A Survey of Diabetes Mellitus in a Sample of Children below 15 Years Attending Child Welfare Hospital

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الخلاصـة:

الهدف: تحديد عمر وجنس الأطفال ما دون الخامسة عشر من العمر المصابين بالسكّري وإيجاد العوامل المصاحبة للمرض كعوامل مـساعدة للإصابة.

المنهجيّـة: دراسة مقطعيّة أجريت في عيادة مرضى السكري في مستشفى حماية الأطفال التعليمي في بغداد خـلال العـام ٢٠٠٦. شـملت العينة الأطفال دون سن الخامسة عشر والذين يعانون من داء السكري. أخذت البيانات من بطاقات مراجعة المرضى فضلا عن مقابلة مباشـرة مع ذوي المرضى. تضمّنت المعلومات عمر وجنس المريض، التاريخ المرضي للمريض عائلته فيما يخصّ وجود أمـراض المناعـة الذاتيـة والسكري في أشخاص آخرين ضمن الأسرة.

النتائـج: أظهرت نتائج البحث توزع المرض بالتساوي للفئات العمرية الثلاث (٥-١، ٦-١٠، ١١-١٥) سنة وبمعدل (٣٣%) لكل فئة. كما أظهرت النتائج زيادة في نسبة إصابة الإناث (٦٦%) عن الذكور. كانت هناك بداية مبكرة للمرض لدى المرضى وخصوصاً للفئة العمرية (١-٣) سنة بنسبة (٣٢%) تليها الفئة العمرية (٤-٦ سنة) بنسبة (٣٠%). بلغت نسبة الإصابة بمرض فيروسي لدى المرضى قبل ظهور السكري (٢٤%) ونسبة وجود أفراد آخرين مصابين بنفس المرض هي (٢٣%)، أمّا وجود أفراد مصابين بمرض المناعة الذاتية فكانت النسبة (١٣%). كان وزن المرضى لدى زيارتهم الأولى للعيادة اقل من (٥٠%) حيث أنّ (٤٢%) منهم كانوا ضمن نسبة (٢٥%)، و(٤%) فقط من العينة كانت أوزانهم بحدود ال(٧٥%).

التوصيات: التثقيف الصحي للناس عن المرض فضلا عن توفير مراكز صحية قريبة لتوفير التشخيص المبكر ومادة الأنسولين بصورة مستمرة.

Abstract:

Objectives: Determine the age and gender distribution of children who experience diabetes mellitus (DM) under the age of 15 years and the presence of some associated factors that might be a predisposing factor for the disease including obesity.

Methodology: A cross-sectional study was conducted at diabetic clinic in Children Welfare Teaching Hospital in Baghdad City during 2006. The study sample included diabetic children less than 15 years of age. Data were taken from the patients' record and by direct interview with the patients' parents. Information included demographic data, as well as past history of the patient and his/her family relative to diabetes and other immune diseases.

Results: Data analysis showed that there was an equal distribution of patients among the three age groups (1-5, 6-10-, and 11-15 years) in a rate of 33% for each. Females had higher incidence rate (66%) than males. Onset of the disease was mostly at age group 1-3 years (32%) followed by age group 4-6 years (30%). History of viral illness was present in 24% of patients and a positive family history of DM was found in 23% of them, and a family history of autoimmune disease was positive in 13% of cases. Body weight at the first visit to the clinic was mainly below the 50th percentile (42% within the 25th percentile) and only 4% of patients had a body weight within the 75th percentile.

Recommendations: Health education about the disease and provision of health centers those are easily accessible for early diagnosis and treatment and uninterrupted insulin supply.

Key words: Diabetes Mellitus, Children

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Introduction:

Diabetes is the most common pediatric endocrine disorder, affecting approximately 1 in 500 children under 18 years of age. The annual incidence in children ranges from a high of 30:100,000 among Scandinavian population to a low of 1:100,000 in Japan [1]. In several clinic-based studies, the percentages of children with newly diagnosed with type II diabetes had increased from less than 5% before 1994 to 30-50% in subsequent years [2]. This increase in incidence is because 10-15% of children are overweight nowadays which is twofold the number of two decades age [3, 4].

Diabetes is one of the main causes of death in most of developed countries. Both types of diabetes I and II are spreading across the globe at an alarming rate, driving the condition to become one of the most challenging health problems of the 21st Century [5]. Type I diabetes is due to destruction of insulin-secreting islet cells. Both genetic and environmental factors cause type I diabetes and environmental events can operate very early, even in- utero. The early induction of diabetes-associated auto-antibodies and the long pre-diabetic period means that autoimmune diabetes in children can be predicted by detecting these auto-antibodies [6].

