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A STUDY ON ASSOCIATION OF SERUM ZINC WITH HbA1C AND MICROALBUMINURIA IN COASTAL RURAL SOUTH INDIA

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ABSTRACT: Diabetes is a "metabolic disorder of multiple aetiologies characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both "is defined as diabetes mellitus by WHO.[1] According to several studies has observed that the number of cases of diabetes worldwide in the year 2000 among adults at around 171 million, but the number of cases of diabetes mellitus is likely to rise around 366 million by the year 2030. So the present study is done to observe the correlation serum zinc levels with HbA1C levels and microalbuminuria. A cross sectional observational study is done on 70 patients divided into2 groups cases-with complications and controls-without complications who presented to the department of General Medicine, VMMC, Karaikal, Pondicherry with diabetes mellitus for duration of 6 months. All cases of type 2 diabetes mellitus patients attending general medicine Outpatients with complications are included in study. The mean HbA1C value of cases is 7.823% with a standard deviation of 1.29% and the mean HbA1C of controls is 5.83% with a standard deviation of 0.53%, p-value is <0.005 which is statistically significant. In cases urinary albumin excretion was 90.5±63 mg/dl and in control group it is 86.5±62mg/dl, p-value is <.005 which is statistically significant indicating that in coastal areas there are elevated levels of zinc despite of poor glycaemic control.

INTRODUCTION:

Diabetes is a "metabolic disorder of multiple aetiologies characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both "is defined as diabetes mellitus by WHO.[1] According to several studies has observed that the number of cases of diabetes worldwide in the year 2000 among adults at around 171 million, but the number of cases of diabetes mellitus is likely to rise around 366 million by the year 2030.[2]According to the International diabetes federation by 2015, Some 415 million people worldwide, or 8.8% of adults aged 20-79, are estimated to have diabetes. By 2040, around 642 million people, or one adult in ten, will have diabetes. According to IDF 2015, in India there are 69.2 million people suffering from T2DM. (2) Diabetes mellitus is now approaching epidemic proportions. Although the pathogenesis of diabetes is complex, various factors that increase the risk of disease have been discovered due to revolution in the field of science and research. Genetic factors, life style changes, alcohol use, smoking, raised BMI etc. were identified. There occur changes in insulin production or insulin action resulting in hyperglycaemia. The chronic hyperglycaemia associated with diabetes leads to long-term complications. All over the world Diabetes mellitus is the leading cause of chronic kidney disease(CKD). Accounting for 20-40% of all causes of CKD, it is the most disabling complication of diabetes. As estimated, over 43% of the patients developing ESRD have diabetes as the cause. The hallmark of diabetic nephropathy is persistent albuminuria which can be diagnosed

clinically if the following additional criteria can be fulfilled: Absence of clinical or laboratory evidence of other kidney or renal tract disease and the presence of diabetic retinopathy. Raised urinary albumin excretion below the level of clinical albuminuria, so called microalbuminuria, strongly predicts the development of diabetic nephropathy as shown in several longitudinal studies during the last decade. patient having albumin in urine more than 300mg/dl will be considered to have microalbuminuria. In patient with type 2 Diabetes, insulin reduces the hyperzincuria while the other agents had no effect on zinc excretion. It has also been postulated that hyperglycaemia can interferes with the active transport of zinc back into renal tubular cells So the present study is done to observe the correlation serum zinc levels with HbA1C levels and microalbuminuria.

AIM AND OBJECTIVES: To study the correlation between serum zinc levels with HbA1C and microalbuminuria in coastal rural South India, Karaikal.

MATERIALS AND METHODS: A cross sectional observational study is done on 70 patients divided into2 groups cases-with complications and controls-without complications who presented to the department of General Medicine, VMMC, Karaikal, Pondicherry with diabetes mellitus for duration of 6 months. All cases of type 2 diabetes mellitus patients attending general medicine Outpatients with complications are included in study. Patients with diabetes mellitus with chronic kidney disease (stage 3 onwards), Patients receiving magnesium supplements or magnesium containing antacids, Malabsorption or chronic diarrhea, Patients with a history of alcohol abuse were excluded from the study. After identifying patients with type 2 diabetes mellitus appropriate questionnaire was used to collect data of patients. About 5ml of venous blood Samples from cubital vein was collected in sodium fluoride/potassium oxalate (Grey tube) for glucose tests and blood sample also taken for serum zinc, HbA1c. Colorimetric assay kit was used for estimation of serum level in this study. Urine analysis was done for microalbuminuria.

