Abstract

Background: There is paucity of literature on childhood diabetes mellitus from developing countries and especially North west Nigeria and this has made it pertinent for documentation of the features of the disease in a major regional referral centre.

The study was designed to describe the clinical presentation and outcome of childhood diabetes mellitus.

Methodology: Retrospective review of hospital records of paediatric patients managed for diabetes at Aminu Kano Teaching Hospital, Kano. Nigeria between January 1999 and December 2006. The age, sex, presenting features, complications, laboratory features and outcome of the patients were retrieved from the hospital records.

Results: During the years under review eleven out of 3,585 admissions were managed for Type 1 diabetes mellitus giving a prevalence rate of 3.1/1000. Male to female ratio was 1:0.6. The mean age at presentation was 10±4.5 years most of the patients (72.7%) belonged to the lower socio-economic classes IV and V. The duration of symptoms ranged from 6-58 days with a mean of 24±22.8 days. The patients presented with urinary tract infections (36.4%), malaria (27.3%) and recurrent boils (18.2%). Three (27.3%) of the patients had polyuria and polydypsia while only one (91%) patient had polyphagia and weight loss. The mean random blood glucose on admission was 28.5±7.9 mmol/L (16.9 39.2 mmol/L). Four patient presented with diabetic ketoacidosis. Two patients (18.2%) were discharged against medical advice while 1 (9.1%) patient died.

Conclusion: Childhood diabetes mellitus remains relatively uncommon in Nigeria.

Keywords: Childhood diabetes mellitus, Northwest Nigeria.

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Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder of multiple aetiologies.1,2 Diabetes mellitus is a complex disorder with profound consequences, both acute and long term for the health of the affected individual and for the lost of health care in society at large.3,4 The classical type 1 diabetes mellitus (TIDM), also known as insulin dependent diabetes mellitus (IDDM) is an autoimmune disease that is increasing in frequency worldwide, most rapidly in children.1 Both genetic and environmental factors play a role in the development of the disease.4,5

It was estimated that about 100,000 children less than 15 years developed TIDM with wide global variations in incidence rates. Incidence rates of 1.9 to 7.0 and 0.13 to 10 per 100,000 per year were reported in Africa and Asia respectively, the incidence rates in Europe, North America and South America respectively were 3.4, 7.61 and 1.27 per 100,000 per year respectively.6 There are scanty data in the incidence, aetiology and outcome of childhood DM from developing countries like Nigeria.7,8

The aim of this study is to review hospital admissions to determine the clinical presentations and outcome of childhood diabetes mellitus in a tertiary hospital in Northwestern Nigeria.

Materials and Methods

The study was conducted at Aminu Kano Teaching Hospital, Kano. This hospital is a major referral centre located in North West Nigeria, providing health care for children in the region. A retrospective review of all children diagnosed with diabetes mellitus between January 1998 and December, 2006 was carried out. Childhood Diabetes mellitus was diagnosed according to the recommendations of the experts committee on the Diagnosis and Classification of Diabetes mellitus.9

Diabetic Ketoacidosis (DKA) was diagnosed using a combination of the following criteria hyperglycaemia > 16.7 mmol/L, serum bicarbonate < 15 mmol/L, glycosuria and Ketonuria. Acute renal failure was also diagnosed from rising levels of serum urea diagnosed from rising levels of serum urea (> 35 mg/dL) and Creatinine (> 1.5 mg/dL). Data retrieved from the case notes of children included age, sex, presenting symptoms, duration of symptoms prior to presentation, presence of complications and out-come of hospitalization. The
Results

Table I summarizes the clinical presentation and complication of all the children that were studied. There were eleven children treated for diabetes mellitus out of a total of 3,585 Paediatric admissions during the period under review, giving a prevalence rate of 3.1 per 1,000. There were seven (63.6%) males and four (36.4%) females giving a male to female ratio of 1:0.6. The mean (±SD) age at presentation was 10± 4.51 years eight (73.7%) of the patients belonged to the lower socio-economic classes IV and V while 2(18.2%) belonged to the middle class (Class III) while the remaining one was from the upper socio-economic background.

