Original Article

Microalbuminuria in Type 1 Diabetes Mellitus Children

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ABSTRACT

Objective: The basal bolus regimen proved to be the most effective way of controlling glycemic index but unfortunately, its supply is limited in resource-limited and remote areas. Due to poor control of glycemic index, patients face Long-term complications such as renal parenchymal disease. It is therefore most important to do frequent screening of children suffering from type 1 diabetes irrespective of duration of their disease in order to justify care for type 1 diabetes sufferers.

Study Design: Cross-Sectional Study

Place and Duration of Study: This study was conducted at the Arif Memorial Teaching Hospital Lahore on March 2019 to February 2020.

Materials and Methods: At endocrinology clinic, about 40 children suffering from type 1 diabetes mellitus underwent urine albumin creatinine ratio (UAC) after early morning urine submission over span of a 6-months. The resulted ratios obtained were compared between disease duration (< 5 years and > 5 years) and between insulin type regimen types 1 either mixtard or basal bolus. All the children who reported elevated UAC ratio were put on retesting of their levels after a period of 3 months.

Results: About 25 females and 15 male members participated and the mean UAC ratio was calculated to be 125mg/g with a range of 6.00 − 899 mg/g. About fifteen candidates (10 diagnosed with span of less than five years) had value of UAC ratio ≥ 31mg/g alongwith a mean of 195.0. When the UAC ratio repeated for these candidates it came out to be 144.35 mg/g. All the children who were put on mixtard regimen and suffering from diabetes for greater than five years span had higher UAC ratio as compared to candidates who were taking basal bolus regime and had diabetes for less than five years of duration.

Conclusion: Micro albuminuria showed higher prevalence in type 1 diabetes sufferers who were having this disease for span of greater than five years and were put on mixtard régime.

Key Words: Microalbuminuria, Diabetes Mellitus,s Children

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INTRODUCTION

Health care organizations needs attention as far as increase in incidence of diabetes mellitus type 1 is concerned in case of children around the globe, for making system of healthcare better for preventing long term complications related to micro and macro-vascular system[1-3.]

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Due to poor diabetes control, high blood pressure and elevated HbA1c levels, the risk factors affecting micro and macro vascular system increases.[2-4] Kids have better control and monitoring of diabetes as compared to adults due to the fact that they are constantly checked by their parents and it is also proven by the epidemiology of diabetes interventions and complications trial, that with basal bolus regimen, there is decline in risk for complications at macro and micro vascular level[5]. Patients suffering from micro-albuminuria, are bound to check their rental status after every 5 years[5,7], so children should be checked frequently due to poor glycemic control and economic factors.

MATERIALS AND METHODS

Study setting: This case research took place in Arif Memorial Teaching Hospital Lahore on 1st of March 2019 to 15th of February 2020. This case research included all the kids who were suffering from type 1 diabetes. Informed consent was taken from each patient involved in this case research.

Study design: All the children diagnosed with type 1 diabetes mellitus were under study. This cross-sectional study aimed mainly at renal complications due to type 1 diabetes mellitus.

Sample and data collection: All the patients were informed to maintain fast for 8 - 10 hours before coming for checkup of blood glucose levels. The urine sample was taken in morning via with the aid of universal container and secured at low temperature (in ice) before arrival. All the children urine samples underwent Urinalysis in order to rule out any markers for proteins urinary tract infections leucocytes and blood. These urine sample transported immediately to the research laboratory for chemical pathology in ice box in order to extract urine creatinine, urine albumin and urine albumin excretion ratio with the aid of immunoturbidity technology. Moreover, with the aid of the kinetic method, the urine creatinine was extracted via spectrophotometry machine. The formula urine albumin/ urine creatinine was used in order to calculate ratio that was converted into mg/g. By following the standard protocols, patient height, weight, waist and hip was calculated. The CDC USA 2000 reference values were used in order to calculate height for age SDS and weight for age SDS, other variable factors such as socio-economic status of parents, family history, last 6 months HbA1c record, dosage of insulin in last 6 months, frequency of glucose checking and insulin regimen taken by patient (basal bolus or mixtard) were calculated. All those individuals who reported high urine albumin: creatinine ratios were called again after duration of 2 months for repeated testing in order to diagnose renal complications.

