



*Int. J. New. Chem., 2022, Vol. 9, Issue 2, pp. 198-208.*

## International Journal of New Chemistry

Published online in <http://www.ijnc.ir/>  
Open Access



Print ISSN: 2645-7237

Online ISSN: 2383-188x

### Original Research Article

## Investigating the Relationship between Eating Habits, Blood Pressure, Weight and Lifestyle in Children Aged 6 to 18 Years in East Azerbaijan Province

**Lida Saboktakin**

Associate Professor of Pediatric Endocrinology & Metabolism, Rahat Breath and Sleep Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

*Received: 2021-08-05*

*Accepted: 2021-10-18*

*Published: 2021-11-19*

### ABSTRACT

The risk of obesity and subsequent hypertension in children is associated with several variables; The most prominent of these variables that can be modified are eating habits and lifestyle in children; Therefore, the aim of this study was to investigate the relationship between eating habits, blood pressure, weight and lifestyle in children aged 6 to 18 years in East Azerbaijan province. This correlation study was conducted in 2019 with the participation of 850 children (492 boys and 358 girls) in East Azerbaijan; Blood pressure, weight, eating habits and lifestyle of each child registered in the apple system were examined. The relationship between each variable and descriptive and inferential statistics was investigated. 86.12% of normal blood pressure was 9.41% of prehypertension and 4.47% had hypertension. The relationship between systolic blood pressure and dairy products ( $r = 0.020$ ) watching TV / computer ( $r = 0.041$ ), BMI ( $r = 0.001$ ) and BMI quarters ( $r = 0.001$ ) and age ( $R = 0.001$ ) was statistically significant and the other variables did not show a statistically significant relationship. It can be concluded that based on the criteria used in this national program, and the high prevalence of hypertension among them, dietary intake and lifestyle with high blood pressure in obese children and adolescents show a significant correlation. Therefore, nutritionists and health professionals should further evaluate their food intake and lifestyle when providing advice to children and adolescents with overweight and obesity.

**Keywords:** BMI, Blood Pressure, Lifestyle, Children

## Introduction

Hypertension is one of the most common and asymptomatic health problems that is associated with cardiovascular disease and is directly related to mortality and is now a major health problem for children and adolescents worldwide (1). The prevalence of hypertension in obese children is 19 to 22% compared to 4 to 6% in normal weight children (2). The prevalence of hypertension and hypertension in Iranian children and adolescents is reported to be 7.44 and 6.82%, respectively. Studies show that hypertension is significantly due to a combination of genetic (3), environmental, behavioral and Diet is created. Recent studies emphasize the role of diet and lifestyle in increasing blood pressure. For example, in one of these studies, it was shown that in addition to sodium, other nutrients in foods such as potassium, magnesium, calcium and fiber are involved in the etiology of adult hypertension (4). A meta-analysis showed that this sodium restriction had a great effect on elderly people with hypertension, but its benefits were small in people with normal blood pressure. Later, Sacks et al. Dietary Approaches to Stop Hypertension have found that the DASH diet lowers blood pressure at all levels of sodium intake (5). Studies also show that the number of meals can increase or decrease the risk of obesity and cardiovascular disease in children. Physical activity is another effective factor in determining blood pressure in childhood and adolescence. Studies also show that the number of meals can increase or decrease the risk of obesity and cardiovascular disease in children (6). Physical activity is another effective factor in determining blood pressure in childhood and adolescence.

## Methods

The present study is a descriptive cross-sectional study that in 2019, using data entered into the Apple system related to the health system transformation program in the field of health, anthropometric information, some demographic factors, food intake and lifestyle of 850 children Adolescents with overweight and obesity (492 boys and 358 girls) referring to health centers in Tabriz were collected by available sampling. Inclusion criteria were: being 6 to 18 years old and overweight and obese. Exclusion criteria also include history of kidney problems, adrenal glands, thyroid, diabetes, steroid use. Also, adolescents who smoked were not included in the study. According to the instructions of the Health System Transformation Program in the field of health, which was also observed in this study, anthropometric measurements including height

