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"The Study of Glysemic Control (Hba1c) And Its Correlation With Nephropathy in Diabetes Mellitus Type 2 Patients''

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Abstract
Background :- *Diabetic nephropathy is one of the most severe diabetic microangiopathies. The aim of this study was to evaluate different stages of proteinuria and glycemic control in type 2 diabetic patients*
Methods:- *In this study 100 type 2 diabetic patients were subjected to detailed history, clinical examination, Urine albumin creatinine ratio, HbA1C and routine biochemical investigations.*
Results:- *Among 100 patients, 22 had overt proteinuria, 37 had micro-albuminuria and 41 were normoabluminuric. Increased frequency of proteinuria was seen in male than female.. Glycated hemoglobin level was increased with the increasing proteinuria. On statically analysis a positive correlation found between HbA1c and ranges of protienuria (P value < 0.001). Which is highly significant.*
Conclusions:- *concluded that poor glycemic control is associated with Diabetic Nephropathy.*
Keywords:- *Diabetes type 2, diabetic nephropathy, albuminurea, proteinurea, Glycated hemoglobin (HbA1C).*

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I. Introduction

Diabetes Mellitus is the most common metabolic disorder characterized by a series of hormone induced metabolic abnormalities and long term complications. Diabetic nephropathy is one of the major complications of Diabetes Mellitus characterized by persistent albuminuria, elevated arterial blood pressure, a relentless decline in glomerular filtration rate (GFR) and a high risk of cardiovascular morbidity and mortality.[1] Diabetic nephropathy is a leading cause of death in many developed countries. 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 μg/mg creatinine to 299 μg/mg creatinine. If UAER is > 200 μ mg/min or total urinary albumin/day is > 300 mg/day or Spot collection >299 μg/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 early pathologic changes and microalbuminuria are reversible with noramalisation of plasma glucose. But once overt nephropathy develops, the pathologic changes are irreversible. 20-40% cases of Type 2 diabetes without specific interventions change from incipient to overt nephropathy shortly after diagnosis indicating its long asymptomatic period when tissue damage was relentlessly progressing, but only 20% cases of overt nephropathy with Type 2 diabetes develop ESRD. 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.

II. 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, HbA1C , Urine albumin creatinine ratio and routine investigations are done. Patients with Urinary tract infection, obstructive uropathy were excluded.

Criteria For The Diagnosis Of Diabetes Mellitus[2]

1.	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
2.	FPG =126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h.
	OR
3.	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 g anhydrous glucose dissolved in water.
4.	HbA1C 6.5 %

Urinary Albumin creatinine ratio calculated by:-

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

Urinary Albuminuria classified by :- Normoabuminurea <30 , Microalbuminurea 30 – 300, Overt proteinurea ≥ 300 **µg/mg creatinine** (Adapted from ADA, 2002)[3]. For the estimation of glycated hemoglobin (HbA1c) the blood collected in the EDTA vial was used and assayed manually by resin-exchange method. The patients were divided into three groups based on HbA1C values 6.5-8, 8-10 and >10 %.

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

Of the total 100 diabetic patients included in this study 62 of them were male and 38 were female. 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 1).** This study shows that HbA1c value increases the ranges of protienuria also increases. Majority of patients with HbA1c > 10 are overt protienuric, those with HbA1c 8-10% are microalbuminuric and those with HbA1c 6.5-8% are normoalbuminuric. On statically analysis a positive correlation found between HbA1c and ranges of protienuria (P value < 0.001) (**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 1). Among both male and female patients, of the total 100 patients, 41 were normoalbuminuric , 37 had micro-albuminuria and 22 had overt proteinuria (Table 1). HbA1 c is regarded as the gold standard for measurement of glycemic control and is important for long term management of diabetic patients. lt is also a predictor of diabetic complications as measures reducing HbA1c correspondingly reduce the risk of complications.[4] The rate of progression of nephropathy is correlated with metabolic control. In this study HbA1c is highest in overt proteinuria patients than in micro-albuminuria as well as in normoalbuminuric patient**s.** On statically analysis a positive correlation found between HbA1c and ranges of protienuria (P value < 0.001). Which is highly significant.[3-10]

V. Conclusion

The study entitled **"**The study of Glysemic control and its correlation with Nephropathy in Diabetes Mellitus type 2 patients'' 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 Poor glycemi control were is the statistically significant found correlation with diabetic nephropathy. The glycemic status (HbA1C) 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.