RESULTS:

Table1: distribution of mean age and standard deviation if the cases and control

Variable	Mean age in years	Standard deviation in years
Cases	55.485	9.864
Controls	55	12.326

Table 2: distribution of cases based on gender

Gender	Cases
Male	12
Female	23
Total	35

Table 3: Distribution of control group based on gender

Gend er	Control group
Male	18

Female	17
Total	35

Figure 1: bar diagram showing distribution of cases and control group based on age group

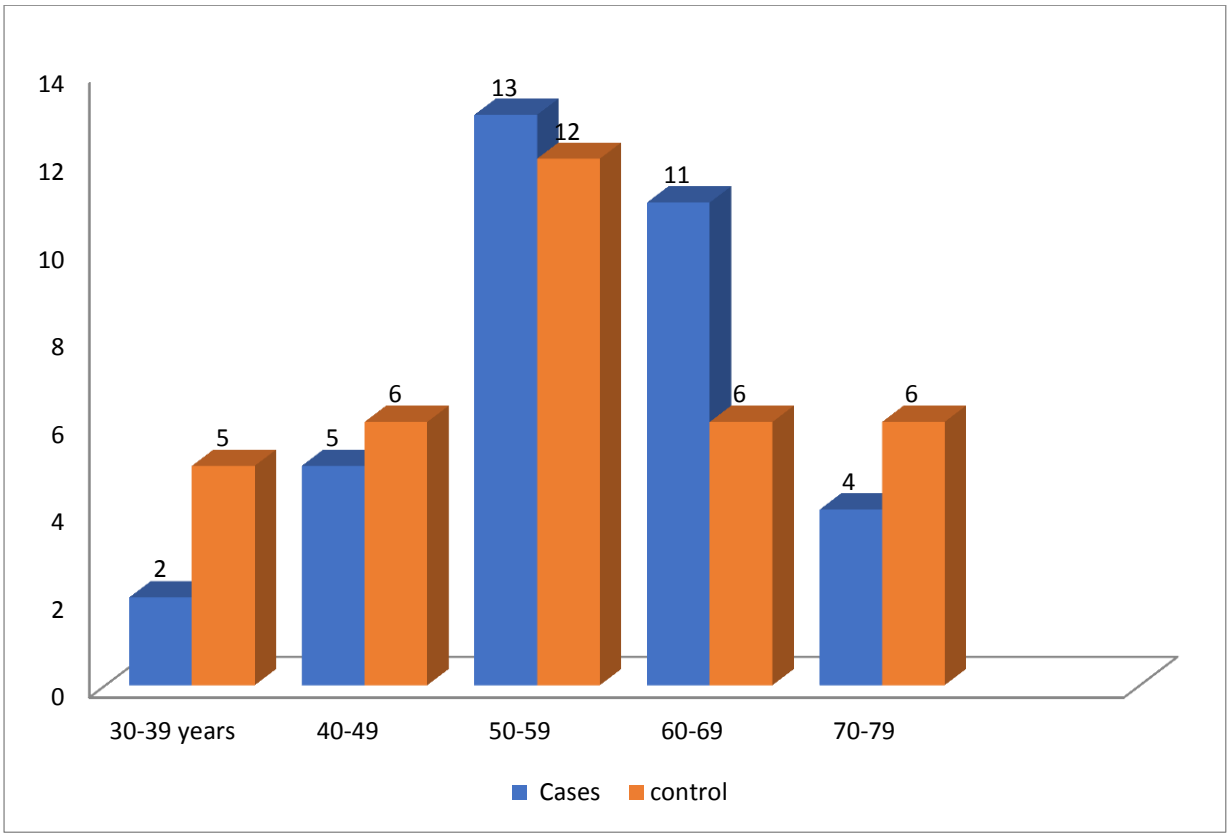

Figure 2: Bar showing distribution of serum zinc among cases

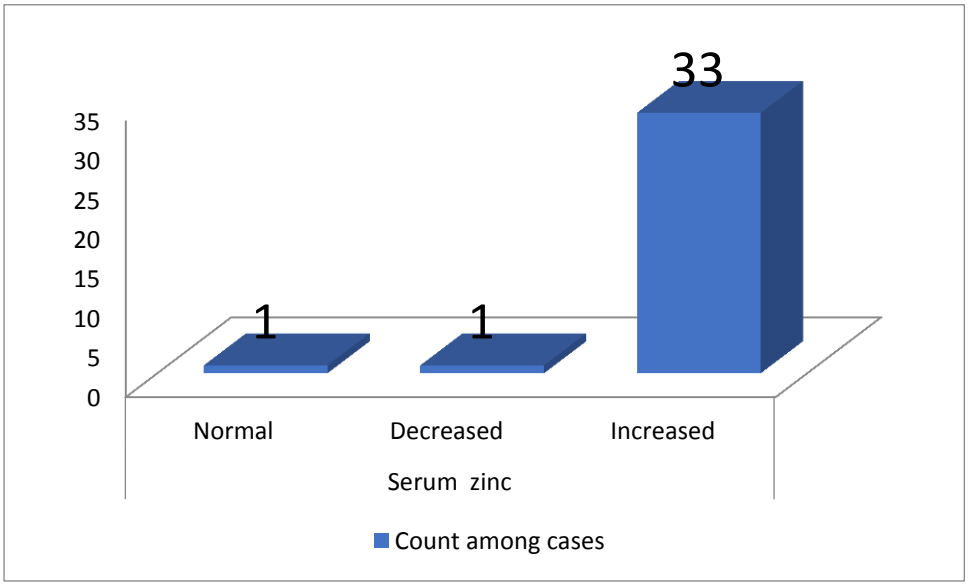

Figure 3: serum zinc levels among control group

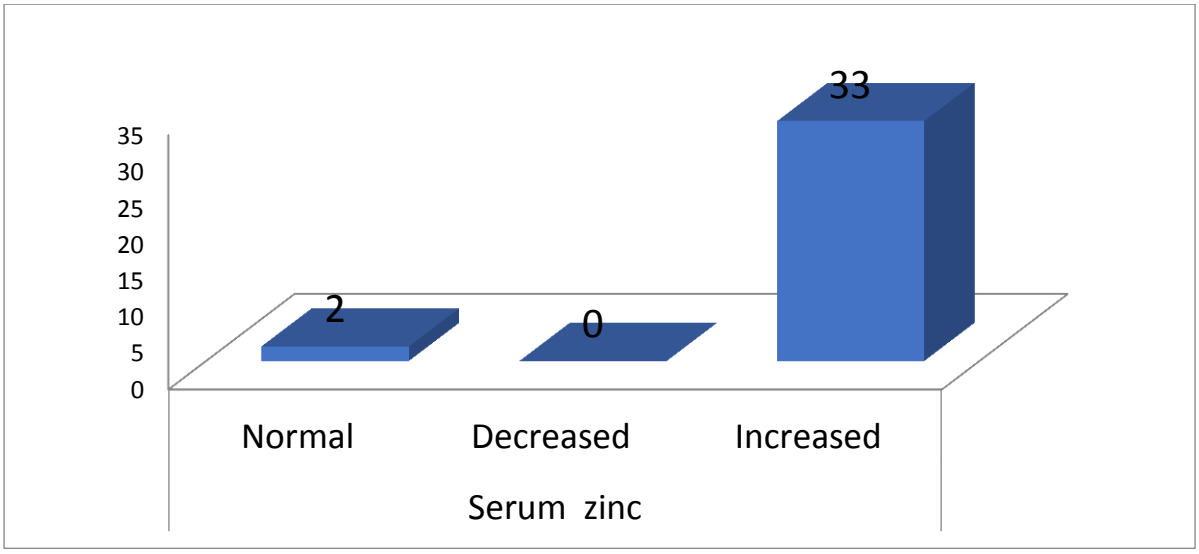

Table 4: distribution of mean and standard deviation of various parameters of cases

