

“The Study of Body Mass Index (BMI) in Diabetes type 2 Patients and Its correlation with Diabetic Nephropathy”

*Dr. Rakesh K. Sisodia¹, Dr. Archana Gupta², Dr. Neelima singh²

¹ (Department of medicine, GMC Ratlam , (M.P))

² (Department of medicine, GRMC Gwalior, (M.P))

*Corresponding author: Dr. Rakesh K. Sisodia

Abstract:

Background: Diabetic nephropathy is the leading cause of Chronic Kidney Disease (CKD), ESRD, and CKD requiring renal replacement therapy. The aim of this study was to evaluate Body Mass Index (BMI) and Its correlation with Diabetic Nephropathy in type 2 diabetic patients.

Methods: :- In this study 100 patients of type 2 diabetic were subjected to detailed history, clinical examination, Urine albumin creatinine ratio, BMI and routine biochemical investigations.

Result: Among 100 patients, 41 were normoalbuminuric, 37 had micro-albuminuria and 22 had overt proteinuria. Increased frequency of proteinuria was seen in male than female. Majority of patients were over weight (BMI 25-29.9) which is account to about 58 of total cases, 30 patients were Normal BMI and 12 patients were Obese. In this study On statistical analysis a positive correlation found between BMI and Ranges of proteinuric (P value 0.037). Which is significant

Conclusion: concluded that Obesity(BMI) is associated with Diabetic Nephropathy.

Key words :- Albuminurea, Body Mass Index (BMI), Diabetes type 2, Diabetic nephropathy, End stage renal diseas (ESRD) Proteinurea,.

Date of Submission: 17-07-2019

Date of acceptance: 03-08-2019

I. Introduction

Diabetes Mellitus is the most common metabolic disorder characterized by a series of hormone induced metabolic abnormalities and long term complication. The worldwide prevalence of Diabetes mellitus has risen dramatically over the past two decades, from an estimated 30 million cases in 1985 to 415 million in 2017.¹ Obesity is a state of excess adipose tissue mass.² However, in the presence of nutritional abundance and a sedentary lifestyle, and influenced importantly by genetic endowment, this system increases adipose energy stores and produces adverse health consequences

.According to WHO global obesity almost doubled between 1980 and 2008. There were >200 million obese men and almost 300 million obese women, 11% of adults worldwide, in 2008.³ In developing countries, such as India obesity prevalence is rising (5%) with a greater tendency to harmful intraabdominal obesity at lower BMI in the population, and the consequences for metabolic and cardiovascular health are disproportionate to obesity prevalence.³

Diabetic nephropathy carries its significance, as diabetes has become one of the most common cause of end stage renal disease (ESRD). Initial clinical evidence of nephropathy is the appearance of low but abnormal levels of albumin in the urine as "microalbuminuria" in which urinary albumin excretion rate (UAER) is between 20 μ gm/min to 200 μ gm/min or total urinary albumin/day between 30 mg to 300 mg/day or Spot collection 30 μ g/mg creatinine to 299 μ g/mg creatinine. If UAER is > 200 μ mg/min or total urinary albumin/day is > 300 mg/day or Spot collection >299 μ g/mg creatinine then it is known as "clinical albuminuria". Stage of microalbuminuria is also known as incipient nephropathy while stage of clinical albuminuria is known as stage of overt nephropathy. Once overt proteinuria develops, there is steady decline in GFR and approximately 50% of individuals reach ESRD in 7-10 years. The exact pathogenesis of microvascular complications in diabetes mellitus (DM) is unknown. Oxidative stress, activated renin-angiotensin system (RAS), hyperglycemia, advanced glycosylation end-products (AGE), and oxidized low-density lipoproteins are factor contributing to initiation and progression of endothelial inflammation, ultimately leading to diabetic vascular complications. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels.⁴

II. Material and Methods

This was a cross sectional study done in the department of medicine GRMC Gwalior on 100 diabetic patients were diagnosed case of Type 2 diabetes mellitus patients which were admitted and attend Medicine OPD in J.A. Group of Hospital. Informed consent was taken from all the patients and each patient was subjected to detailed history and clinical examination and take BMI, Urine albumin creatinine ratio and routine investigations are done. Patients with Urinary tract infection, obstructive uropathy were excluded.

