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RISK FACTORS FOR TYPE ONE DIABETES MELLITUS AMONG CHILDREN IN MOSUL CITY

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ABSTRACT

Background: Type 1 Diabetes Mellitus is one of the autoimmune diseases that are triggered by many environmental factors and have a genetic component, it is frequently diagnosed in children worldwide. The full extent of these effects is still unknown. Understanding the environmental elements that contribute to type 1 diabetes mellitus; can aid in disease prevention, control, and cost-effective treatment. **Objectives:** To investigate the risk factors of type I diabetes among children less than 14 years of both genders in Mosul city. **Methods:** This is case control study**,** included 200 randomly selected patients, of them 100 patients had diagnosed with type I DM (case group) and another 100 one, in the same age group, in whom evaluation proved not to have type I diabetes mellitus (control group). The study conducted from September 1st, 2023, to March 1st, 2024. The questionnaire composed from four parts; part one for sociodemographic information of the study participants. Part two for family history of autoimmune diseases like, Hashimoto thyroiditis, Addison disease and pernicious anemia. Part three for type of feeding during the first year of life whether exclusively breast feeding, bottle or mixed feeding. Part four for history of major events one year before diagnosis of disease such as viral illnesses, stressful events which also include accident and surgery. **Results:** The mean age of the study participants are 5.31 ± 3.27 years. It's evident diabetes type I is more prevalent among those aged more than or equal to 5 years (82%), females (54%) and patients from urban residence (74%). The majority of patients had diabetes for more than five years and the age onset of DM at 5-15 years. Risky association and statistically significant difference are found between cases and controls regarding the presence of stressful life events, family history of DM or autoimmune disease, depending on bottle feeding during the first 6 months of age and introduction of weaning food before 6 months. **Conclusion:** The study concluded that there is seasonal variation for diabetes mellitus onset, which suggests that other environmental risk factors might be additional risk factor. Breast feeding may delay or protective for the development of type I diabetes in children.

KEYWORDS: Insulin dependent diabetes, Pediatrics, Nineveh, Iraq.

1. INTRODUCTION

Type 1 Diabetes Mellitus (T1DM) is one of the autoimmune diseases that are triggered by many environmental factors and have a genetic component, it is frequently diagnosed in children worldwide.[1] The full extent of these effects is still unknown. Although there are various immunological theories explaining the onset of type 1 diabetes, class II loci within the Human Leukocyte Antigen (HLA) play a crucial role in its appearance.[2] Even while recent studies had yielded important insights into the etiology of this disease, the number of new cases being diagnosed is still rising by 3-5% annually, and the mortality rate is substantially high.[3-4] Apart from the genetic predisposition of type 1 diabetes, it is crucial to identify the unknown environmental factors linked to the disease's occurrence, such as specific food types or viral infections that trigger autoimmune activity which damages the pancreatic beta cells (B-cells) and causes T1DM.[5-6]

Environmental factors vary among individuals and locations due to genetic differences and risk exposure.[7] Viruses such as rubella, mumps, CMV, and coxsackie B-virus infect pancreatic B-cells and contribute to type 1 diabetes.[8]

Dietary problems may contribute to B-cell defects and T1DM, however the exact mechanism of this

effect remains uncertain.[9] Diabetes development in early children is heavily influenced by in-utero and maternal factors.[10] Understanding the environmental elements that contribute to T1DM can aid in disease prevention, control, and cost-effective treatment.[11] Primary prevention involves preventing exposure to risk factors, while secondary prevention involves limiting damage progression before clinical symptoms and consequences arise.[12] Maintaining good control of type 1 diabetes in children is crucial for preventing complications, slowing progression, and promoting normal growth and development.[13] Failure to take insulin on time, overeating, and insufficient exercise can all contribute to poorly controlled type I diabetes. Some episodes of hyperglycemia have no evident cause. Illness may also raise blood glucose levels.[14] Hyperglycemia can cause damage to kidneys, nerves, blood vessels, eyes, teeth, and gums over time. Hyperglycemia-related neurocognitive consequences have been observed.[15]

The aim of study is to investigate the risk factors of type I diabetes among children less than 14 years of both genders in Mosul city.