and weight were performed in such a way that height with standard gauge and error rate of 0.1 cm that to measure height, people with The following conditions: No shoes, the soles of the feet are completely on the ground, the heels are glued together, the feet are flat, the hands are next to the body, the shoulders are flat, the backbone, buttocks and back of the heels are in contact with the gauge surface (or wall). ), Eyes and face forward and measured before deep breathing and at the end of normal exhalation, their height was measured and weight with the least amount of clothing, without shoes, standing in the middle of the scales without assistance and with seca scales with error rate 100 grams were measured. Systolic and diastolic blood pressure were measured at rest after rest and with a Nova Riester mercury sphygmomanometer with an accuracy of 10 mm Hg in two consecutive intervals with an interval of 5 minutes and the mean of these two blood pressures was recorded as the final blood pressure. Body mass index (BMI) was also calculated by dividing weight in kilograms by the second power of height in meters. Determination of hypertension based on percentile hypertension, which was calculated using the height and age of girls and boys separately and was performed from the tables of children and adolescents with the fourth report of diagnosis and treatment of hypertension in children and adolescents in the United States. According to the above report, systolic and diastolic blood pressure less than 90 percent of normal blood pressure was equal to and greater than 90 percent of blood pressure less than 90 percent of blood pressure was equal to pre-hypertension and equal to and greater than 95 percent of blood pressure was considered high blood pressure. Also according to the criteria of the World Health Organization, BMI for age above Z score + 1 to Z score + 2 was considered as overweight and more than Z score + 2 as obese. To evaluate the nutrition pattern, several questions about how and how much to eat different food groups and other eating habits, the amount of physical activity, as well as measuring anthropometric indices and calculating body mass index were used. The questions in the apple system are a tool for the initial evaluation of the nutritional pattern of clients referred to the health base as the first level of service delivery by age groups. Nutrition pattern criteria were assessed by examining the consumption of fruits, vegetables, dairy products, number of meals, consumption of fast food / snacks, as well as physical activity and hours of watching TV / computer. This questionnaire contained 7 questions. The first option of each question has zero points, the second option has one point and the third option has two points. In question 1, which is about the daily consumption of fruit, if the respondent stated that he does not consume fruit at all daily or

sometimes consumes it infrequently, he would not get a point. If he stated that he consumes less than 2 servings of fruit per day, he would get one point, and if he stated that he consumes 2 or more servings of fruit per day, he would earn two points. In question 2, which is about daily consumption of vegetables, if the respondent stated that he does not eat vegetables at all daily or sometimes rarely, he would not get a point. If he stated that he consumes less than 3 servings of vegetables a day, he would get a point. And if he said he consumed 3 or more servings of vegetables a day, he would get two points. Each share of fruit is equivalent to an average apple or the same amount of any other fruit. Each serving of vegetables is equivalent to a number of medium non-leafy vegetables such as tomatoes, eggplant or carrots, or a glass of leafy vegetables such as vegetables or lettuce. In question 3, which was about the daily consumption of milk and dairy products, if the respondent stated that he does not consume any amount of milk and dairy products daily or may use it very rarely, he would get zero points. If he stated that he consumes less than 3 shares of milk and dairy products per day, he would get one point, and if he stated that he consumes 3 shares or more per day, he would receive two points. Each unit of milk and dairy is equivalent to a glass of milk, or a glass of yogurt, or 45 grams of cheese. In question 4, which is about the consumption of fast food and snacks such as salty, sweet and fatty foods such as chips, puffs, carbonated drinks and industrial juices, if the respondent states that he uses these items almost every day, he gets zero points. If he states that he consumes such items once or twice a week, he will earn a point. And if he states that he uses such items infrequently (ie with less repetition than the weekly scale), he will get two points. In question 5, which is about the number of meals per day (both main meals and snacks) , If the respondent states that he consumes two servings or less, he will get zero points. If he states that he consumes three to four servings, he will earn one point. And if he states that he consumes five or more servings a day, he will earn two points. In question 6, which is about the hours of using the TV and computer or engaging in other sedentary activities, if a person states that he engages in such activities for more than two hours a day, he will gain zero points. If he states that he engages in such activities for about two hours a day, he will earn one point, and if he states that he engages in such activities for less than two hours a day, he will earn two points. In question 7, which is about physical activity per week, physical activity means 60 minutes of moderate and intense physical activity per meal and separately on different days of the week. If the respondent states that he does not do any purposeful physical activity during the week, he will get zero points. If he says

he does less than 420 minutes a week of such physical activity, he will earn a point. And if he says he spends a total of 420 minutes a week (equivalent to sixty minutes a day) or more on aerobic exercise such as brisk walking, swimming or cycling, he will earn two points. Finally, the total points are collected and the nutritional pattern score is obtained, which is the lowest score of 0 and the highest score of 14 points.