RESULTS

Out of 40 children, about 38 gave their informed consent for case research purpose and underwent into research with 90.2% of compliance rate. Out of these 40 candidates, about 10 (25%) males and 30 (75%) were females and the average age 14.96 ± 4.02 of years with a range of 5-18 years. Since these children diagnosed with diabetes mellitus, average duration of diabetes suffering came out to be 2.9 ± 0.44 years with 1- 9 years of range more over it was also noted that 3 candidates had a family history of diabetes mellitus specifically type 2 diabetes. Basal bolus regimen was stated by three candidates a year before in order to save themselves from diabetes complications and to improve HbA1c at optimum levels. The BP both systolic and diastolic was healthy irrespective of their insulin regimen. When the duration of disease was taken into account, then those candidates who were suffering from diabetes within 5 years of duration had lower systolic BP, p = 0.040, but not in case of diastolic BP, p = 0.074. However, no significant difference was observed with respect to mean diastolic and systolic BP of children having or no microalbuminuria, p = 0.954 and 0.401, respectively.

Anthropometry and other clinical features: 0.15 came out to be the average weight for age SDS along with a range of -3.76 to 3.1 and with respect to height, the average height for age SDS came out to be -0.30 along with a range of -3.52 to 3.02. Two candidates had height and weight SDS lesser than - 3, whereas about 3 had more than +3 SDS. The values of SDS with respect to height and weight was same almost between candidates who were suffering from diabetes for <5 years and those who were sufferers for > 5 years. Before the study was conducted, about eighteen (45.0%) candidates were taking basal bolus regimen and about 22 (55.0%) were having mixtard from the past 1 year. Most of the candidates of this research belonged to middle class with respect to socioeconomically, whereas 22(55%), and 14 (35%) belonged to low socioeconomic class and this difference between the socio economic status came out to be significant p = 0.048. Before this case reach was conducted, about 30 (75.0%) children suffering from diabetes for span of below 5 years before the study was conducted. Moreover, there were just 14 (35%) candidates, who used to test their blood glucose thrice a day or more.

Table No.1: Variables

Variable	Mixtard = 25	Basal bolus n =1 5	All = 40	p value
Mean age years	15.1	12.06	14.1	0.01
Duration (<5 years)	18	12	30	0.5.1
Sex of respondents F	20	10	25	
Weight for age	0.17	0.13	0.15	0.97
Height for age	-0.77	0.30	-0.30	0.17
HbA1c %	10.4	11.6	11.2	0.49
Urine albumin mg	3.8	2.9 (1.4)	3.33 (2.4)	0.47
Urine creatinine g	5.9	4.99	6.0	0.72
UAC ratio mg/g	163.1	88.6 (83.0)	123.7(196.9)	0.48

Microalbuminuria: About 32 samples under went into test over the duration of 5-month period, received from the 20 diabetic children. It was estimated that high urine albumin creatinine ratio was identified in about 24(60%) children who were also recalled to repeat test within 6 months of initial test submissions. All those children with elevated UAC ratio and those with healthy levels had no age differences 14.00 and 14. 02 years, p value = 0.901. It was reported that median urine albumin: creatinine ratio was trending higher in the population as compared to cut off for microalbuminuria at 68.15 mg along a very wide range of 6.01 - 900.0 mg/g and mean of 124.01 mg/g.