2-PATIENTS AND METHODS

This is case control study**,** carried out in agreement with the ethical guidelines derived from the Helsinki Declaration at Al Wafa'a specialized center and endocrine clinic of Al Khansa'a Teaching Hospital. Before a sample was taken, the patients' verbal consent was obtained after an explanation of the study's objectives. The study included 200 randomly selected patients, of them 100 patients had diagnosed with type I DM (case group) and another 100 one, in the same age group, in whom evaluation proved not to have type I diabetes mellitus (control group). (After matching for age and gestational age with case group). The study conducted from September 1st, 2023, to March 1st, 2024.

The questionnaire composed from four parts; part one for sociodemographic information of the study participants. Part two for family history of autoimmune diseases like, Hashimoto thyroiditis, Addison disease and pernicious anemia. Part three for type of feeding during the first year of life whether exclusively breast feeding, bottle or mixed feeding. Part four for history of major events one year before diagnosis of disease such as viral illnesses, stressful events which also include accident and surgery.

Statistically analysis done by using SPSS 30.0 software application. Data was analyzed using both descriptive statistics (frequency distribution and percentage) and inferential statistics (Chi-square test for categorical variables, t-test for quantitative continuous variables). A P-value of <0.05 indicates statistical significance. Odds ratio was calculated by applying two by two table.

3. RESULTS

The mean age of the study participants are 5.31 ± 3.27 years. It's evident diabetes type I is more prevalent among those aged more than or equal to 5 years (82%), females (54%) and patients from urban residence (74%). As shown in table 3.1.

Table 3.1: Demographic characteristic of study sample.

Variable		Case		Control	
		No.	%	No.	%
Age (year)	<5	18	18	49	49
	≥5	82	82	51	51
Sex	Male	46	46	52	52
	Female	54	54	48	48
Residence	Urban	74	74	56	56
	Rural	26	26	44	44

Table 3.2 shows distribution of the study participants (males and females) according to their diseases duration and age onset of DM I. The majority of patients had diabetes for more than five years and the age onset of DM at 5-15 years.

Table 3.2: Duration and onset of the disease and by gender.

Variable	Male		Female		Total	
	No.	%	No.	%	No.	%
Duration of diabetes (years):						
<1	8	8	4	4	12	12
1-2	14	14	10	10	24	24
2-5	10	10	16	16	26	26
5+	14	14	24	24	38	38
Age of onset of diabetes I (years):						
<2	2	2	2	2	4	4
2-5	18	18	24	24	42	42
5-15	26	26	28	28	54	54

Figure 3.1 illustrates seasonal variation according to the onset of diabetes. Statistically significant difference (P-value <0.0001) was found between the season with the highest incidence was shown in winter & autumn seasons.