Duration of symptoms ranged from 6 - 58 days with a mean ± SD of 24 ± 22.8 days. All the patients presented with infections, urinary tract infections (36.4%), malaria (27.3%) and recurrent boils (18.2%). Only 3(27.3%) of the patients had polyphagia and weight loss. Thirty six percent of the patients had malnutrition, all belong the social class IV and V. There was family history of diabetes in only one patient in social class I, both parents have diabetes. The blood glucose on admission ranged from 16.9 ± 392 mmol/L with a mean of 28.5 ± 7.9 mmol/L all the patients had significant glycosuria with urinary glucose ranging 2 - 3 while four also had Ketonuria.

Table II describes the serum urea and electrolytes profile of the patients at the point of admission.

All the patients had type 1 diabetes mellitus. They were all managed with insulin according to the standard guidelines. The duration of hospitalization ranged between 2 and 21 days with the mean of 14.0 ± 8.5 days. Eight (72.7%) patients were discharged, 2 (18.2%) were discharged against medical advice due to financial constraint and 1(9.1%) died, he had both Diabetes Ketoacidosis and acute renal failure.

Discussion

The present study appears to be the first of childhood diabetes in our region. Our hospital is a major referral centre established over a decade ago. The prevalence rate of 3.1/1000 obtained over period of nine years in the present study suggests that the disease may be uncommon in the population studied. This rate is higher than the 1.2/1000 reported from Port-Harcourt in Southern Nigeria and also 1.6/1000 in Sagamu south west Nigeria. The low prevalence in the present study may be due to the hospital based study. There are many forms of treatment in our region, most of the time, the patients visit the local traditional healers before coming to the hospital. It is not likely the cases are sequestrated in peripheral facilities since such facilities lacked where to manage such cases and therefore should be referred to tertiary hospitals. However, it is not impossible that some of the affected children succumbed to the illness at home out of parental ignorance and high cost of orthodox medical care.

All the patients in our review had type 1 diabetes mellitus. The occurrence of hypoglycaemia, DKA, and infections was also similar to previous reports. There were superficial or invasive infectious in all the children studied, may be explained by the metabolic and hormonal changes that characterize diabetes mellitis with result in immunosuppression.

One of the patients had an unusual presentation presented as a case of severe malaria with cerebral involvement. The basic urine analysis for glucose should be incorporated into the care of acutely ill patient to avoid missed cases of childhood diabetes mellitus. All the patients belong to the lower socio-economic group where the risk of long term malnutrition and endemic infections predisposing to pancreatic diseases and DM later in life may be significantly high.

Table I: Pattern of clinical presentation of Eleven patients with Type 1 Diabetes mellitus

| Subjects | Age | Sex   | SEC | Complication                  |
|----------|-----|-------|-----|-------------------------------|
| I        | 10  | Female| IV   | Diabetes Ketoacidosis (DKA)  |
| II       | 6   | Male  | V    | UTI and Hypoglycaemia        |
| III      | 4   | Male  | IV   | Recurrent boils and hypoglycaemia |
| IV       | 4   | Female| V    | Recurrent boils               |
| V        | 7   | Male  | V    | Malaria, DKA and hypoglycaemia |
| VI       | 5   | Female| IV   | UTI                           |
| VII      | 9   | Female| IV   | UTI, DKA and hypoglycaemia    |
| VIII     | 5   | Male  | III  | Malaria Hypoglycaemia         |
| IX       | 8   | Male  | III  | UTI and Hypoglycaemia         |
| X        | 5   | Male  | IV   | DKA + ARF                     |
| XI       | 6   | Male  | I    | Malaria & Hypoglycaemia       |

Keys:
SEC  =  Socio-economic Class
DKA  =  Diabetic ketoacidosis
UTI  =  Urinary Tract Infection
ARF  =  Acute Renal Failure.

Nigerian Journal of Medicine, Vol.19, No. 2 April - June 2010, ISSN 1115 2613
146
Table II: Pattern of serum urea and electrolytes in 11 patients with Type 1 Diabetes Mellitus

| Serum Electrolytes | Mean ± (SD)mmo/L |
|--------------------|-----------------|
| Potassium          | 3.6 ± 0.6       |
| Sodium             | 123.0 ± 2.6     |
| Bi carbonate       | 11 ± 5.6        |
| Urea               | 43 ± 5.9        |

were only six patients with malnutrition and there were no pancreatic calcifications. Only one of the patients with family history diabetes was seen. However, several factors have been incriminated in development of TIDM.\textsuperscript{17,18}

Diabetes Ketoacidosis was the commonest complication recorded in this present study, this is similar to reports in Tunis,\textsuperscript{17} Sudan\textsuperscript{19} and Sagamu\textsuperscript{17} (southwest Nigeria). This is the cause of death in the only child who died following short course of illness. This highlights the need to pay attention to symptoms and signs which may be suggestive of DKA in acutely ill children.