The insult is either a viral infection, especially with multiple exposures that might speed up the onset of diabetes in children [7], or antibodies to bovine milk in children exposed to cow's milk before the age of 2 years [1].

This study aims to find out the age and gender distribution of diabetic children between the age of 1-15 years and the presence of some associated factors that might play a predisposing factor for the disease including obesity.

Methodology:

A cross-sectional study was conducted in the diabetic clinic in Children Welfare Teaching Hospital in Baghdad City during the year 2006. The study sample included diabetic children less than 15 years of age (they were already diagnosed by pediatrician as having DM type I and are receiving insulin therapy). Data were taken from the statistical records of the clinic, as well as by face to face interview with one of the patient's parents which included demographic and clinical data such as age, gender, time of onset of the disease, past history of viral infection, history of diabetes in the family, and the presence of a member in the family with an autoimmune disease (including hypothyroidism, rheumatoid arthritis, allergy and celiac disease) were obtained from records as documented by the physicians). Weight and height at the time of the first visit to the center was obtained from the archive. Assessment of the nutritional status depended on the percentile of weight/height indices compared to the NCHS/CDC/WHO sex combined references (1982), expressed as percentage of the median. Sample size was 100 patients.

Results:

Table 1. Distribution of the sample according to the age and gender

Age group (years)	Male		Female		Total
	Frequency	Percent	Frequency	Percent	
1-5	16	47	17	25.7	33
6-10	9	26.5	25	37.9	34
11-15	9	26.5	24	36.4	33
Total	34	100	66	100	100

This table shows that the three age groups were almost equally distributed (33%, 34% and 33%), while it was found that a higher incidence among age group 10-14years [8]. Females had a higher frequency rate (66%) than males. This agrees with the findings of a study which showed that type I diabetes mellitus in children has a higher incidence rate among females unlike that in adults who had a higher incidence rate among males starting from the age of 24 years [9]. The incidence rate was higher in males in another study conducted in Crete Island [10].

Table 2. Distribution of the sample according to the onset of illness

Onset of illness (years)	Male	Percent	Female	Percent	Total
1-3	13	37.1	19	29.2	32
4-6	11	31.4	19	29.2	30
7-9	3	8.6	8	12.4	11
10-13	7	22.9	20	29.2	27
Total	34	100	66	100	100
Mean age: 6.2 years S.D= 3.6					

Table (2) shows that the disease onset in males is in highest rate (37.1%) at age group of 1-3 years, followed by the 4-6 years age group in a rate of 31.4%. The lowest rate was at age group 7-9 years in a rate of 8.6%. In females, the onset was equally distributed between the ages of 1-3, 4-6 and 10-13 years in a rate of 29.2%, while as in males, the age group 7-9 years had the lowest rate (12.4%). The mean age of onset of diabetes in this study was 6.2 year which is an early age of onset of the disease compared to findings in other studies that found out that the mean age of onset is 16 years [11]. This difference might be due to higher rate of enterovirus infection in our children (evident by high incidence rate of diarrheal diseases in Iraqi children) and hence inducing beta-cell autoimmunity with increased genetic susceptibility to type I diabetes [12].

Table 3. Distribution of the sample according to the presence of a positive past history

Positive history of:	Male (no.34)		Female (no.66)		Total (no.100)
	frequency	Percent	frequency	Percent	
Viral illness	8	23.5	16	24.2	24
Family history of DM	10	29.4	13	19.7	23
History of Autoimmune diseases in first degree relatives	4	11.8	9	13.7	13
No past history	12	35.3	28	42.4	40

Table (3) shows that 24 patients with diabetes mellitus had a positive history of viral illness prior to the development of diabetes which agrees with a study which showed that a viral infection, especially multiple exposures might speed up the onset of diabetes in children [7]. This table shows that 23 patients of the sample had diabetic members of the family which coincide with findings of a study which showed that type I diabetes is related to genetic and environmental factors [6], also another study had found that there is a high association of the incidence of the disease (odd ratio=4.04) with a family history of either type I or II diabetes [13]. Family history of autoimmune diseases was present in 13% of the sample which agrees with the fact that there is an association between type I diabetes and a history of autoimmune diseases in the family [14].

Table 4. Distribution of the sample according to weight percentile on diagnosis

Percentile	Male		Female		Total
	Frequency	Percent	Frequency	Percent	
10th	5	14.7	8	12.1	13
25th	12	35.3	30	45.5	42
30th	8	23.5	14	21.2	22
50th	7	20.6	12	18.2	19
75th	2	5.9	2	3	4
Total	34	100	66	100	100

Table 4 illustrates weight percentile which is measured on the first visit to the diabetic clinic. It shows that 42% of the patients was of the 25^{t} percentile and 22% of the 30th percentile, while the patients in the 75th percentile was only 4%. These findings showed that most of the patients had lower percentile than the average standards and only 4% of them was in 75% percentile which indicates that these patients suffered malnutrition either as poor nutritional status or late diagnosis of the disease that caused this under nutrition. Also, these findings indicate that diabetic children in the studied sample do not suffer from obesity induced type II diabetes that is starting to threaten the developed countries [4].

