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Original Research Article

A Hospital Based Observational Study Assessing Association of Proteinuria with HbA1C in Diabetes Mellitus

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Abstract

Aim: The aim of the present study was to assess the association of Proteinuria with HbA1C in Diabetes Mellitus.

Methods: The present study was conducted in the Department of Pathology, Patna Medical College and Hospital, Patna, Bihar, India for one year and 50 patients were included in the study.

Results: The mean age of the patients were 46.44±6.34 years and there was male predominance. The association between HbA1C and proteinuria showed non-significant results statistically till 7-7.5 HbA1C but >7.5 HbA1C showed statistical significant result.

Conclusion: A Strong association was found between HbA1C and Proteinuria.

Keywords: HbA1C, proteinuria, diabetes mellitus

Introduction

Proteinuria accelerates worsening kidney function and leads to the development of cardiovascular disease (CVD) events, thereby increasing the risk for all-cause mortality. [1-6] Thus, proteinuria is considered a predisposing factor of kidney dysfunction, CVD, and life-threatening events. Diabetes mellitus (DM) is a major risk factor for proteinuria mainly via diabetic kidney disease. [7,8] Moreover, given that up to one-third of patients newly diagnosed with DM already have kidney damage [9-12], the risk of chronic kidney disease (CKD) could increase even in people with prediabetic hyperglycemia.

Diabetic nephropathy occurs in as many as 30% of insulin dependent diabetes mellitus patients and 25% of noninsulin-dependent diabetes mellitus patients. Diabetic nephropathy is a dreaded disease with progressive and continuous. Deterioration in glomerular function resulting in irreversible renal failure. Diabetic nephropathy is an important cause of morbidity and mortality and is now among the most common cause of end-stage renal disease. However, there is an early phase of diabetic renal disease called incipient diabetic nephropathy. This study is intended to study the association of Proteinuria with HbA1C in Diabetes Mellitus. The knowledge of diabetes dates back to centuries before Christ. Polyuria disease resembling diabetes was described as early as 150 BC in ancient Egyptian records discovered by George Beers. Celsius (30BC-50AD) had recognised the disease. Diabetes, a Greek term, which literally means to 'run thru' or a 'siphon' was initially used by Aretaeus in first century AD for the generic description of a condition causing increased urine output. Roman physicians thought of diabetes as a "wonderful affection", not very frequent among men being melted down of flesh and limbs into urine. The patient never stopped making water, but the flow is incessant as if from an opening of aqueducts Aretaeus, the Cappadocia. [13,14]

The aim of the present study was to assess the association of Proteinuria with HbA1C in Diabetes Mellitus.

Materials and Methods

The present study was conducted in the Department of Pathology, Patna Medical College and Hospital, Patna, Bihar, India for one year and 50 patients were included in the study.

Inclusion Criteria

1. Age: 18-80 years.

2. Those who gave written informed consent.

Exclusion Criteria

1. Patients unwilling and uncooperative for the study

2. Patients suffering from known kidney pathology.

Results

Table 1: Age and sex distribution

Mean Age	Std Deviation	Male	Female
46.44 years	±6.34 years	35	15

The mean age of the patients were 46.44±6.34 years and there was male predominance.

Table 2: HbA1C association with Proteinuria

HbA1C levels	Proteinuria				P Value
	-	+	++	+++	
<6.5	25	Nil	Nil	Nil	0.950
6.5-7	14	01	Nil	Nil	0.912
7-7.5	Nil	01	01	01	0.867
>7.5	Nil	01	01	05	<0.001

The association between HbA1C and proteinuria showed non-significant results statistically till 7-7.5 HbA1C but >7.5 HbA1C showed statistical significant result.

Discussion

Diabetes Mellitus (DM) is a chronic disease caused by the inability of the body to produce the insulin hormone or ineffective utilization of the produced insulin, which is marked by a high blood glucose concentration. The prevalence of DM is increasing rapidly, and it is estimated that, currently, 8.3% of adults worldwide are suffered from DM. The 2014 WHO Global Status Report on non-communicable disease (NCD) showed that 68% of worldwide mortality for all ages is related to NCDs. [15] DM ranks sixth as the cause of death, with around 1.3 million persons dying from DM, and 4% of these deaths occur before 70 years of age. By the year 2030, it is estimated that DM occupies the seventh rank as the cause of global mortality. In Indonesia, it is estimated that by 2030, there will be 21.3 million patients with DM. [16,17]

The mean age of the patients were 46.44±6.34 years and there was male predominance. The association between HbA1C and proteinuria showed non-significant results statistically till 7-7.5 HbA1C but >7.5 HbA1C showed statistical significant result. In 1963, Keen and Chlouvervakis developed sensitive and specific radioimmunoassay for detecting human albumin in low concentration, i.e. proteinuria, which indicate earliest stage of diabetic renal disease. Later various other methods were developed for detection of proteinuria. [18] This means significant increase in Albumin Excretion Rate (AER). Albumin excretion in healthy individuals ranges from 1.5 to 20 mcg/min. with geometric mean in the range of 6.5 mcg/min., these have been termed norm albuminuria. Proteinuria thus defines the wide substantial range of albumin hypersecretion ranging between 20- to 200- mcg/min. (30 to 300 mg/day). Normal persons excrete less than 30 mg/day. [19]

In contrast to microproteinuria, the degree of macroproteinuria shows no relationship with current level of diabetic control. Neither the mean plasma glucose concentration nor glycosylated haemoglobin levels correlated significantly with clearance and excretion rates of different proteins. Long-term correction of hyperglycaemia by an intensified treatment regimens failed to stop or significantly slow the progressive increase in fractional clearance of albumin and IgG in insulin-dependent diabetic subjects with renal failure over a period of 2 years observation. [20] In IDDM patients with low levels of proteinuria (i.e., AER of 20-30 mcg/min.), no consistent glomerular abnormalities have been found. Above these levels of urinary albumin excretion, however, the fractional volume of mesangium is on average significantly increased and minor reduction in creatinine clearance and rise in blood pressure are observed. Similar findings have been reported in NIDDM patients with proteinuria and proteinuria. [21]

Conclusion

A Strong association was found between HbA1C and Proteinuria.

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