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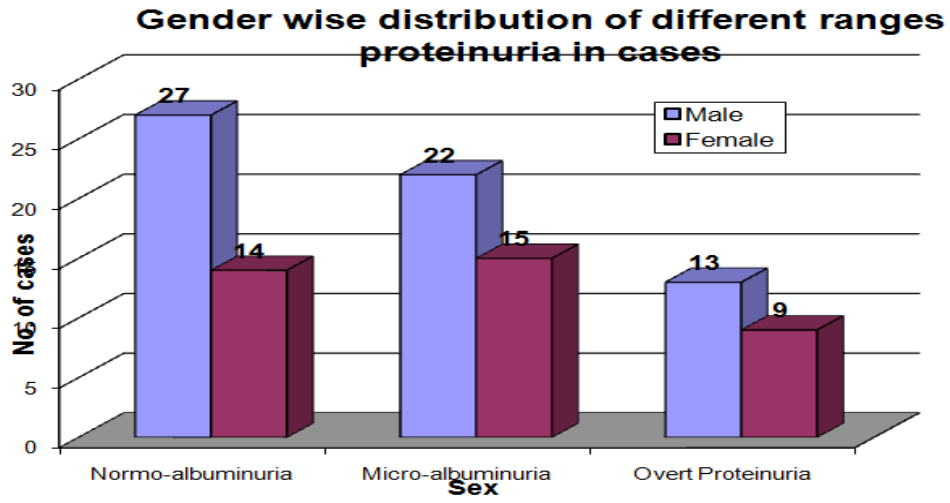

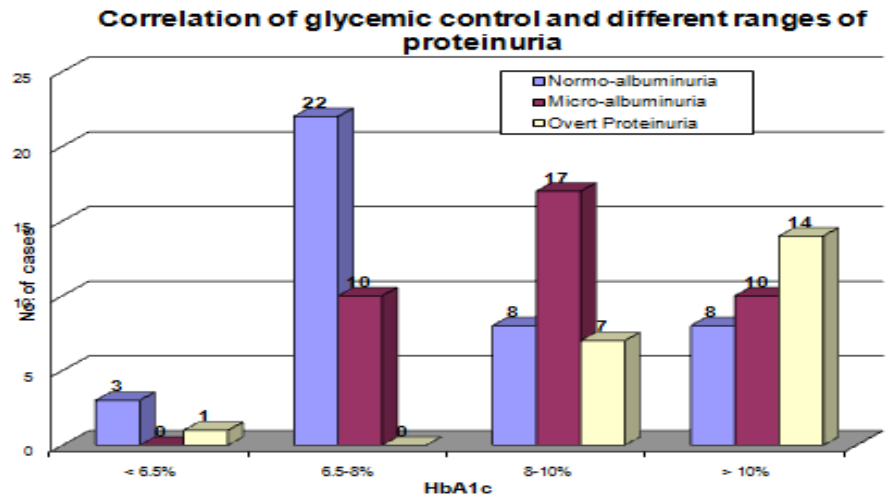

Table 1

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 2

Table 2 showing correlation of glycemic control and different ranges of proteinuria

S.No.	HbA1c	Normo-albuminuria		Micro-albuminuria		Overt Proteinuria		Total
		No.	%	No.	%	No.	%	
1.	< 6.5%	3	7.31	0	0	1	4.54	4
2.	6.5-8%	22	53.65	10	27.02	0	0	32
3.	8-10%	8	19.51	17	45.94	7	31.81	32
4.	> 10%	8	19.51	10	27.02	14	63.63	32
	Total	**41**	**100**	**37**	**100**	**22**	**100**	**100**

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