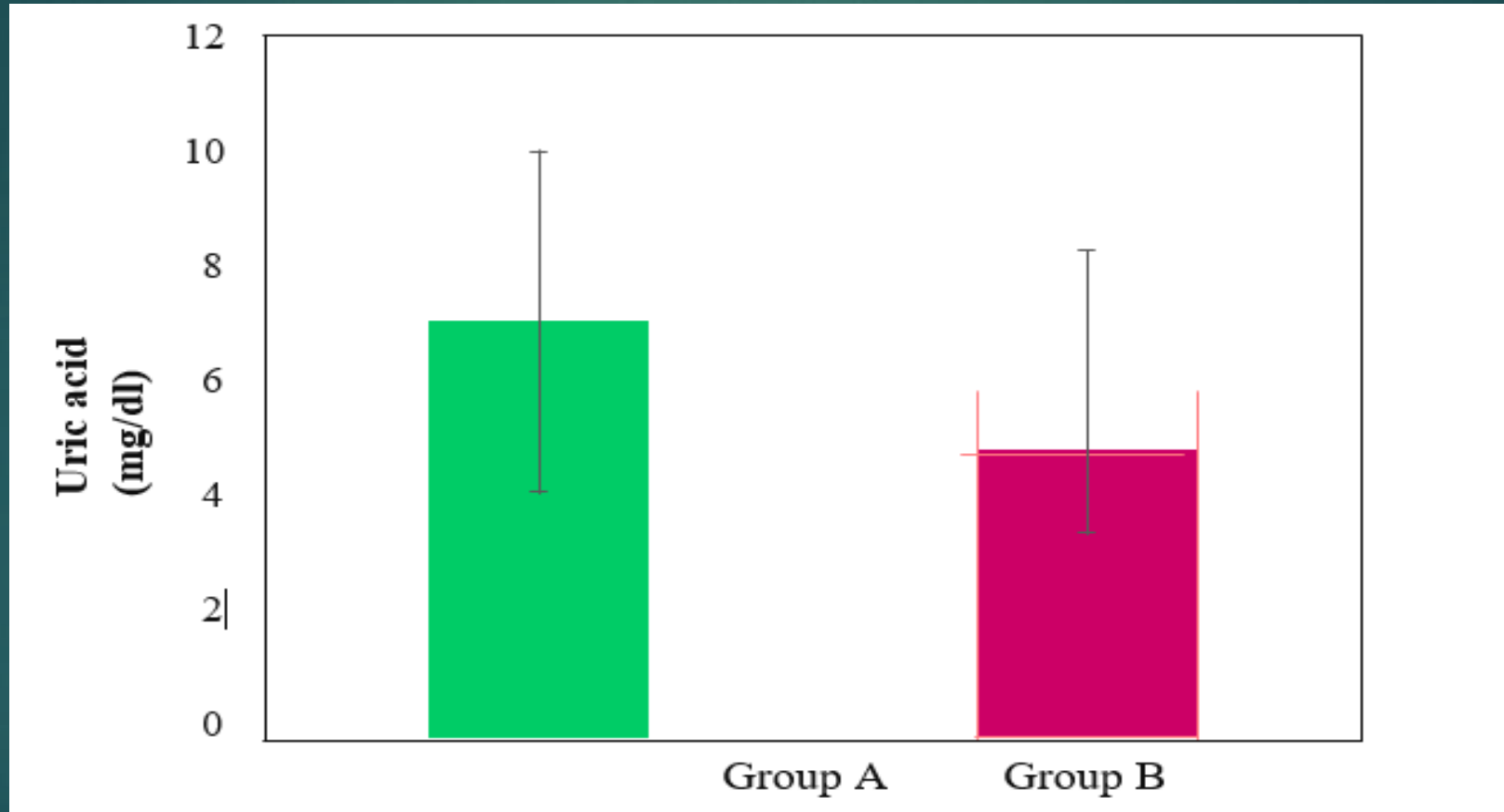
Table II: MetS components between study subjects (N=100)

Groups			
Parameter	Group A	Group B	P value
	(n=50)	(n=50)	
	Mean±SD	Mean±SD	
Systolic BP (mm Hg)	125 ±15	120 ±12	0.068
Diastolic BP (mm Hg)	85 ± 9	78 ± 8	0.0001
Waist Circumference (cm)	89.7±7.3	81.5±6.8	0.025
BMI (kg/m²)	28.5±3.5	21.6±3.1	0.005

Table III: Biochemical Parameters of MetS in study subjects (N=100)

Parameter	Group A	Group B	P Value
	(n=50)	(n=50)	
	Mean ± SD	Mean ± SD	
TG (mg/dl)	152.69±19.67	138.82±17.81	0.0003
HDL (mg/dl)	32.45±9.15	31.23±8.17	0.1123
Fasting plasma glucose	8.1±1.4	7.4±1.1	0.0065
(mmol/l)			

Uric acid level of the study population.