As a conclusion; results of this study showed that diabetes mellitus is distributed equally in age groups of children below the age of 15 and that females had a higher incidence rate than males, age of onset was higher among the younger age group. Past history of viral disease and a family history of diabetes and autoimmune disease were present in less than one third of the sample. The patients in the studied sample did not suffer from obesity and a high percentage of them were underweight.

Recommendations:

Based on the above findings researchers recommend the followings:
1. Health education of people about diabetes mellitus in children so as to enable them to recognize the symptoms in their children early and seek medical help.
2. Improve diagnosis, care and treatment of diabetes; by establishing diabetic centers accessible to the whole community
3. Continuous provision of insulin that is affordable

References:

1. Behrman R. and Kliegman, R.: **Diabetes Mellitus in**: Nelson Essentials of Pediatrics 4th ed. W.B. Saunders Company, 2002, P.P. 752-66.

2. Kaufman, F.: Type II Diabetes Mellitus in Children and Youth; A New Epidemic. **J. Pediatr Endocrinol Metab**. 15 suppl, 2002, 2: P.P. 737-44.

3. Ogden, C.; Flegal, K.; Carrol, M. and Johnson, C.: Prevalence and Trends: An Over Weight among US Children and Adolescents 1999-2000. **JAMA**, 2000, 288 (14): P.P. 1728-32.

4. Kiess, W.; Bottner, A.; Raile, K.; Kapellen, T.; Muller, G.; Galler, A. and others: Type II Diabetes Mellitus in Children and Adolescents: A Review from a European Perspective. **Horm-Res**. 2003, 59, (1): P.P. 77-84

5. Lefebvre, P. and Pierson, A.: The Global Challenge of Diabetes. **World-Hosp-Health-Serv**; 2004, 40(3): P.P. 37-40,42.

6. Leslie, R.: Preventing Type I Diabetes Mellitus: Hype and Hope. **Clin-Med**. 2004, 4(5): P.P. 442-6

7. Altobelli, E.; Petrocelli, R.; Verrotti, A. and Valenti, M.: A Population-based Case-control Study. **Eur-J-Epidemiol**. 2003, 18(5): P.P. 425-30

8. Michalkova, D.; Minarik, P.; Hlava, P.; Camajova, J. and Nazarov, V. Trends in the Incidence of Childhood-onset Type 1 Diabetes in Slovakia 1985 - 2000. **Cent-Eur-J-Public-Health**. 2004, 12(2): P.P. 75-7

9. Kyvik, K.; Nystrom, L.; Gorus, F.; Songini, M.; Oestman, J.; Castell, C. and others: The Epidemiology of Type I Diabetes Mellitus Is Not the Same in Young Adults As in Children. **Diabetologia**. 2004, 47(3): P.P. 377-84

10. Mamoulakis, D.; Galanakis, E.; Bicouvarakis, S.; Paraskakis, E. and Sbyrakis, S.: Epidemiology of Childhood Type I Diabetes in Crete, 1990-2001. **Acta-Paediatr**. 2003, 92(6): P.P. 737-9

11. De-Luis, D.; Alonso-F.; Gonzalez, M.; Aller, R.; Izaola, O.; Martin, J. and others: Descriptive Study of Onset Diabetes Mellitus Type I Patients and First Degree Families. **An-Med-Interna**. 2004, 21(8): P.P. 378-81

12. Sadeharju, K.; Hamalainen, A.; Knip, M.; Lonnrot, M.; Koskela, P.; Virtanen, S. AND Others: Enterovirus Infections as a Risk Factor for Type I Diabetes: Virus Analyses in a Dietary Intervention Trial. **Clin-Exp-Immunol**. 2003, 132(2): P.P. 271-7

13. Sipetic, S.; Vlajinac, H.; Kocev, N.; Marinkovic, J.; Radmanovic, S.; Denic, L.: Family History and Risk of Type 1 Diabetes Mellitus. **Acta-Diabetol.** 2002, 39(3): P.P.111-5

14. Karlsson, F.; Ernerudh, J.; Ludvigsson, J.: Cytokine profile in Children During the First 3 Months after the Diagnosis of Type 1 Diabetes. **Scand-J-Immunol.** 2004, 59(5): P.P. 517-26