



The Pattern of Presentation and Trends of Childhood Diabetes Mellitus in Port Harcourt, Southern Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author JT designed the study, wrote the protocol and first draft of the manuscript literature search and discussion. Author YI performed the statistical analysis, managed the analysis and literature search. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: To look at the Pattern of presentation trends of childhood DM in Port Harcourt, Southern Nigeria.

Study Design: Retrospective study.

Place and Duration of Study: Department of Paediatrics, Endocrinology unit between April 2009 and April 2014.

Methods: Twenty one patients presented with diabetes mellitus during the study period but only 20 patients had complete data and were studied, 6 males and 14 females, age range 2 years to 17 years. Information on patient biodata, clinical features, treatment and outcome were retrieved from endocrine registers, case files, and clinic and ward records.

Results: Diabetes mellitus in children accounted for 0.35% of total admissions over study period. Mean age of patients at diagnosis was 10.55±4.03. 14(70%) were females. The commonest presenting features were polyuria, polydipsia and weight loss with 14(70%) presenting with Diabetic ketoacidosis (DKA). Mean duration of symptoms was 5.45 weeks with 65% presenting with duration of symptoms less than 30days. 14(67%) of the patients were diagnosed in the rainy

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months April to September. There was positive family history of DM in 14(70%) and 80% of patients were from low socioeconomic class. Only one child was obese. Hospital case fatality rate was 4.8%. All patients were on twice daily mixtard insulin.

Conclusion: This report highlights a reducing number of children are presenting with DKA in our centre. Clinical features have remained easily recognizable symptoms of polyuria, polydipsia which will aid early diagnosis. There is still a high prevalence of DKA in our environment, which is a risk factor for increased mortality amongst our children with diabetes. Hospital fatality is also lower. There is need for creation of more awareness amongst the health workers and the general public on childhood diabetes.

Keywords: Childhood; diabetes mellitus; trend; clinical profile.

1. INTRODUCTION

Diabetes mellitus (DM) is a chronic disease with a public health challenge. There is a global increase in the prevalence and incidence of DM. Worldwide, about 65,000 children less than 15 years of age have type 1 DM and this is increasing at a rate of 3% per year [1]. The incidence of diabetes mellitus varies from country to country with high rates in Finland and low rates in China and Fiji [1,2]. In Africa, survey of published information on DM revealed that childhood DM is not rare and incidence is rising [3]. In Nigeria, prevalence vary from region to region and range from 0.1/1000 in Abakaliki, South-eastern Nigeria, 3.1/1000 in Kano, North-eastern Nigeria and 10.1/1000 in Jos, North central Nigeria [4,5,6]. In an earlier report from this centre, a prevalence of 1.6/1000 was recorded by Anochie et al. [7].

Ninety percent of childhood diabetes is type 1, although the incidence of type 2 is increasing worldwide. The classic symptoms of diabetes mellitus in children are polyuria, polydipsia and weight loss. Diabetic ketoacidosis is seen in about 80% of children at presentation in Africa and is the leading cause of death [8,9].

In Nigeria and most developing countries, diabetes mellitus in children is still a huge burden as most children die before they are diagnosed or are misdiagnosed as other childhood illnesses, which mimic DM. Awareness amongst health workers and the general population about childhood diabetes is still very low and there is need for improved awareness, knowledge, and technological capacity in management.

This study presents the prevalence, clinical profile and trend of childhood diabetes in Port Harcourt, Southern Nigeria.

2. METHODOLOGY

The study was a five years retrospective analysis of all children managed for diabetes mellitus at the Paediatric endocrinology unit of a tertiary centre in Southern Nigeria between April 2009 and April 2014. The hospital is in a cosmopolitan city, and a major oil exploration area in the country with a lot of companies. The hospital serves as a referral centre to most private clinics and secondary health centres in the state and neighbouring states. Ethical approval for this study was given by the ethics and research committee of the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria.

