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### Original Research Article

## Evaluation of the Effect of Risk Factors for Childhood Obesity in the Prevention of Adult-Onset Diabetes

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### ABSTRACT

Risk factors for diabetes in adulthood include childhood obesity. Since the first step in preventing and treating the complications of obesity is to diagnose the associated factors in children, the aim of this study was to investigate the risk factors for obesity in children to prevent type 2 diabetes in adulthood. In this case study, 300 children (60 obese children and 240 children with normal zone) were included in the study by available sampling method during 2019. Child weight, parental weight, type of delivery and feeding methods of the child before school age were compared and compared between the two groups. The results also showed that there was a significant relationship between obesity and consumption of high-fat milk and yogurt, pasta, sugar and jams and fast foods, while there was a significant relationship between consumption of other foods including cheese, Ordinary milk and yogurt, buttermilk, curd, beans, soy, sausages, hamburgers, red meat, chicken, fish eggs, liver, heart and offal, offal, Bread, rice, boiled or fried potatoes, cakes, muffins, pastries, plain biscuits, puffs, chips, salt, soda, fresh fruit or juice, dried fruits, fresh vegetables or cooked, nuts and seeds, and fried foods with cream, buttermilk, butter, and mayonnaise were not present between the obese and normal groups. There is a relationship between obesity and poor diet in childhood and the risk of developing diabetes in adulthood; It seems that providing prevention programs in obese children can prevent diabetes in adulthood.

**Keywords:** BMI, obesity, childhood, diabetes

## Introduction

In developed countries, obesity and overweight are major problems for children and adults, and childhood overweight has been identified as a contributing factor to adult overweight and chronic diseases such as diabetes and insulin resistance(1).

Numerous studies show the growing trend of childhood obesity in developing countries, especially in the Middle East; Approximately 22 million children under the age of 5 worldwide are obese. Researchers say the prevalence of obesity among Iranian children is approaching that of industrialized countries. Obesity is one of the common problems of primary school children that is gradually in the middle and upper socio-economic classes of society (2).

Child weight and height as the simplest measurable criteria clearly indicate the body mass index of children and ultimately their obesity (3). Childhood obesity is closely related to cardiovascular disease, hypertension, hyperlipidemia, asthma, type 1 diabetes mellitus and 2, increased insulin levels and orthopedic problems (4).

There are many factors involved in the occurrence of obesity; These include the genetic background of obesity in the family, the amount of physical activity (5), watching TV, playing computer games and being overweight at birth, and the duration of watching TV for more than 2 hours (6).

Researchers have also introduced parental obesity as one of the risk factors for adolescent obesity and according to various studies on obesity and its cardiometabolic complications, a detailed study on obesity and its complications for planning (7) .

Since the first step in preventing and treating the complications of obesity is to diagnose the associated factors in children, the aim of this study was to investigate the risk factors for obesity in children to prevent type 2 diabetes in adulthood.

## Methods

The present study was a case-control study. The target population was primary school children. The sample population is primary school children who have health records in health centers. The case group includes students whose body mass index is 85% or higher and the control group includes children whose body mass index is less than 85%. The number of samples in the case group was 60 and the control group was 240.

Sampling was done in several centers (3 health centers). All students in the first grade of primary school are examined by a doctor before enrolling in schools. When the student goes to the school for registration, the principal of the school refers the student to the nearest health center (where the school is located) for examinations. At this referral, the student's health certificate is compiled and completed. In this study, while all students are examined and completed a health certificate. After classification according to size in different areas of Rasht city (affiliated to health centers of Rasht city), the first sample in each base is randomly determined and then by observing the distance, the next referring student who has referred for student examinations, the next sample was (systematic random).

If the parent does not want and agrees with the student, the next person will be considered a research subject. Before the start of the project, all colleagues, including the examining physicians, executive supervisors and coordinators of the tests, will have a joint meeting to review the completion of the questionnaires by physicians while making the necessary arrangements. These surveys include demographic characteristics of the child, weight of the child and parent, type of delivery, student weight at the time of entering primary school, nutritional status of the child and physical activity of the child. In these examinations, after recording the demographic characteristics, first the height, weight and body mass index of students are measured. In each health center, the number of obese cases is registered in red and non-obese cases in blue. The first example of this study will be the first obese student who has referred to a health center for examinations. For this student, the design questionnaire is completed while performing routine examinations. The next sample will be obese by observing the set distance between students. Control cases are non-obese students of the same sex who are registered in the office immediately after the obese sample is examined. For control cases, the design questionnaire is completed while performing routine examinations.

Data were described (frequency and frequency percentage, mean and standard deviation) in the form of tables or graphs and data analysis was performed by Chi-square and Independent t test using SPSS Version22 software. P-VALUE less than 0.05 was considered significant.