CRITERIA FOR THE DIAGNOSIS OF DIABETES MELLITUS⁴

Symptoms of diabetes plus random plasma glucose concentration >200 mg/dl (11.1 mmol/l). random is defined as any time of the day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss.
OR
FPG =126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h.
OR
2-h post load glucose >200 mg/dl (11.1 mmol/l) during an OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 gm anhydrous glucose dissolved in water.
HbA1C> 6.5 %

Body mass index:- Body height in centimeters and body weight in kilograms (kg) were measured with light clothes and bare feet , and BMI in kg/m² was calculated.

Classification of Weight Status and Risk of Disease⁵

	BMI (kg/m²)	Obesity Class	Risk of Disease
Underweight	<18.5		
Healthy weight	18.5–24.9		
Overweight	25.0–29.9		Increased
Obesity	30.0–34.9	I	High
Obesity	35.0–39.9	II	Very high
Extreme Obesity	≥40	III	Extremely high

Source: Adapted from National Institutes of Health, National Heart, Lung, and Blood Institute: *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*. U.S. Department of Health and Human Services, Public Health Service, 1998

Urinary Albumin creatinine ratio calculated by:-

1. Urinari Albumin:- Immunoturbidimetric assay.
2. Urinari Creatinine:- Jaffé rate reaction assay.

Urinary Albuminuria classified by :-

Normoalbuminurea <30 , Microalbuminurea 30 – 300, Overt proteinurea ≥ 300 $\mu\text{g}/\text{mg}$ creatinine (Adapted from ADA, 2002)⁶

Data Analysis

Data analysis was done by software EPICAL and p value are measured in all statistics by Chi square (χ^2) test and ANOVA test. P value <0.05 was considered significant

III. Results

Out of 100 diabetic patients included in this study 62 of them were male and 38 were female. Majority of patients were overweight (BMI 25-29.9) which account to about 58 (58%) of total cases, followed by 30(30%) patients were Normal BMI(18.5-24.9) and followed by 12(12%) patients were Obese (BMI>40) . Out of 58 overweight patients, 33 (53.22%) patients were male and 25 (65.78%) patients were female. Out of 30 normal BMI patients, 23 (37.09%) patients were male and 7(18.42%) patients were female. Out of 12 obese patients, 6 (9.67%) patients were male and 6 (15.78%) patients were female.. (**Table 1**).

Maximally 41% patients were Normoalbuminuri Followed by 31% Microalbuminuric, followed by 22% patients had Overt protienuric. Out of 41 Normoalbuminuric patients, 65.85% patients were males (n=27) and 31.14% patients were females (n=14). Out of 31 Microalbuminuric patients 59.45% patients were males (n=22) and 40.54% patients were females (n=15). Out of 22 Overt protienuric patients, 59.09% patients were males (n=13) and 40.90% patients were females (n=9) (**Table 2**).

IV. Discussion

In present era diabetes is the most common endocrine disorder which prevalence is 6.5% of entire population worldwide is still on rise owing to the interaction of various host and changing environmental factors. India is the world capital of diabetes. Of the total 100 diabetic patients included in this study 62 of them were male and 38 were female. Out of the 62 male patients, 27 were Normoalbuminuric, 22 had Micro-albuminuria and 13 had Overt proteinuria. Among the 38 female patients, 14 were Normoalbuminuric, 15 had Micro-albuminuria and 9 had Overt proteinuria (**Table 2**). Among both male and female patients, of the total 100 patients, 41 were Normoalbuminuric , 37 had Micro-albuminuria and 22 had Overt proteinuria (**Table 2**). In this study majority of patients were Over weight (BMI 25-29.9) which is account to about 58% of total cases,

30% patients were Normal BMI and 12% patients were Obese (**Table 1**). In this study On statistical analysis a positive correlation found between BMI and Ranges of proteinuric (P value 0.037) (**Table 3**). Which is significant.⁷⁻¹⁰

V. Conclusion

The study entitled “The study of Body Mass Index (BMI) in Diabetes type 2 patients and its correlation with Diabetic Nephropathy” is of cross sectional study done in department of medicine G.R. Medical college Gwalior (M.P.) for a sample of 100 patients of type 2 Diabetes mellitus (excluding the cases of UTI, obstructive uropathy) revealed that abnormal BMI were is the statistically significant found correlation with diabetic Nephropathy. The BMI and early urinary protein estimation should be kept under strict control so that complications associated with diabetes would be delayed. The urinary protein excretion should be monitored regularly as it has been found to be associated with increased risk of cardiovascular diseases.

