

Original Research Article

Clinical profile of type 1 diabetes mellitus among children in eastern part of Nepal

Dipak Muktan^{1*}, Lisa Tamang (Ghising)², Rupa Rajbhandari Singh¹

¹Department of Pediatrics, BP Koirala Institute of Health Sciences, Dharan, Nepal

²Department of Emergency, Star Hospital, Lalitpur, Nepal

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*Correspondence:

Dr. Dipak Muktan,

E-mail: deepak.muktan9@gmail.com

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ABSTRACT

Background: The objective of this study is to determine the clinical profile of Type 1 diabetes mellitus (T1DM) among children.

Methods: Descriptive cross sectional study was conducted at B.P. Koirala institute of Health Sciences (BPKIHS), Dharan, Nepal, the eastern part of Nepal. A total of 42 diabetic children of less than 20 years old diagnosed with T1DM were included in the study. Data were collected via semi-structured interviews and medical records of patients attending diabetic clinic at the time of follow up.

Results: The mean age at diagnosis of disease was 11.1±4.9 years. Polyuria 33 (78.6%) was found to be the commonest symptom followed by polydipsia 27 (64.3%), weight loss 23 (54.8%) and polyphagia 13 (30.9%). The mean duration of symptoms before diagnosis was 14.3±9.7 days. DKA was present in 25 (59.5%) children at the time of diagnosis. Mean Glycosylated hemoglobin (HbA1c) value was 10.6±2.7. Obesity was observed in 9 (21.4%) children. Nine (21.4%) children had family history of diabetes. In most of the cases, primary caregiver was mother, among them only 24 (57.2%) had formal education. Almost half of the caregivers were using FRIO, an insulin cooling case, for insulin storage.

Conclusions: Polyuria was the most common presenting symptom followed by polydipsia, weight loss and polyphagia. Moreover, most of the children had landed up in diabetic keto-acidosis (DKA) at the time of diagnosis. Therefore, community awareness programs should be emphasized among parents and primary health care workers especially in rural areas regarding T1DM for early recognition and prompt treatment.

Keywords: Community awareness, Diabetic ketoacidosis, Insulin, Type 1 diabetes mellitus

INTRODUCTION

Type 1 diabetes mellitus (T1DM) is one of the common chronic endocrinal and metabolic disorders affecting more than 8.8% of the total adult population globally characterized by β cell destruction leading to insulin deficiency thereby, causing hyperglycemia.^{1,2} Among the diabetic population, type 2 diabetes mellitus (T2DM) is the most common form and only 10-15% has T1DM.

However, T1DM is the most common form of diabetes in children (<20 years of age) and more than 1.1 million children and adolescent are currently living with this chronic disease globally.¹

The incidence of T1DM is increasing worldwide and it is estimated that more than 100,000 children and adolescent are diagnosed each year.¹ As per the study from European diabetes centers, the annual rate of increase in T1DM

incidence is 2-9%. In addition, the rate of increase is greatest among the youngest children.³

In Nepal, due to lack of awareness of diabetes especially in parents of rural areas; symptoms of diabetes are usually ignored resulting to delayed hospital visit leading to serious complications like Diabetic ketoacidosis. Moreover, primary care physicians may also miss these symptoms when a child presents with other concomitant diseases. Knowledge among parents regarding symptoms of diabetes is important in early recognition of the disease. Although a lot of studies have been carried out so far in many countries regarding T1DM, authors conducted this study in Eastern region of Nepal as there are no any published studies available from this region.

So, this study was carried out to determine the clinical profile of T1DM in children at Pediatric Diabetic Clinic, BPKIHS Hospital, a tertiary care referral centre for Eastern Nepal.

METHODS

Descriptive cross sectional study was conducted at B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal, a referral center for eastern part of Nepal. A total of 42 diabetic children diagnosed with T1DM as per WHO criteria were regularly followed up in Pediatric Diabetic Clinic.⁴ This clinic has been supported by the International Diabetes Federation (IDF), Life for a Child Program since 2013, which provides insulin, glucometer, glucose strips, insulin syringes, education materials etc.⁵ Informed assent was obtained from all the parents of 42 children. Diabetic children (below 20 years of age at diagnosis) were enrolled who were regularly followed up in diabetic clinic as well as newly diagnosed cases until 30/03/2018. Data were collected via semi-structured interviews and medical records of patients attending the diabetic clinics at the time of follow up. Confidentiality was maintained during collection of data.