S.no	Variable	Mean	Standard deviation
3	FBS	202 mg/dl	104.5 mg/dl
4	PLBS	267.2 mg/dl	118.25 mg/dl

Table 5: distribution of mean and standard deviation of various parameters of control group

S.no	Variable	Mean	Standard deviation
1	FBS	160.45 mg/dl	78.72 mg/dl
2	PLBS	219.97 mg/dl	90.35 mg/dl

TABLE 6: COMPARSION OF SERUM ZINC WITH HbA1C AND MICROALBUMINURIA

PARAMETERS	CASES	CONTROL	P-VALUE
HbA1C	7.823±1.29	5.83±0.53	<0.005

MICROABLUMINURIA IN mg/dl	90.5±63	86.5±62	<0.005

DISCUSSION:

In our study the mean age group of cases was observed to be 55.485 years and the mean age controls was 55 years. Out of 35 cases 12 are males and remaining 23 are females and out of 35 controls 18 are males, females are 17 in number. Among cases ,2 is in between age group of 30-39 years,5 is in age group of 40-49 years ,13 is in age group of 50-59 years,11 is in the age group of 60-69 years and remaining 4 are in the age group of 70-79 years. Among controls ,5 is in between age group of 30-39 years,6 is in age group of 40-49 years ,12 is in age group of 50-59 years,6 is in the age group of 60-69 years and remaining 6 are in the age group of 70-79 years. In a study by Naila et al., on 42 cases and 42 controls the mean age group of study population males is 47.7±9.79 years and mean age group of females is 41±11.55 years and 30.9% are males and 53.3% are females. In their study there is no association between age, gender on serum concentration of zinc and magnesium. In our study 42.85% are males and 57.14% are females and very a smaller number of patients with diabetes in <40 years' age group. In our study also there is no significant correlation between serum zinc and magnesium levels. Therefore, the findings of our study are similar to Naila et al., study. The mean FBS of cases group was observed to be 202 mg/dl with a standard deviation of 104.mg/dl and the mean FBS of control group was observed to be 160.45 mg/dl with the standard deviation of78.72mg/dl.The mean PLBS of cases group was observed to be 267.2 mg/dl with a standard deviation of 118.25 mg/dl and the mean PLBS value of control group was found to be 219.97 mg/dl with a standard deviation of 90.35 mg/dl.The mean HbA1C value of cases is 7.823% with a standard deviation of 1.29% and the mean HbA1C of controls is 5.83% with a standard deviation of 0.53%,p-value is <0.005 which is statistically significant. In a study by Mahmoud Parham et al on effect of zinc supplementation on microalbuminuria in patients with type 2 diabetes mellitus observed that supplementation of zinc caused significant reduction in microalbuminuria. In our study the zinc levels were found to be elevated in both cases and controls but still we observed significant difference in microalbuminuria between cases and controls. In cases urinary albumin excretion was 90.5±63 mg/dl and in control group it is 86.5±62mg/dl, p-value is <.005 which is statistically significant. Serum zinc levels are increased in 33 cases, normal in 1 case and decreased in 1 case, where as in controls serum zinc levels are raised in 33 controls and normal in 2 controls. On comparison of glycaemic indices among cases and controls levels are normal in 10 cases and raised in 25 cases, FBS levels are normal in 13 controls and raised in 22 controls, PLBS levels are normal in 12 cases, increased in 23 cases. PLBS levels are normal in15 controls and raised in 20 controls, HbA1C levels are raised in 32 cases, normal in 3 cases, HbA1C levels are normal in 15 controls and raised in 20 controls. In a study by Dhananjay et al.; observed that zinc has negative correlation with FBS, PPBS, HbA1C but not significant. In our study we didn't observe any association with serum zinc and levels with FBS, PPBS and HbA1C.

CONCLUSION: We observed significant difference in HbA1C levels and microalbuminuria in between cases and controls, but serum zinc levels were elevated in both cases and control groups indicating that in coastal areas there are elevated levels of zinc despite of poor glycaemic control and microalbuminuria is associate with degree of glycaemic control and duration of disease. Further studies are needed to be done to confirm the role of zinc with microalbuminuria and glycaemic control.

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