References

- [1]. Alvin C. Powers, Kevin D. Niswender, Carmella Evan-Molina. Diabetes mellitus: Diagnosis, classification, and pathophysiology. In: Anthony S. Fauci, editor. Harrison's principles of internal medicine, 20th ed. New Delhi: McGraw-Hill Education; 2018. p.2851.
- [2]. Jeffrey S. Flier, Elefneria Maratos-Flier. Pathobiology of obesity. In: Anthony S. Fauci, editor. Harrison's principles of internal medicine, 20th ed. New Delhi: McGraw-Hill Education; 2018. p.2837.
- [3]. Jeffrey S. Flier, Elefneria Maratos-Flier. Pathobiology of obesity. In: Anthony S. Fauci, editor. Harrison's principles of internal medicine, 20th ed. New Delhi: McGraw-Hill Education; 2018. p.2838.
- [4]. American Diabetes Association. Standards of Medical Care in Diabetes - 2008. Diabetes Care. 2008;31 (Suppl 1):S13-S54.
- [5]. Robert F. Kushner. Evaluation and management of obesity. In: Anthony S. Fauci, editor. Harrison's principles of internal medicine, 20th ed. New Delhi: McGraw-Hill Education; 2018. p.2844.
- [6]. American Diabetes Association (ADA), Diabetes care, volume 25, supplement 1, January 2002.
- [7]. Henri Afghahi¹, Jan Cederholm², Björn Eliasson³, Björn Zethelius⁴, Soffia Gudbjörnsdóttir³, Henrik Hadimeri¹ and Maria K. Svensson⁵ Risk factors for the development of albuminuria and renal impairment in type 2 diabetes—the Swedish National Diabetes Register (NDR). Nephrol Dial Transplant (2011) 26: 1236–1243.
- [8]. Mordchai Ravid, MD; David Brosh, MD; Dorit Ravid-Safran, MD; Zohar Levy, MD; Rita Rachmani, MD. Main Risk Factors for Nephropathy in Type 2 Diabetes Mellitus Are Plasma Cholesterol Levels, Mean Blood Pressure, and Hyperglycemia. ARCH INTERN MED/VOL 158, MAY 11, 1998 1001.
- [9]. Hiroki Yokoyama, Hirohito Sone, Mariko Oishi, Koichi Kawai, Yoshihide Fukumoto. Masashi Kobayashi and on behalf of Japan Diabetes Clinical Data Management Study Group. Nephrol Dial Transplant (2009) 24: 1212–1219.

[10]. Martina Tonic, Tamara Polgicanin, Ivana Paulic-Renar, Zeljko Metelko. Obesity a risk factor for microvascular and neuropathic complication in Diabetes. Diabetologia croatica 32-2:2000.

Table 1: Body mass index distribution of cases

S. No.	BMI (kg/m ²)	Male		Female		Total
		No.	%	No.	%	
1.	Normal (18.5-24.9)	23	37.09	7	18.42	30
2.	Overweight (25-29.9)	33	53.22	25	65.78	58
3.	Obese (≥30)	6	9.67	6	15.78	12
	Total	62	100	38	100	100

Table 2: Table 1 showing Gender wise distribution of different ranges proteinuria in cases

S. No.		Normo-albuminuria		Micro-albuminuria		Overt Proteinuria		Total
		No.	%	No.	%	No.	%	
1.	Male	27	65.85	22	59.45	13	59.09	62
2.	Female	14	34.14	15	40.54	9	40.90	38
	Total	41	100	37	100	22	100	100

Table 3: showing correlation of BMI and different ranges of proteinuria

	Normo-albuminuria	Micro-albuminuria	Overt Proteinuria	P value
BMI (kg/m²)	25.82±3.39	25.95±3.39	28.01±3.39	0.0375*

Correlation of BMI and different ranges of proteinuria