Modified Kuppuswamy scale was used to assess socioeconomic status.⁶ Blood glucose was measured in a hospital laboratory from venous sample. HbA1c was measured using an automated analyzer (Cobas, Hitachi, Japan).

Statistical analysis

Data were entered in Excel and analyzed by using SPSS version 20. The quantitative variables were presented in the form of mean, standard deviation (SD) and range. Categorical variables were expressed in frequency and percentage. The study proposal was approved by Institutional Research Ethical Committee.

RESULTS

Total 42 children below 20 years of age participated in this study. Among them, 26 (61.9%) were girls and 16

(38.1%) were boys. Most of the children 26 (61.9%) were from rural areas and remaining 16 (38.1%) were from urban areas. The mean age at diagnosis of disease was 11.1±4.9 years. Among them, 29 (69%) were from lower middle socio economic status and remaining were from middle 11(26.2%) and lower socio economic status 2 (4.8%). Nine (21.4%) children had family history of diabetes.

Table 1: Demographic and clinical characteristics of children with type 1 diabetes mellitus.

Parameters	n=42
Age at diagnosis of DM (year), mean±SD, (range)	11.1±4.9, (17 months-21 years)
Residence	n (%)
Rural	26 (61.9%)
Urban	16 (38.1)
Socio-economic status	
Lower middle	29 (69%)
Middle	11(26.2%)
Lower	2 (4.8%)
Presenting complaints	
Polyuria	33 (78.6%)
Polydipsia	27 (64.3%)
Weight loss	23 (54.8%)
Polyphagia	13 (30.9%)
DKA at initial presentation	25 (59.5%)
Duration of symptoms (days), mean±SD	14.3±9.7
Family history DM	9 (21.4%)
Obesity	9 (21.4%)
HbA1c (%), mean±SD	10.6±2.7
Secondary infection at diagnosis	
Vaginal candidiasis	3 (7.1%)
Pneumonia	2 (4.8%)
Urinary tract infection	1 (2.4%)
Primary caregiver	
Mother	22 (52.4%)
Father	8 (19.1%)
Both mother and father	10 (23.8%)
Brother	1 (2.4%)
Sister	1 (2.4%)
Education of caregiver	
Literate	24 (57.2%)
Illiterate	18 (42.8%)
Hypothyroidism	6 (14.3%)
Insulin storage	
FRIO	21 (50%)
Refrigerator	19 (45.2%)
Clay pot	2 (4.8%)
Consumption of Cow's milk in infancy	18 (42.9%)

During presentation in the hospital, polyuria 33 (78.6%) was found to be the commonest symptom followed by polydipsia 27 (64.3%), weight loss 23 (54.8%) and polyphagia 13 (30.9%). The mean duration of symptoms before diagnosis was 14.3±9.7 days. DKA was diagnosed

in 25 (59.5%) children at the time of diagnosis. Mean HbA1c value was 10.6 ± 2.7 . Obesity was observed in 9 (21.4%) children whereas 6 (14.3%) children had secondary infection at the time of diagnosis. Vaginal candidiasis was the commonest infection followed by pneumonia and urinary tract infection. In most of the cases, primary caregiver was mother followed by father and both father and mother. Among primary caregivers, only 24 (57.2%) had formal education and rest did not even know how to read and write. Almost half of the caregivers were using FRIO, a portable insulin cooling case, provided by International Diabetes Federation (IDF), Life for a Child Program while others were using refrigerators and pots made up of mud which is locally available.^{6,7} Clinical characteristics have been shown in Table 1.