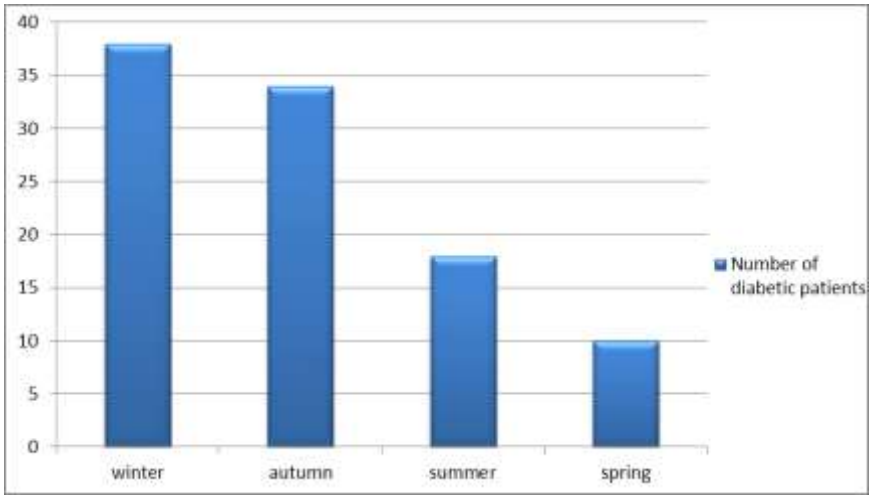

Figure (3.1): Seasonal variation according to onset of disease.

Table 3.3 shows comparison between case with DM and those with no diabetes regarding different risk factors. Risky association and statistically significant difference are found between them regarding the presence of stressful life events, family history of DM or autoimmune disease, depending on bottle feeding during the first 6 months of age and introduction of weaning food before 6 months.

Table 3.4: Comparison between cases and controls regarding different risk factors.

Variable	Cases, number (%)	Controls, number (%)	Odds ratio	95%CI	P-value
Gender:					
- Female	54	48	1.27	0.73-2.21	0.2
- Male	46	52			
Residence:					
- Urban	74	56	2.23	0.96-5.20	**0.04**
- Rural	26	44			
History of stressful events:					
- Present	68	6	33.29	**8.98-123.34**	**<0.0001**
- Absent	32	94			
Family history of diabetes mellites:			2.45	**1.10-5.49**	**0.02**
- Positive	64	42			
- Negative	36	58			
Family history of autoimmune Diseases:			6.769	**1.41-32.36**	**0.007**
- Positive	22	4			
- Negative	78	96			
Type of feeding:					
- Bottle feeding	76	56	2.49	**1.06-5.86**	**0.02**
- Breast feeding	24	44			
Introduction of solid food:					
- Yes	58	38	2.25	**1.01-5.02**	**0.03**
- No	42	62			

4. DISCUSSION

In children and adolescents, type I diabetes mellitus is the most prevalent endocrine metabolic disease. Serious complications associated with this syndrome include requirement for exogenous insulin on a regular basis, patient metabolic control monitoring, and constant attention to nutritional intake.[16]

This study found that type I DM affect patients aged more than five years, which is similar to Amelia S Wallace et al study results.[17] Moreover; the current study shown slight female predominance which is goes with Nosaiba Ahmed Hussein Abdelseed et al study findings.[18]

The present study showed that in (38%) of cases the onset of the disease was in winter and (34%) was shown

in autumn season. This was as the same as the results obtained by Maaret Turtinen[19] and Eirini Kostopoulou,[20] indicating considerable role of the environmental factors in which the viral infections seasonally occurred.

The presence of stressful life events was shown in this study be significant risk factor for type I DM, due to stimulation of the secretion of counter regulatory hormones and possibly by modulating immune activity. This result is consistent to Diletta Maria Francesca Ingrosso et al study finding.[21] On the other hand; the presence of family history of DM or other autoimmune disease was another risk found in the current study, which is comparable to Anna Parkkola et al[22] and Lydia Kossiva et al[23] study findings. Moreover; bottle finding and early introduction of solid food were illustrated to be risky for type I DM in this study, which is goes with the results of Anna-Maria Lampous et al study.[24]

Lastly; the limitation of the study; is the relatively small sample size, and retrospective case control design. Additionally; due to short time of data collection, as a result it could be susceptible to selection and recall bias.

5. CONCLUSION

The most common age group affected by this disease was 5-15 years. The study concluded that there is seasonal variation for diabetes mellitus onset, which suggests that other environmental risk factors might be additional risk factor. Additionally; the following variables are risky for type I DM among children and adolescent; stressful conditions, family history of diabetes mellitus or other autoimmune diseases. From the other hand; breast feeding may delay or protective for the development of type I diabetes in children.

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Conflict of intertest

About this study, the authors disclose no conflicts of interest.

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