The study included all children aged 0 to 18 years who were managed in the unit with a diagnosis of diabetes mellitus. Information on the patients was retrieved from several sources such as the endocrine register, clinic records, and ward records and from the case notes of patients. Data collected included biodata, family history of diabetes, presenting symptoms and duration of symptoms, laboratory details and treatment. Subjects were divided by time of presentation into two seasons; the rainy season between April and September, and the dry season between October and March. The social class of parents was calculated using the highest educational attainment and occupation of both parents, as recommended by Oyedeji et al. [10]. For the purpose of this report, parents who were in social classes 1 and 2 were considered high, and those in 3, 4 and 5 were considered low.

Diagnosis of diabetes mellitus was made based on the International Society for Paediatric and Adolescent Diabetes (ISPAD) 2009 consensus guideline [11]. Diabetic Ketoacidosis (DKA) is diagnosed in the presence of hyperglycaemia of above 11.1mmol/l, bicarbonate of less than 15mmol/l or arterial blood pH of less than 7.30 with ketonaemia or ketonuria [8].

Data was entered into an excel spread sheet and analysed using Statistical Package for Social Sciences (SPSS) version 20. The World Health Organization (WHO) Anthro plus soft ware version 1.04 was used to determine the weight for age, height for age and BMI for age Z scores for the patients [6]. Descriptive analysis was done, with mean, median and standard deviation calculated from data. A p-value of <0.05 was regarded as statistically significant.

3. RESULTS

Twenty-one patients were diagnosed with diabetes mellitus during the 5 year period, accounting for 0.35% of total admissions. One patient did not have complete data and was excluded from the analysis. The clinical characteristics of the remaining 20 patients are shown in Table 1. There were 14 (70%) females and 6 (30%) males with a male female ratio of 1:2.3. The mean age of the patients at diagnosis was 10.55±4.03 years with a range of 2 - 17 years. Fourteen (67%) of patients were diagnosed in the rainy season. All patients were on twice daily insulin regimen using mixtard after resolution of DKA. There were more patients, 16

(80%) in the lower socioeconomic classes than those in the upper class 4 (20%).

Most children, 13 (65%) presented between ages 10 and 15 years, and family history of diabetes mellitus was positive in 14 (70%) children. Mean duration of symptoms before presentation was 5.45 weeks with 13 (65%) of the children presenting with duration of symptoms of less than 30 days.

There was no statistically significant association between sex or age group and family history of diabetes mellitus as shown in Table 2. Table 3 shows the most common symptoms at presentation were polyuria, polydipsia, fatigue and weight loss. Fourteen (70%) children had diabetic ketoacidosis at presentation. Only 20% of the patients were in coma at presentation. Vaginitis was seen in 6 females and these were mostly teenagers.

Table 4 shows the WHO Z scores for height, weight and BMI. Only 1 patient had a BMI Z score > +2.00 for sex and age. Twelve (60%) of the patients were wasted and 8(40%) were both wasted and stunted.

Table 1. Clinical characteristics of children with diabetes

Characteristics	Male	Female	Mean age years (SD)	Total no (%)
Age group (yrs.)				
<5	1	1	3.0(±1.4)	2 (10)
5 -10	1	3	6.0(±0.96)	4 (20)
10 -15	3	10	12.54(±1.39)	13 (65)
≥ 15	1	0	17 (0.00)	1(5)
Total	6	14	10.5(±4.03)	20(100)
Family History				
Yes	5	9	10.43	14(70%)
No	1	5	11.00	6(30%)
Total	6	14	10.55	20(100)
Duration of symptoms before diagnosis				
< 30days	4	9	9.62	13 (65)
>30days	2	5	12.57	7 (35)
Seasons at diagnosis				
Rainy season	4	11		
Dry season	2	3		

Table 2. Association between sex, age and family history of Diabetes mellitus

	Family history of DM		P value
	Positive	Negative	
Age group (yrs.)			0.074
<5	2	0	
5-10	3	1	
11-15	8	5	
>15	1	0	
Sex			0.232
Male	5	1	
Female	9	5	

Table 3. Frequency of clinical presentation of patients

Presentation	Male	Female	Total (%)
Polyuria	6	14	20(100)
Polydipsia	6	14	20(100)
Fatigue	5	13	18(90)
Weight loss	5	13	18(90)
Polyphagia	3	13	16(80)
Dehydration	1	11	12(60)
Abdominal pain	2	7	9(45)
Vaginitis	0	6	6(30)
Vomiting	1	3	4(20)
Enuresis	0	4	4(20)
Coma	1	3	4(20)
DKA	2	12	14(70)