DISCUSSION

The incidence of type 1 diabetes is inclining worldwide day by day; however, there is a wide variation in different parts of the world. Thus, some part of the world has higher incidence than others.⁸ In the present study, there was female preponderance 26 (61.9%) which is in concordance with other studies.^{9,10} The mean age of onset of T1DM in present study was 11.1 ± 4.9 years which is similar to study from Ghana (12.6 ± 3.8 years).¹⁰ In contrast, studies from Saudi Arabia (6.8 ± 3.2 years) and Bangladesh (9 ± 3.9 years) reported younger age of onset.^{11,12} Minimum age at the time of diagnosis in present study was 17 months. Mean duration of symptoms before diagnosis was more than two weeks which is comparable to a study from Europe.¹³ Children presenting with DKA was found to be high 25 (59.5%) which is in consistent with studies from 69.8% South Africa and 67% Saudi Arab.^{14,15} However, studies from Tanzania and Nigeria revealed quite high DKA at presentation, 75% and 77.1% respectively.^{16,17} But some of the studies, 17% Egypt, 46.7% Arab countries and 22% Saudi Arab had less prevalence of DKA at presentation.^{11,18,19} The older age at diagnosis and high incidence of DKA in present region is probably due to delay in hospital visit and lack of awareness of diabetic symptoms in parents. The commonest symptom being polyuria 33 (78.6%) followed by polydipsia 27 (64.3%), weight loss 23 (54.8%) and polyphagia 13 (30.9%) which is comparable to other studies.^{11,20}

In present study, family history of diabetes in first degree relative was 9 (21.4%) which is similar to the studies from India (26.4%) and Bangladesh (22.2%).^{12,21} In contrast, studies from Saudi Arab (34%) and Libya (48%) revealed high prevalence of family history of diabetes.^{11,22} Majority of the patients were from rural areas 26 (61.9%). In addition, a study from Finland also showed similar findings.²³ However, some other studies have shown higher incidence of pediatric type 1 diabetes in urban areas.^{24,25} According to Kuppaswamy modified scale, diabetic population from lower middle socio economic status 29 (69%), middle socio economic status

11 (26.2%) and lower socio economic status 2 (4.8%). In contrast to this finding, a study from India showed that majority (66.7%) of patients were from upper lower socio economic status.²¹ These variations may be due to geographical diversity as well as poor access to health care centre. In present set up, being a government health care center, most of the patients belong to lower socio economic status and rural areas. People from good socio economic status and urban areas usually visit private health care facilities. As it is a single center hospital based study, further studies might be needed to explain this variation.

Mean HbA1c at diagnosis in present study was 10.6 ± 2.7 which is comparable to the studies done in Ghana (12.7 ± 1.9), India (9.96 ± 2.6), Saudi Arab (10.4 ± 1.8) and Libya (9.7 ± 2.2 %).^{10,11,21,22} A study from Bangladesh showed high HbA1c 14.49 ± 2.7 .¹² In present study, the primary caregiver was mother 22 (52.4%), father 8 (19.1%), both mother and father 10 (23.8%), sister 1 (2.4%) and brother 1 (2.4%). But only 24 (57.2%) primary caregivers had formal education. All these findings are similar to a study done in Ghana.¹⁰ Nineteen (45.2%) children used refrigerator for insulin storage. Mostly caregivers 21 (50%) were using FRIO, a portable insulin cooling case, provided by International Diabetes Federation (IDF), Life for a Child Program and 2 (4.8%) caregivers were using clay pot evaporative cooling.^{5,7} A study from Ghana revealed that majority of the children had refrigerator for insulin storage.¹⁰ Most of the children were from rural areas where there is no availability of electricity and refrigerator. So, they were provided with FRIO by the center. Hypothyroidism was found to be in 6 (14.3%) children which is similar to a meta-analysis (7-30%).²⁶ However, some other studies reported much lower prevalence (3-8%, 9.6%) of hypothyroidism in type 1 Diabetes.^{27,28} This difference in prevalence could be due to a variation in study design including cut-off levels. Cow's milk is regarded as a triggering factor for the development of type 1 diabetes.^{29,30} In present study, 18 (42.9%) children were fed with cow's milk during infancy who developed diabetes later on as there is a tradition of giving cow's milk to infants in present scenario.

As it is a cross sectional study and is carried out in a tertiary care centre of eastern Nepal with small sample size, these findings cannot be generalized to all pediatric diabetic population of the country. Multicenter large studies or population based longitudinal studies are necessary to describe the characteristics of pediatric diabetes of the country. Measurement of C-peptide is necessary for classification of diabetic patients, rather than relying only on clinical presentations. However, this might not always be feasible in present set up.

CONCLUSION

Polyuria was the most common presenting symptom followed by polydipsia, weight loss and polyphagia.

Majority of children had landed up in diabetic ketoacidosis. Community awareness programs among parents, children and primary health care workers especially in rural areas regarding T1DM should be conducted for early recognition of the disease in order to avoid life threatening complications like diabetic ketoacidosis.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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