Conclusion

- ❖ Serum uric acid is
 - ✓ higher in patients of diabetes with metabolic syndrome than those without metabolic syndrome
 - ✓ significantly and positively correlated with WC, FPG, blood pressure, triglycerides while negatively correlated with HDL-C

Comparative Study

- ▶ A cross-sectional study by Li et al(2011) in Shanghai, in 395 study population, to see Serum uric acid level and its association with metabolic syndrome and carotid atherosclerosis in patients with type 2 diabetes.
- ▶ A cross-sectional study conducted in Nigeria by Obegra & Abenazor (2010), with 601 patients with type 2 DM, SUA found positively and significantly associated with serum TG ($r = 0.2$, $p = 0.0001$)

Limitations

- ▶ HOMA-IR for measurement of insulin resistance could not be done.
- ▶ Possible information bias
- ▶ Sample size



Recommendations

- Causality between uric acid and MetS still debated.
 - Further prospective study with large sample size
 - Serum uric acid should be part of metabolic screening in diabetics to identify high-risk individuals early.
- 

References

1. Akter, S., Rahman, M.M., Abe, S.K. and Sultana, P. (2014). Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey, *Bulletin of the World Health Organization*, 92(A), pp. 204-213.
2. Alberti, K.G.M.M., Zimmet, P. and Shaw, J. (2006). Metabolic syndrome—a new world-wide definition. A consensus statement from the international diabetes federation, *Diabetic medicine*, 23(5), pp. 469-480.
3. American Diabetes Association.(2017). Classification and diagnosis of diabetes, *Diabetes Care*, 40(1), pp. S11-S24.
4. Bhowmik, D and Tiwari, S.C. (2008). Metabolic syndrome and chronic kidney disease, *Indian J Nephrol*, 18(1), pp. 1–4.
5. Devaraj, S., Singh, U. and Jialal, I. (2009). Human C-reactive protein and the metabolic syndrome, *Current opinion in lipidology*, 20(3), pp. 182-189.
6. Fu, H.D., Yang, H., Zheng, J.S., Zeng,Z., Zeng,W., Fan,Z et al. (2017). Positive association between metabolic syndrome and serum uric acid in Wuhan, *Asia Pac J Clin Nutr*, 26(2), pp. 343-350

Original Article

Uric Acid and it's association with Metabolic Syndrome in type 2 Diabetes Mellitus

Haque J¹, Sultana N², Saeed RA³, Sharmin T⁴

Abstract

Background: Metabolic syndrome is a cluster of risk factors which include hypertension, obesity, dyslipidemia and insulin resistance in a single patient and patients who present with such a cluster are at much greater danger of morbidity and mortality from Type 2 Diabetes Mellitus (T2DM). An elevated serum uric acid is one of the independent predictor of diabetes. Like increased serum uric acid level, increased components of metabolic syndrome has been suggested to be associated with cardiovascular disease.

Objectives: To explore the association of serum uric acid with metabolic syndrome components in Type 2 DM.

Methodology: This cross sectional study was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from January 2017 to December 2017 with 100 diagnosed T2DM patients in which 50 T2DM with Metabolic Syndrome (Group A) and 50 T2DM without Metabolic Syndrome (Group B) of both sexes were selected from department of Endocrinology, DMCH. Metabolic syndrome was diagnosed by the presence of 3/ more criteria of the modified National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP-III). Baseline parameters were measured and serum uric acid, Fasting Plasma Glucose (FPG), Triglyceride (TG), High Density Lipoprotein Cholesterol (HDL-C) were measured by enzymatic method in all study subject. Data was statistically analysed. Prior to start the study ethical permission was taken from Ethical Review Committee of DMCH.

Results: Mean $\pm$ SD of serum uric acid was significantly higher ($p < 0.05$) in T2DM with metS than T2DM without metS. Components of metS- WC, Diastolic blood pressure (DBP), FPG, TG were significantly higher in metS group than without metS group. Serum uric acid showed significant positive correlation with metS components and for HDL-C showed negative correlation.

Conclusion: Serum uric acid level is increased in patients of diabetes with metabolic syndrome than those without metabolic syndrome. Uric acid is positively correlated with components of metabolic syndrome.

Keywords: Serum uric acid, Metabolic Syndrome, Type-2 diabetes mellitus.

Introduction:

Metabolic syndrome is a cluster of risk factors which include hypertension, obesity, and dyslipidemia, insulin resistance in a patient can be a signal that patients who present with such a cluster are at much greater danger of morbidity and mortality from Type 2 Diabetes Mellitus -T2DM.¹

Metabolic syndrome (MetS) is a major public health problem and is increasing in prevalence worldwide. Around 20-25% of the world's adult population has MetS.²

The prevalence of MetS varies according to geographic location, nationality, population characteristics, and MetS criteria. Among

Europeans, the prevalence has a range of 20-30%.³

An increasing trend has been observed in Asian population. One meta-analysis has shown that approximately 10-13% of adult Asian people have MetS in 2007.⁴

Serum uric acid is also one of the best independent predictors of diabetes and commonly precedes the development of both insulin resistance and diabetes.⁵

According to the criteria of the National Cholesterol Education Program Expert Panel (NCEP) and Adult Treatment Panel III (ATP III), that were modified in 2004 and adapted for Asians, and of the International Diabetes Federation (IDF) for 2005, the definition of MetS comprises the clinical condition meeting at least 3 or more from 5 risk factors, i.e. central obesity (waist circumference ≥ 90 cm for males and ≥ 80 cm for females), low HDL cholesterol (males < 40 mg/dL and females < 50 mg/dL, or under treatment), high serum triglycerides (≥ 150 mg/dL, or under treatment), increased blood pressure ($\geq 130/85$ mmHg or under treatment), and fasting blood glucose ≥ 100 mg/dL or under treatment.⁶

Serum uric acid is a final enzymatic product of purine metabolism in humans and it is suggested that hyperuricemia is associated

ISSN 2409-3513
BMDC RECOGNIZED

Dhaka Community Medical College Journal

Volume 11

No. 01

January 2022

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Thank you