### *Statistical Analysis*

Data were expressed as mean ( $\pm$  SD) and frequency (%) for quantitative and qualitative variables, respectively) nominal or rank. BMI was classified into quarters as follows: first quarter less than 20.22; second quarter between 20.22 By 22.25, the third quarter was considered between 22.25 and 27.28 and the fourth quarter was higher than 28.79. The normality of the data was based on having three SD criteria less than half the mean, Kurtosis in the range of 3% and Skewness in The range of 1.5% was confirmed to examine the correlation between quantitative variables (BMI, age and dietary pattern score) with hypertension by Pearson correlation test and the relationship between qualitative and rank variables) Food intake and nutritional pattern score and BMI quarters Spearman test was used for hypertension. Data analysis was analyzed using STATA statistical software.

### **Results**

At the time of the study, the total number of children and adolescents aged 6 to 18 under care in the health complex was 7296 (3669 boys and 3627 girls) with a prevalence of obesity and overweight of 82.5%. Profile of participants (children and adolescents with overweight and obesity) in Table 1 shows that out of 850 participants, 492 boys and 358 girls were included in this study, of which 86.12% of normal blood pressure was 9.41% of prehypertension And 4.47% had hypertension (ie, in total, 13.88% of these people have prehypertension and hypertension. Table 2 shows the mean systolic and diastolic blood pressure by girl and boy according to lifestyle). Systolic and diastolic blood pressure in boys increased with increasing number of fruits per day, increasing with increasing number of meals and snacks, as well as decreasing the

consumption of fast foods, showed systolic and diastolic blood pressure in girls, with decreasing consumption Fast food / snacks, decreased TV time and increased physical activity showed a decreasing trend, and diastolic blood pressure showed a decreasing trend with increasing consumption of vegetables and dairy products, and increasing the number of meals in girls. Diastolic with contextual variables and lifestyle . illustrates this point Is between systolic blood pressure with fruit consumption ( $r = 0.056$ ), vegetables ( $r = 0.001$ ) and age ( $r = 0.509$ ), BMI ( $r = 0.466$ ) and BMI quarters ( $r = 0.461$ ) Direct relationship with consumption of dairy products ( $r = 0.112$ ) Number of meals and snacks ( $r = -0.004$ ) Physical activity ( $r = -0.35$ ) Less watching TV / computer ( $R = -0.098$ ) and less consumption of fast food / snacks ( $r = -0.60$ ) inverse relationship was observed. However, only the relationship between systolic blood pressure and dairy products ( $r = 0.020$ ) watching TV / computer ( $r = 0.041$ ), BMI ( $r = 0.001$ ) and BMI quarters ( $r = 0.001$ ) and age ( $R = 0.001$ ) was statistically significant and the other variables did not show a statistically significant relationship. Also, between diastolic blood pressure with fruit consumption ( $r = 0.069$ ), vegetable consumption ( $r = 0.025$ ), age ( $r = 0.509$ ), BMI ( $r = 0.456$ ) and BMI quarters ( $r = 0.25459$ ) Direct and with consumption of milk and dairy products ( $r = -0.93$ ) Number of meals and snacks ( $r = 0.060$ ) Physical activity ( $r = -0.24$ ) Less TV / computer watching ( $0 / R5-054$ ) Fast food / snacks ( $r = -0.021$ ) inverse relationship was observed.

Table 1: Details of study participants

Variable	Subgroups	Total	Girls	Boys
<b>Sex</b>	-	850	358	492
<b>BMI</b>	first quarter	212 ( 25.12%)	84	128
	second quarter	210 ( 24.88%)	82	128
	third quarter	210 ( 24.88%)	102	108
	Fourth quarter	212 ( 25.12%)	86	124
<b>blood pressure</b>	normal	732 ( 86.12%)	314	416
	Prehypertension	40 ( 9.41%)	26	54
	hypertension	19 ( 4.47%)	18	20
<b>Fruitage</b>	Rarely / never	10 ( 1.18%)	4	6
	Less than 3 shares / day	140 ( 16.47%)	64	76

	3 shares or more / day	700 ( 82.35%)	290	410
<b>vegetables</b>	Rarely / never	16 ( 1.88%)	8	8
	Less than 3 shares / day	252 ( 29.65%)	120	132
	3 shares or more / day	582 ( 68.47%)	230	352
<b>dairy products</b>	Rarely / never	12 ( 1.41%)	6	6
	Less than 3 shares / day	108 ( 24.47%)	110	98
	3 shares or more / day	630 ( 74.12%)	242	388
<b>Fast food / Junk Food</b>	Rarely / never	74 ( 8.71%)	42	32
	Once a week	206 ( 24.24%)	72	134
	Up to once or twice a month	570 ( 67.06%)	244	326
<b>Snack</b>	2 servings or less / day	24 ( 2.82%)	16	8
	4-3 servings / day	576 ( 53.67%)	178	278
	5 servings / day	370 ( 43.53%)	164	206
<b>Watch TV / PC</b>	More than two hours	342 ( 40.24%)	140	202
	two hours	176 ( 20.71%)	68	108
	Less than two hours	332 ( 39.06%)	150	182
<b>physical activity</b>	Almost without targeted physical activity	144 ( 16.94%)	82	62
	Less than 420 minutes per week	364 ( 42.82%)	154	210
	420 minutes per week or more	342 ( 40.24%)	122	220