Table 4. WHO Z Score for height for age, weight for age, BMI score for age

Patients	Sex	Age (yrs)	Ht (cm)	Wt (kg)	HAZ	WAZ	BAZ
1	F	2	91	13.5	+0.41	+0.64	+0.52
2	M	4	114	15	+2.23	-0.84	-3.55
3	F	5	115	18	+1.06	-0.53	-1.85
4	M	6	118	19	+0.41	-0.58	-1.04
5	F	7	139	31	-0.59	-	-0.49
6	F	10	149	37	+0.67	-	-0.25
7	F	10	138	23	-0.97	-	-3.53
8	M	11	141	35	-0.72	-	+0.19
9	M	11	138	37	-1.18	-	+0.82
10	F	13	164.5	56.5	+1.57	-	+0.89
11	F	13	174	74	-1.32	-	-1.13
12	F	14	161	56	+0.24	-	+0.72
13	F	14	153	38	-1.20	-	-1.73
14	F	14	142	35	-2.90	-	-1.23
15	M	14	157	59	-1.46	-	+1.37
16	F	13	163	56	+0.68	-	+0.85
17	F	13	153	30.5	-0.83	-	-3.61
18	F	13	151.4	34	-0.94	-	-2.21
19	F	13	149	38	-1.54	-	-1.05
20	M	17	161	78	-1.92	-	+2.13

HAZ (Height for age Z score), WAZ (weight for age Z score), BAZ (BMI for age Z score)

4. DISCUSSION

This report has shown an increasing prevalence of childhood diabetes mellitus from this centre over the years. In this study, the prevalence of diabetes mellitus is 3.5/1000 which is higher than earlier reports of 1.2/1000 and 1.6/1000 in this centre [7]. Other reported hospital prevalence ranged from 0.1/1000 in Abakaliki, South Eastern Nigeria [4] to 10.1/1000 in Jos, North central Nigeria [6]. However a similar record of 3.1/1000 was reported in Kano, North western Nigeria [5]. The reason for variations in the prevalence from the different regions is not immediately obvious but the fact that they are retrospective studies could pose a limitation due to possibility of

incomplete data. It is also believed that further research will be needed to address this.

The present study has shown that diabetes mellitus is commoner in females, a similar finding to other reports from Nigeria and Africa [3,4,6,12]. Seventy percent of subjects were females, which is also similar to the finding of 68.8% in Abakaliki [4] and 60% in South Africa [12]. The reason for this female preponderance in most studies has been attributed to a genetic susceptibility in females. It has also been noted that autoimmunity, an established pathologic basis of Type 1 diabetes mellitus is commoner in females, though these findings have however not been proven [4].

In children under 15 years of age, the incidence of Type 1 diabetes rises with age, with a higher incidence in the age group between 10-14 years. More than 50% of children in this report were in the age group 10-15 years with a mean age at presentation of 10.55 years, similar to the 11.8 years in an earlier study from this centre [7] and 11.4 years from Abakaliki [4]. However the mean age reported in most studies in Nigeria are much higher than the 6.7 years reported in Omani [13] and Tunisian [3] children. In North America, a bimodal pattern has also been reported, with peak age at presentation at 6 - 8 years and puberty [6]. The difference in mean age at presentation in different populations as highlighted may be due to genetics and environmental differences.

The mean duration of symptoms before presentation in this study did not differ considerably from other reports [4,7]. The mean duration of symptoms in this study was 35 days, which is similar to 36 days reported by Anochie and Opara in an earlier study in this centre [7]. However, some patients had a long duration of symptoms before presentation and this could be attributed to the poor health seeking behaviour, due to low awareness, poverty and strong traditional beliefs prevalent in this area. In some cases, the symptoms were subtle and insidious needing investigation for possible type 2 DM.