Duration of diabetes and Microalbuminuria: When comparison was made between group of children with diabetes mellitus for duration of lesser than than five years with those who were suffering from this disease for five years or more, mean UAC ratio calculated came out to be 89.00 mg/g and 232.58mg/g respectively but when the difference was calculated it came out to be, p = 0.488 i.e. not significant. Among Kids who showed raised values of UAC (12), children were whose who was suffering from diabetes mellitus for lesser than five years, and four were suffer for greater than 5 years of duration. The comparison value of mean UAC was not significant in those who were suffering from diabetes for greater than 5 years of span as compared to lesser than five years sufferers 287.71 vs 162.51 p value = 0.60. Even the mean UAC value was not significant even after repeating test after two months of duration, p = 0.97. More over the mean original and repeated ones were almost same. As far as mean age was concerned those who had diabetes for lesser than 5 years of duration and greater than five years was 13.002and 16 fifty years, respectively whereas p value = 0.161

DISCUSSION

It has been recommended by ISPAD and ADA guidelines that micro albuminuria should be screened in children suffering from diabetes type 1 specially after a span of 5 years of their existing disease and further follow-up at 10 years since micro albuminuria occurrence is rare after the establishment of disease.[1] From our case study we found that micro albuminuria, attacked type 1 diabetes sufferers within span of 5 years and same result was reported.[6] In our case research, the incidence of diseases was 60% greater as compared to any research performed[6] and the established countries such as Sweden, Germany[10] and USA, though it must be stated that our sample size was smaller due to smaller number of population. In 2010, a research was performed by Allyne et al.[5] in which he found that about 25% for all tests samples showed elevated urine albumin excretion, and from them further, 315% were isolated whereas 8.99% remained persistent. The decline prevalence of micro albuminuria was also declared by case research done by Svenss on et al.[11] In both case studies done in Sweden, a greater cohort study was performed and their patients were followed up over a span of greater than 15 years unlike to or case research which was less than span of 10 year. Moreover, in our case research, change in status and resources can effect glycemic control. In case of Asia, great UAC ratios in children were been observed by three case researchers and systemic review of all of them showed that it was solely due to poor glycemic maintenance in population.[4, 12, 13]

In case our case research; insulin included most of mixtard insulin with a little dosage of regular insulin. For this denoted insulin, children have to wait for longer duration and sometimes they have to even go without any insulin dosage for a long time. Some children even reduce their standard insulin dosage so that they do not run short before arrival of next dosage. All the children who were put on basal bolus regimen showed better renal function as compared to others as shown by the epidemiology of diabetes interventions and complications and many other case researches. the children were put on basal bolus regimen for year or less than years their regimen changed when they could afford and when their need for glycemic control became mandatory. This regime helps in maintaining their glycemic control as well as maintain the health of their kidneys at optimum level. in this case research no age difference was noted among those with high micro albuminuria levels and those with healthy levels, which may be due to reason that many children in this case research already crossed the 10-year mark done for screening complications resulted due to diabetes. it was also noted that about out of 3 children, two children that were under 10 years had high uac ratio level and moreover their repeat test also gave similar results. hba1c levels in case of all three were high which may be due to poor eating habits and due to fear of suffering from hypoglycemia. due to poor glycemic control t no relationship was found correlation between uac ratio and hba1c levels, similar to other studies.[4, 13, 14]

Maintenance of glycemic index has deep connection with mal nutrition, availability of insulin and its adherence[1, 15.] The children belonging to high society, showed decreasing trends in values of HbA1c when compared with compared to children from low-as well as middle-class society. This point of view was presented by many researchers and it is directly connected to insulin availability, well balanced diet as well as following and sticking to nutritional instructions as well as ability to frequent checking of glucose levels in body[10,16.] In order to have optimum control of blood glucose levels, these children were put on basal bolus insulin regimen[1, 11].

CONCLUSION

The micro albuminuria prevalence and incidence is high in case of children suffering from type 1 diabetes specially who were put on mixtard insulin regime and suffering from diabetes for more 5 years of span. All those children with diabetes type 1, who are unable to receive insulin, are more prone to long term complications related to kidney such as higher risk of micro albuminuria.

Author's Contribution:

Concept & Design of Study:	Sofia Waheed Khan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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