Table 2: Mean blood pressure in obese and overweight children and adolescents by girl and boy; In accordance with the lifestyle

lifestyle	Girls		Boys		
	DBP	SBP	DBP	SBP	
<b>Fruitage</b>	Rarely / never	61.14±0	105.80±9.12	62.45±6.14	108.59±10.52
	Less than 3 shares / day	63.78±6.90	102.97±8.20	65.66±6.59	105.55±9.95
	3 shares or more / day	61.95±6.48	100.64±8.53	60.65±6.66	102.59±9.89
<b>vegetables</b>	Rarely / never	62.54±7.26	106.64±9.51	65.98±6.48	105.41±9.78
	Less than 3 shares / day	64.54±6.49	101.64±8.84	63.39±6.96	102.54±9.85
	3 shares or more / day	60.21±8.63	98.31±8.86	62.84±6.45	101.59±8.47
<b>dairy products</b>	Rarely / never	63.23±6.96	104.13±9.75	66.58±6.45	104.26±9.54
	Less than 3 shares / day	64.56±6.41	102.46±8.73	63.93±6.96	103.22±9.41
	3 shares or more / day	61.89±6.74	100.79±8.82	61.81±6.75	100.59±8.32
<b>Fast food / Junk Food</b>	Rarely / never	64.78±7.52	106.48±9.54	64.19±6.85	105.95±9.96
	Once a week	61.12±6.85	104.59±8.91	63.45±6.97	102.69±9.59
	Up to once or twice a month	60.45±5.59	103.26±8.78	60.65±6.59	102.63±8.81
<b>Snack</b>	2 servings or less / day	65.63±7.57	105.03±8.10	65.75±6.59	105.88±9.85
	4-3 servings / day	63.96±6.53	102.30±9.42	62.98±6.45	103.85±9.45
	5 servings / day	61.96±6.51	101.84±8.86	60.53±6.29	101.59±9.65
<b>Watch TV / PC</b>	More than two hours	67.78±7.32	107.62±9.53	68.51±6.65	104.74±8.89
	two hours	65.47±7.65	105.95±8.75	65.57±6.85	103.66±9.58
	Less than two hours	62.45±6.98	102.51±8.42	63.59±6.48	101.85±9.41
<b>physical activity</b>	Almost without targeted physical activity	64.59±6.87	104.84±9.12	65.37±6.36	105.95±9.47
	Less than 420 minutes per week	62.85±6.54	101.59±9.78	62.35±6.52	102.88±9.45
	420 minutes per week or more	60.33±5.33	100.26±8.66	60.30±6.78	101.47±9.33

## Discuss

The results of this study can be summarized as follows:

1. A positive and significant relationship was observed between age and systolic and diastolic blood pressure.

2. A positive and significant relationship was observed between BMI and BMI quartiles with systolic and diastolic blood pressure.
3. An inverse and significant relationship was observed between dairy consumption and systolic blood pressure.
4. An inverse and significant relationship was observed between watching less TV / PC (positive) and significant relationship with watching TV / PC (with increasing systolic blood pressure).

An inverse and significant relationship was observed between watching less TV / PC (positive) and significant relationship with watching TV / PC (with increasing systolic blood pressure). A study on adolescents showed that the trend of hypertension increased with overweight and obesity. Other studies also suggest a direct link between increased BMI and blood pressure in children and adolescents. The results of all the mentioned studies were in agreement with the results of the present study. One of the mechanisms linking weight and high BMI to blood pressure is related to the inflammatory state in obese and overweight patients, which leads to the production of the inflammatory factor CRP C-reactive protein. In a study of children with a mean age of 10 years, the results showed that CRP increases the thickness of the carotid artery in these children. Finally, increasing the thickness of the carotid artery intima increases blood pressure in children (7). Studies show that diets high in fruits, vegetables, and dairy products (especially low-fat dairy products) are negatively correlated with high blood pressure in adults (8). However, such an association was not observed in children with dark skin, so this case indicates that high consumption of dairy products alone cannot show a good relationship with systolic blood pressure, regardless of race, and in the present study, a positive and significant relationship between dairy consumption and systolic blood pressure This association with diastolic blood pressure was observed to be close to the significant limit (9) .A cohort of meta-analyzes(10) showed that low-fat milk and dairy products can play an important role in the prevention of hypertension, which may be due to the effect of calcium and potassium on Blood pressure can be considered to provide 250 mg of calcium and 300 mg of potassium(11), and studies show that consuming about 1 gram of calcium or 2 grams of potassium per day can significantly reduce systolic and diastolic blood pressure. Reduce iodine In a meta-analysis showed that