## Results

In this study, it was shown that there is no relationship between type of delivery and time of birth and gender of obese and non-obese children. The results showed that the weight of parents in obese children was significantly higher than others (Table 1).

Table 1: Demographic characteristics of children and parents

Variable	Normal	Obese and overweight	P Value
<b>Natural childbirth</b>	19.2%	5.7%	0.625
<b>Cesarean section</b>	60.6%	14.4%	
<b>Premature</b>	8.2%	2.7%	0.587
<b>mature</b>	72.1%	17%	
<b>Girl</b>	12%	10%	0.145
<b>Boy</b>	55%	23%	
<b>Father weight</b>	75.69±8.78	89.95±9.14	0.019
<b>Mother weight</b>	68.74±5.75	74.33±8.11	0.021

The results also showed that there was a significant relationship between obesity and consumption of high-fat milk and yogurt, pasta, sugar and jams and fast foods (Table 2), while there was a significant relationship between consumption of other foods including cheese, Ordinary milk and yogurt, buttermilk, curd, beans (lentils, peas, beans, mung bean, etc.), soy, sausages, hamburgers, red meat, chicken, fish eggs, liver, heart and offal, offal, Bread, rice, boiled or fried potatoes, cakes, muffins, pastries, plain biscuits, puffs, chips, salt, soda, fresh fruit or juice, dried fruits, fresh vegetables (vegetables, tomatoes, cucumbers, Carrots, eggplants, salads) or cooked, nuts and seeds, and fried foods with cream, buttermilk, butter, and mayonnaise were not present between the obese and normal groups (Table 2).

Table 2: Consumption of various foods in obese and non-obese children

	Variable	Daily	Weekly	monthly	rarely	Never	Total
<b>High-fat milk and yogurt and ice cream</b>	normal	57.3%	18.4%	1.2%	1.8%	0.5%	72.8%
	Obese and overweight	11.0%	6.8%	0.9%	1.4%	0.7%	20.8%
<b>noodle</b>	normal	2.2%	65.5%	9.9%	1.2%	1.2%	79.9%

	Obese and overweight	0.0%	15.1%	4.5%	0.5%	0.0%	20.1%
<b>Sugar, jam, sugar, candy and chocolate</b>	normal	74.4%	20.4%	4.1%	7.0%	0.9%	79.8%
	Obese and overweight	8.7%	8.8%	1.0%	1.2%	0.5%	20.2%
<b>Fast food and restaurant food</b>	normal	1.4%	8.3%	26.4%	28.7%	15.4%	80.1%
		0.2%	2.9%	7.9%	7.3%	1.7%	19.9%

## Discussion

Childhood overweight is known to be a contributing factor to adult overweight and chronic diseases such as diabetes and insulin resistance. In this study, it was shown that there is no relationship between the type of delivery and the time of birth and gender of children with obesity. However, researchers in a cohort study examined children at the age of three and concluded that children born by cesarean section were more obese than children born naturally, which was contrary to our study. Maybe this is why we examined children at the age of seven, and perhaps by following the children in the study mentioned, they will come to the conclusion of the study(8 , 9). In a systematic review and meta-analysis, they examined the relationship between obesity in different age groups with low, moderate and high rank scores and concluded that cesarean delivery has a moderate relationship with childhood obesity. In the present study, there was no significant difference between obese and non-obese preterm infants, while in a similar study, the results showed that prematurity was a risk factor for obesity in childhood and adolescence, which may be further examined in our adolescence We also achieve this important, but at present in our study there is this connection (10). In a study by researchers, overeating was thought to be the cause of this weight gain in premature infants. Of course, in our study, there is no such relationship, perhaps due to the prevalence of weight gain and obesity in all children, it is hotter and hotter in this geographical area (11). In the present study, there is a significant relationship between consumption of high-fat dairy products, jams, pasta and fast foods with obesity, which are the favorite foods of children; In a similar study, researchers concluded that the consumption of sugary drinks played an important role in the prevalence of obesity, stating that the role of the family in the consumption of these substances is important and family recommendations are necessary(12 , 13).The results showed that the weight of parents in obese children was significantly higher than others, although in previous studies more focus was placed on body mass and the relationship between obesity and weight gain in children with parental

obesity. Researchers in a similar study found that there is a strong correlation between a child's body mass with the parent's body mass and the paternal weight. They follow their example and work on families to prevent obesity (14, 15).

## Conclusion

There is a relationship between obesity and poor diet in childhood and the risk of developing diabetes in adulthood; It seems that providing prevention programs in obese children can prevent diabetes in adulthood.

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