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Original Research Article

Control in Type 1 Diabetic Children and Adolescents Attending Endocrine Clinic of Pediatric/ Medicine Department at Tertiary Care Center in Western India

Mital M Gover[1], Deval Surana[2], Hiteshee Patel[3]

[1]Senior Resident Doctor, Department of Paediatrics, SMIMER, Surat
[2]Doctor & Ex Medical Student, SMIMER, Surat
[3]Junior Resident Doctor, Department of Paediatrics, SMIMER, Surat

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Corresponding Author: Dr. Mital M Gover
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Abstract:

Background: Type 1 diabetes is one of the common endocrine diseases among pediatric and adolescent population. The present study was intended to study the glycemic control among pediatric and adolescent population attending endocrine clinic of pediatric /medicine department at tertiary care center in western India.

Materials and Methods: A cross - sectional observation study was carried out over period of 3 months at pediatric and medicine outpatient clinic of tertiary care center. A total of 34 patients were registered Data on age, sex, duration of Illness, associated comorbidities, antidiabetic regimen, and HbA1c levels were obtained.

Results: A total of 34 patients were enrolled; 61.7% were females. Data showed moderately positive correlation between age and HbA1C level ($r = 0.5543$, $p = 0.00068$). Mean HbA1C level were low in age group less than 6 years and increase in mean values of HbA1C noted as age increases with a statistical significance. No statistical significance was noted between gender and type of insulin regime with HbA1C level.

Conclusion: Patients with T1DM had poor glycemic control with mean HbA1c level of 11.35 ± 2.1 at our center. Older age group and duration of disease were significantly associated with poor control. Further work addressing the factors associated with poor glycemic control is required.

Keywords: Type 1 diabetes, pediatric/adolescent, HbA1c, Glycaemic Control.

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Introduction

Type 1 Diabetes Mellitus (T1DM) is the most common endocrine disorder in children and adolescents worldwide. [1]. Most cases are due to autoimmune destruction of pancreatic beta cells. Its incidence varies in different countries being highest in Scandinavian countries and lowest in Japan. In India incidence of T1DM is reported as 10.5/year/100000 patients. [2]

T1DM is a chronic disease associated with microvascular and macrovascular complication like retinopathy, nephropathy, neuropathy. [3,4,5] Adequate glycemic control can slow down the development of these complications. [3,6]. Measurement of HbA1C is considered the gold standard for glycemic control in diabetic patients. [7].

Maintaining HbA1C level below 7.5% is recommended by the International Society for Pediatric and Adolescent Diabetes in children and adolescents. [3,8]. However, achieving adequate glycemic control in T1DM is always challenging. Evaluation of T1DM children of their HbA1C level and thus reflecting their glycemic control is important to know the effectiveness of therapy or the need for other interventions. So this study was planned to determine the degree of glycemic control in children and adolescents having T1DM.

Methods

Study design & setting: A cross - sectional observation study was carried out over period of 3 month at pediatric and medicine outpatient clinic of tertiary care center. Children and adolescents who were diagnosed with T1DM and attending endocrine clinic of tertiary care center were included in the study. An informed consent was taken from parent of patient and approval from institution ethical committee was taken.

Data collection: Socio demographic details like Age, gender, family income were collected. Clinical data like age at diagnosis of T1DM, duration of disease, dose and type of insulin regime and any associated diseases were recorded. HbA1C level were measured for each patient at the time of

enrollment. For this study purpose HbA1c level < 8% was considered adequate glycemic control, 8% - 10% as partial control and more than 10% as poor control.

Statistical analysis: Data were entered in Microsoft Excel sheet and were analysed using Open Epi online software. Qualitative data were expressed in frequency and percentage. Quantitative data were expressed in mean and standard deviation. Pearson's Chi- Square test was used for association between categorical variable. An Independent student't' test or Annova test was to compare quantitative data. Correlation between quantitative parameter was done using the Pearson correlation test. Level of significance was set at p value < 0.005.

Results

Table 1: Study group characteristic (N=34)

Characteristic	Frequency n(%)
Gender	
Male	13(38.2%)
Female	21(61.7%)
Age at diagnosis (in years)	
<6	18 (%)
6-11	11 (%)
12-17	5(%)
Mean ± SD	6.67±3.54
HbA1c level (%)	
<8	0
8-10	10 (30%)
>10	24 (70%)
Mean ± SD	11.35 ± 2.1
Duration of illness mean (SD)	3.7 ± 3.277

A total of 34 patients visited the endocrine clinic during three month period and were recruited in study. Mean age of study group was 6.67(3.54) and male: female ratio was 1:1.61. The mean duration of illness was 3.7 (3.54).