increasing calcium intake by 200 grams per day reduces hypertension by 3%. Also in this study showed that low-fat dairy products had a significant relationship with lowering blood pressure, but high-fat dairy products, fermented and cheese and yogurt did not show a significant relationship. Another factor that showed a significant relationship with blood pressure in the present study was the time of watching TV(12). The results showed that a positive and significant relationship was seen with watching more TV and increasing systolic blood pressure. These results are similar to the results of a study that showed that watching more TV / computer, with the effect of consuming more snacks rich in fast food and sugary drinks, increased weight and BMI, and thus watching TV caused severe obesity in children. By controlling the severity of obesity, the results showed that the time spent watching TV can be considered as a strong predictor of high blood pressure in children(13).

### **Limitations**

One of the limitations of the present study is the impossibility of primary and secondary blood pressure sampling, the inability of parents to measure blood pressure as a possible factor influencing children's blood pressure.

### **Conclusion**

It can be concluded that based on the criteria used in this national program, and the high prevalence of hypertension among them, dietary intake and lifestyle with high blood pressure in obese children and adolescents show a significant correlation. Therefore, nutritionists and health professionals should further evaluate their food intake and lifestyle when providing advice to children and adolescents with overweight and obesity. The information presented in this article not only provides a good basis for applying such criteria more accurately in health care centers, but also as an epidemiological study provides a good basis for further studies.

### **Acknowledgment**

This study is the result of a research project approved by the Pediatric Health Research Center, Tabriz University Of Medical Sciences, code ethics number IR.TBZMED.REC.1399.1037. Therefore, the author of this article thanks the support of that center.

## References

1. W. Qin, M. Baruah, A. Stefan, M. Van der Auweraer, N. Boens, ChemPhysChem. 6, 2343 (2005).
2. D. Frath, JE. Yarnell, G. Ulrich, FN. Castellano, R. Ziessel, ChemPhysChem. 14, 3348(2013).
3. G. Ulrich, A. Barsella, A. Boeglin, S. Niu, R. Ziessel, ChemPhysChem. 15, 2693 (2014).
4. ML. Agazzi, JE. Durantini, NS. Gsponer, AM. Durantini, SG. Bertolotti, EN. Durantini, Chem Phys Chem, 20, 1110 (2019).
5. Z-H. Pan, G-G. Luo, J-W. Zhou, J-X. Xia, K. Fang, R-B. Wu, Dalton Trans., 43, 8499 (2014).
6. J. Kabatc, B. Jedrzejewska, A. Bajorek, and J. Paczkowski, J. Fluoresc, 16, 525 (2006).
7. EN. Kaya, B. Köksoy, S. Yeşilot, M. Durmuş, Dyes and Pigments, 172, 107867 (2020).
8. Y. Liu, L. Yang, C. Ma, A. Tangb, Dyes and Pigments, 173, 107981 (2020).
9. A. Ortiz, Dyes and Pigments, 171, 107690 (2019).
10. T. Rappitsch, I. Klimant, S.M. Borisov, Dyes and Pigments, 174, 108037 (2020).
11. T. Xu, C. Yan, Y. Wu, C. Yuan, X. Shao, Dyes and Pigments, 168, 235 (2019).
12. Z. Khanjari, B. Mohtat, R. Ghiasi, H. Djahaniani, F. K. Behbahani, Main Group Chemistry, 20, 59 (2021).
13. R. Ghiasi, Z. Zandiyeh, Inorganic Chemistry Communications, 124, 108412 (2021).

### How to Cite This Article

Lida Saboktakin, “**Investigating the relationship between eating habits, blood pressure, weight and lifestyle in children aged 6 to 18 years in East Azerbaijan province**” International Journal of New Chemistry., 2022; DOI: 10.22034/iinc.2022.2.1.