The most common presentations of diabetes mellitus in this study are the same as reported in other studies [3,4,6,7,13]. All the children in this report presented with history of polyuria, polydipsia, which are easily recognizable symptoms especially in older children. A good proportion of the children also presented with history of weight loss, which is a common feature of type 1 DM. This was however not the finding by Adeleke et al. [5] in Kano who reported weight loss in only 27% of their patients. Only one subject, a 17-year old male was obese at presentation but the diagnosis of type 2 could not be ruled out as the patient was lost to follow up and he could not afford to do the antibody test as they are not readily available in Nigeria. Samples for these tests have to be sent outside the country, specifically to South Africa and the cost was too high for most of our patients.

The prevalence of diabetic ketoacidosis at presentation in this report was 70%. This finding is lower than an earlier report of 90% by Anochie and Opara [7] in this centre. Other reports from other centres in Nigeria and Africa showed

figures which ranged from 75% to 90% [3,4,5,6]. The rate of DKA at presentation in this study is high when compared to reports from developed countries such as the USA (26%) [14] and Sweden (15%) [15] and also from Arabian countries with rate of between 31 to 55% [13]. However, our report of DKA is similar to that from South Africa with a prevalence of 69.8% [12]. The difference in prevalence of DKA from the various reports could also be due to genetic heterogeneity in different populations, cultural, and environmental factors and levels of awareness of diabetes mellitus in the different regions [12,13].

The family history of diabetes mellitus is an important risk factor for development of diabetes mellitus [13]. Although the type of diabetes in the family was not specifically stated in our subjects, more than half of the children had positive family history in first or second degree relatives similar to the report from Jos [6]. There was however no statistically significant relationship between family history of DM and sex or age group of children reported. This report is however not conclusive as some patients were not sure of the type of disease or cause of deaths in their relations. There is therefore need for a more focused study to establish this relationship.

Eighty percent of our subjects were in the lower socioeconomic classes, which is very high and similar to 82% [7] reported in an earlier study 5 years ago in this centre. Diabetes is an expensive disease to manage, because it requires monitoring of blood glucose levels, regular insulin injections, dietary management for growth and optimal glycaemic control, and prevention of acute and chronic complications. In developing countries, and societies where the population is not under universal health insurance, many patients pay out-of-pocket for their supplies of insulin and tests strips. Without subsidising these materials, the cost is usually overwhelming to the patients. Recommendation for glucose monitoring is at least 3 times daily, preferably before every standard meal, but this is not achievable in many patients. To achieve optimal care for these children, treatment could be made more affordable by providing a scale up of the National Health Insurance scheme by Government to specially accommodate children with diabetes and other chronic diseases. The higher number of children in the low socioeconomic group in this report and in the previous report from this centre may be due to the fact that this is a Government hospital with

subsidised hospital bills which will attract people from mainly low socioeconomic group compared to the people from high socioeconomic group who can afford and use private clinics and / or travel abroad for treatment. The hypothesis that a clean environment may predispose to the occurrence of type 1 diabetes does not support this finding of higher prevalence of type 1 diabetes in children from lower socioeconomic class, however a larger study involving both private and government hospital may be needed to prove this hypothesis in our environment.

The outcome of management of these children was fair with a hospital case fatality rate of 4.8%, which is lower than previous rates of as high as 28.4% from earlier study in this centre [7] and 42.6% from a report in Sudan [3]. The major challenge has been high default rates at clinic follow up and absence of trained medical staff, which was also reported by Ibekwe et al in Abakaliki [4].

Seasonal variation at diagnosis of Type 1 DM in childhood has been considered as an indirect evidence for environmental exposure in development of Type 1 DM [16]. In this report, although majority of the patients were diagnosed in the rainy months, more data is needed from different centres in the country to give a definite picture of the seasonal pattern.

5. CONCLUSION

This report highlights a reducing number of children are presenting with DKA in our centre. Clinical features have remained easily recognizable symptoms of polyuria, polydipsia, which will aid early diagnosis. There is still a high prevalence of DKA in our environment, which is a risk factor for increased mortality amongst our children with diabetes. Hospital fatality rate is lower. There is need for creation of more awareness amongst the health workers and the general public on childhood diabetes to improve outcome.

CONSENT

Patient consent was not applicable in this study, no personal identifying data was given on any patient

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore

been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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