The mean HbA1C level was 11.35 (2.1). (Table 1). We found moderately positive correlation between age and HbA1C level (r = 0.5543, p =0.00068). Mean HbA1C level were low in age group less than 6 years and increase in mean values of HbA1C noted as age increases with a statistical significance. We didn't find statistical significance between gender and type of insulin regime with HbA1C level. (Table 2,3 & 4)

Table 2: HbA1c level and duration of disease among children with type1 diabetes by age group (in years):

Variable	<6 years Mean ±SD (n = 18)	6-11years Mean ±SD (n = 11)	12-17 years Mean±SD (n = 5)	p-value
Duration of disease (in years)	1.7±1.79	3.44±1.87	5.2 ± 3.99	0.03
HbA1c mean (S.D.)	10.56 ± 1.07	11.2 ± 1.87	12.76 ± 2.43	0.042

Table 3: HbA1c level in children with type1 diabetes disease by duration & gender:

Parameter	Males (n =13) Mean ± SD	Females (n =21) Mean ± SD	p-value
HbA1c	11.06±1.74	11.53± 2.31	0.29
Duration of disease (in years)	2.26 ±1.34	4.59 ± 3.8	0.04

Table 4: Comparison of HbA1c level of children with type 1 diabetes by drug used for treatment of diabetes

parameter	NPH (n = 14) Mean ± SD	Glargine (n=20) Mean ± SD	p-value
HbA1C mean (S.D.)	12.12 ±1.91	10.8± 2.09	0.06

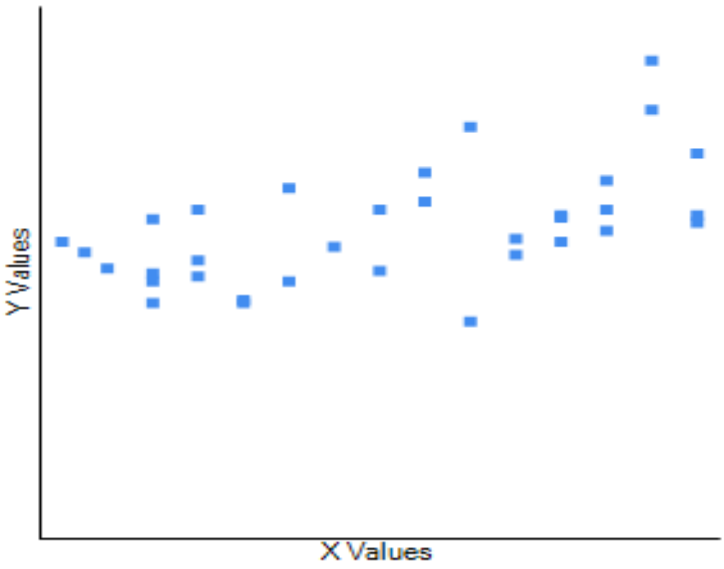

Figure 1: Correlation of age and HbA1c level (x = age, y = HbA1c level)

Discussion

Maintaining adequate glycemic control is important in preventing long term complication in patients with T1DM. Indian data regarding incidence and level of glycemic control of T1DM are limited. [2]. Our study focused on degree of glycemic control in children and adolescents attending endocrine clinic at our hospital.

The mean HbA1c level of our study group was 11.35 ± 2.1. Out of 34 patients 30% had HbA1c level between 8% to 10% and 70% had their level above 10%. None of our patient had HbA1c level below 8%, a parameter suggestive of adequate glycemic control. Our data are comparable to African study where mean HbA1c was found to be as high as 12.5%. [7,9,10]. Alassaf et al and Thomas Ngwiri et al found 80% and 70% of patients having inadequate glycemic control respectively in their study.[1,3]. In contrast to these data from western countries showed mean HbA1c level between 7.8% to >9.3%. [11,12,13]. the better control in these countries may be due to more prosperous economy and better access to healthcare.

We found moderately positive, statistically significant correlation between patient's age and mean HbA1c level which is comparable with other studies. [7,11,12,13].Higher mean HbA1c level in adolescent age group may be due to hormonal changes taking place during puberty. Lack of supervision, erratic dietary habits, and emotional changes could be the other factors responsible for higher HbA1c level in this age group. We found significant association between duration of disease and mean HbA1c level. Patients with longer disease duration showed higher values. This finding is comparable to the observation made by Alasheel et al. [7,]. Earlier age of onset was a poor predictor of glycemic control in Ethiopian children. [14]. Our study didn't find any association with gender and HbA1c level which is similar to the finding noted by Thomas Ngwiri et al and Alassaf et al. [1, 3]. However few studies observed poor glycemic control in females as compared to males. [15,16] Comparable to other studies we didn't find significant association between type of insulin regime and glycemic control. [1,7]. Though DCCT study [17] established improved control with multiple insulin dose injections, several other clinical and psychosocial factors were identified in achieving glycemic control in T1DM by Schmidt S et al. [18].

Our study has limitation of small number of patients and single value observation. However the data reflected poor control in our study cohort. We didn't address role of non-pharmacological measures like physical exercise; dietary habits; parental / caregiver education and / or socio economic dynamics in achieving adequate glycemic control. This study provides a baseline for future work looking into factors associated with poor glycemic control.