Three patients signed discharge against medical advice. The parents belonged to the lower socio-economic groups and their management was largely hindered by lack of funds for investigations and drug procurement. Control was difficult culminating in a high rate of premature discharges from hospital care because of uncontrolled diets, irregular supplies and poor storage of insulin due to power outages.

There is a need for frequent laboratory investigations, and regular purchase of expensive drugs, the care of diabetic children may be economically burdensome for families with low incomes. This often leads to poor compliance with management and increase risk of poor out-come.\textsuperscript{19,20} A recent review of the management of TIDM, revealed about 65% of families expenditure is on health.\textsuperscript{19} It is important to provide affordable hospital care for diabetic children in currently advocated by the International Diabetes Foundation.\textsuperscript{21} This will ensure adequate care for affected children and may thus improve the outcome of childhood DM in this part of the world.

References

1. Eisenbarth GS Type 1 diabetes mellitus: a chronic autoimmune disease. N Engl J Med 1986; 314: 1360 8.
2. Alemzadeh R, Wyatt DT. Diabetes mellitus in children In: Behrman RE, kleigman RM, Jenson HB (eds). Nelson Textbook of Paediatrics. 17th ed. Philadelphia: Saunders, 2003; 1947 2
3. Nishikawa T, Edelstien D, Brown lee M. The mission link; a single unifying mechanism for diabetes complications. Kidney Int. 2000: 77: S26 30.
4. Soltész G. Diabetes in the young: a Paediatric and epidemiological perspective. Diabetologia 2003; 46(4) 447 7.
5. Kishiyama CM, Chase HP, Barker JM. Prevention strategies for Type 1 diabetes. Rev. Endocr metab Disord 2006; 7(3): 215 4.
6. Adeghe E, Schattner P, Dunn E. An update on the etiology and epidemiology of Diabetes Mellitus. Ann NY Acad Sci 2006; 1084: 1 20.
7. Anochie I, Nkangimeme KEO. Childhood diabetes in Port-Harcourt, Southern Nigeria. Diabetes International 2002; 12(1): 20 21.
8. Fetuga MB, Ogunlesi TA, Adekani AF, Olanrewaju DM Clinical presentation of childhood mellitus in Olabisi Onabanjo University Hospital, Sagamu. Nig Hosp Pract 2007: I(3), 70 3.
9. Report of the Expert Committee on Diagnosis and classification of Diabetes Mellitus. Diabetes care. 1999; 20(suppl): S5.
10. Wellcome Trust Working Party. Lancet 1970; ii: 302.
11. Oyedji GA, Socio-economic and cultural background of hospitalized children in Ilesa. Nig J Peadtr 1985; 12:111 7.
12. Akanji A, O. Clinical experience with adolescent diabetes in a Nigerian Teaching Hospital. J Natt Med Ass 1996; 88:101 5.
13. Tubiana R. Diagnosis of diabetes mellitus in children Rev Prat 1996; 46(5): 552 5.
14. Valerio D. Acute diabetic abdomen in Childhood Lancet 1976; 1: 66 68.
15. Afoko AO, Ejeh NM, Nwone EN. Prevalence and clinical picture of IDDM in Nigerian Igbo school children. Diabetes care. 1992; 15: 1310 2.
16. Assan R, Assan D, The baut MF. Diabeticogenic tropical pancreatitis. Diabet metab 1998; 14(3): 299 12.
17. Mongalgi MA, el Bez M, Chakroun D. Analytic study of cases of childhood diabetes in paediatric department in Tunis. Ann Pediatric (Paris) 1991, 38: 623 6.
18. Yoon JW, Jun HS. Cellular and molecular pathogenic mechanism of insulin dependent diabetes mellitus. Ann Sci 2001; 928:200 1.
19. Elrayah H, Eltom M. Bedri A. Economic burden on families of childhood type 1 diabetes in urban Sudan. Diabetes Res Clin Pract 2005; 70(2): 159 5
20. Hanson CL, De Gure MJ, Schiskel AM. Erupirical Validation for a family centered model of care. Diabetes care 1998; 18: 1347 6.
21. International Diabetes Foundation. Available at the website HYPERLINK http://www.idf.org assessed on 8th December, 2007.