Conclusion

Patients with T1DM had poor glycemic control with mean HbA1c level of 11.35 ± 2.1 at our center. Older age group and duration of disease were significantly associated with poor control. Further work addressing the factors associated with poor glycemic control is required.

References

1. Thomas Ngwiri, Fred Were, Barbara Predieri, Paul Ngugi, Lorenzo Iughetti, "Glycemic Control in Kenyan Children and Adolescents with

Type 1 Diabetes Mellitus", International Journal of Endocrinology, vol. 2015, Article ID 761759, 7 pages, 2015.
2. Meena desai, PSN Menon, Vijayalakshmi bhatia. Paediatric Endocrine Disorders 3rd edition, chapter 12 page 319 – 354
3. Alassaf A, Odeh R, Gharaibeh L, Ibrahim S, Ajlouni K. Impact of Socioeconomic Characteristics on Metabolic Control in Children with Type 1 Diabetes in a Developing Country. J Clin Res Pediatr Endocrinol. 2019 Nov 22; 11(4):358-365.
4. Brink SJ. Complications of pediatric and adolescent type 1 diabetes mellitus. Curr Diab Rep. 2001; 1:47–55.
5. Virk SA, Donaghue KC, Wong TY, Craig ME. Interventions for Diabetic Retinopathy in Type 1 Diabetes: Systematic Review and Meta-Analysis. Am J Ophthalmol. 2015; 160:1055–1064.
6. Svensson M, Eriksson JW, Dahlquist G. Early glycemic control, age at onset, and development of microvascular complications in childhood-onset type 1 diabetes: a population-based study in northern Sweden. Diabetes Care. 2004; 27:955–962.
7. Alsaheel AY, Alayed SI, Alotaibi YM, Alfahhad AA, Alothman CM, Alnefaie HF> Mean glycolated haemoglobin in children with type 1 diabetes at King Fahad Medical City, Riyadh, Saudi Arabia. J Fam Community Med. 2020; 27: 163 -7.
8. Rewers MJ, Pillay K, de Beaufort C, Craig ME, Hanas R, Acerini CL, Maahs DM; International Society for Pediatric and Adolescent Diabetes. ISPAD Clinical Practice Consensus Guidelines 2014. Assessment and monitoring of glycemic control in children and adolescents with diabetes. Pediatr Diabetes. 2014;15(Suppl 20):102–114.
9. Elbagir MN, Eltom MA, Mahadi EO, Berne C. Pattern of long-term complications in Sudanese insulin-treated diabetic patients. Diabetes Res Clin Pract. 1995 Oct; 30(1):59-67.
10. Onyemelukwe GC, Isah HS, Mba EC, Awunnor-Renner C, Mohammed I. Glycosylated haemoglobin (HbA1) for diabetic control in Africans; preliminary findings with the microcolumn technique. Trop Geogr Med. 1983 Dec; 35(4):347-51.
11. Pound N, Sturrock ND, Jeffcoate WJ. Age related changes in glycated haemoglobin in patients with insulin-dependent diabetes mellitus. Diabet Med. 1996 Jun; 13(6):510-3.
12. Alam U, Asghar O, Azmi S, Malik RA. General aspects of diabetes mellitus. Handb Clin Neurol. 2014; 126:211-22.
13. Gerstl, EM., Rabl, W., Rosenbauer, J. et al. Metabolic control as reflectet by HbA1c in children, adolescents and young adults with type-1 diabetes mellitus: combined longitudinal analysis including 27,035 patients from 207 centers in Germany and Austria during the last decade. Eur J Pediatr. 2008; 167: 447–453.
14. A Gebre- Yohannes and S.I. Rahlenbeck. Glycemic control and its determinants in diabetic patients in Ethiopia. Diabetes research and clinical practice.1997; 35 (2,3): 129 -134.
15. Majaliwa ES, Munubhi E, Ramaiya K, Mpembeni R, Sanyiwa A, Mohn A, Chiarelli F. Survey on acute and chronic complications in children and adolescents with type 1 diabetes at Muhimbili National Hospital in Dar es Salaam, Tanzania. Diabetes Care. 2007 Sep; 30(9):2187-92.
16. Mortensen HB, Robertson KJ, Aanstoot HJ, Danne T, Holl RW, Hougaard P et al. Insulin management and metabolic control of type 1 diabetes mellitus in childhood and adolescence in 18 countries. Hvidøre Study Group on Childhood Diabetes. Diabet Med. 1998 Sep; 15(9):752-9.
17. Nathan DM; DCCT/EDIC Research Group. The diabetes control and complications trial/epidemiology of diabetes interventions and complications study at 30 years: overview. Diabetes Care. 2014; 37(1):9-16.
18. Schmidt S, Madsen KP, Pedersen-Bjergaard U, Rytter K, Hommel E, Cleal B, Willaing I, Andersen HU, Nørgaard K. Associations between clinical and psychosocial factors and HbA1c in adult insulin pump users with type 1 diabetes. Acta Diabetol. 2023 Aug; 60(8):1089-1097.