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Estimate the Prevalence of Fatty Liver in Overweight and Obese Children in Ilam

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Abstract

Introduction: Obesity worldwide is considered as the single largest cause of chronic illness. The children of the present generation are the only people throughout history who die because of problems with overweight before their parents. Obese children are prone to fatty liver disease. Fatty liver is one of the chronic liver disorders that is associated with lipid accumulation in hepatocytes. The aim of this study was to estimate the prevalence of fatty liver in overweight and obese children in Ilam and to investigate some of its possible causes, in order to consider the need for planning for educational interventions for behavioral change.

Method: This cross-sectional study was carried out in Imam Khomeini Hospital, Ilam, in 2017, and among 106 children aged 6-18 years who were referred to the center for evaluation, a randomized sampling was performed and divided into two groups of overweight and obese based on their BMI.

Conclusion: Regarding the relatively high prevalence of non-alcoholic fatty liver disease in school-age children, and especially in adolescents, the need to educate parents and their children for proper nutrition and daily physical activity with the correct method is still felt.

Keywords: Prevalence; Non-Alcoholic Fatty Liver Disease; Overweight; Obese; Children.

Introduction

Obesity worldwide is considered to be the single largest cause of chronic diseases.[1] Type 2 diabetes, high prevalence of cardiovascular disease, increased number of cancers and the occurrence of a group of mental illnesses associated with obesity.[2] Obesity and the resulting problems impose significant costs on societies. Obesity is predicted in the 21st century as the most important threat to human health.[3] Children of the present generation are the only people throughout history who die for reasons of overweight problems before their parents.[4]

Obese children are prone to fatty liver disease. Fatty liver is one of the chronic liver disorders that

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is associated with lipid accumulation in hepatocytes, and is usually caused by accumulation of fat in the liver of more than 5% by weight of the liver. This disorder is due to steatosis (a simple fatty liver, which is a benign disorder) to non-alcoholic steatosis hepatitis, in which fat accumulation accompanied by inflammation and damage to the fibrosis of the liver tissue, ultimately progressive fibrosis and cirrhosis.[5] Fatty liver disease is often off, sometimes with increased liver enzymes.[6] The prevalence of fatty liver in obese children has been reported from 42.6 to 77.1 in various studies,[7-9] and in the near future fatty liver disease is expected to be the most common cause of chronic liver disease in children. Awareness of Fatty Liver Disease can strengthen the child's and his family's motivation for diet and exercise, as well as new therapies for Fatty Liver Disease, helping to relieve the disease.[10]

The aim of this study was to estimate the prevalence of fatty liver in overweight and obese children in Ilam and to investigate some of its possible causes, in order to consider the need for planning for educational interventions for behavioral change.

Methods

In a cross-sectional study that was conducted in Imam Khomeini Hospital of Ilam city in 2017, 106 children were randomly selected among children between the ages of 6 and 18, who were referred to the center for general evaluation. They were divided into three groups: overweight (85 to 95th percentile), obese (above 95 percent), and patients with severe obesity (more than 120 percent of 95th percentile or BMI greater than 35) based on their BMI. The three groups included 41 (38.7%) overweight, 46 (43.4%) obese and 19 (17.9%) with severe obesity.

Students entered the study after their consent, and their parents. In case of dissatisfaction, another person entered the study. All children and adolescents were examined by a pediatrician. For all participants in the study, a preliminary questionnaire including age, sex, moderate to severe daily activity and clinical examinations including height, weight, blood pressure and examinations for diabetes, liver disease, and endocrine diseases were completed. Students who had mental retardation, chronic drug use, chronic medical condition, genetic symptoms or syndromes, signs of liver dysfunction and signs of endocrine disease were excluded.

Individuals Body mass index (BMI) of the patients were measured, and was calculated based on the BMI percentile charts for age and gender. All of these patients were undergo liver ultrasound by 3 radiologists who were aware of the goals and type of study, but did not have any information on how to divide them. Data were analyzed by SPSS-24 software and P values <0.05 were considered significant.

Results

In this study, 106 children and adolescents 6-18 years old with a mean age of 10.03 ± 2.65 years were studied. The subjects were divided into 3 groups based on their BMI including 41 people (38.7%) with overweight, 46 people (43.4%) with obesity and 19 people (17.9%) with severe obesity. Of the total number of participants, 22 (20.8%) were boys and 84 (79.2%) were female. Table 1 shows the prevalence of NAFLD in different groups of this study.

Table 1: Distribution of NAFLD in overweight and obese children

Variable	Fatty Liver (+) N (%)	Fatty Liver (-) N (%)	Total	P Value
Overweight	5 (12.2)	36 (87.8)	41 (38.7)	≤0.001
Obese	9 (19.6)	37 (80.4)	46 (43.4)	
Severe Obesity	11 (57.9)	8 (42.1)	19 (17.9)	
Total	25 (23.6)	81 (76.4)	106 (100)	

According to Table 1, the prevalence of non-alcoholic fatty liver disease in the whole population was 23.6%. Also, 12.2% of overweight patients, 19.6% of patients with obesity and 57.9% of patients with severe obesity had NAFLD. In a more general comparison, it can be said that the prevalence of fatty liver was 12.2% in overweight people and 30.8% in obese people.

In the sonographic survey, 9 out of 15 boys and 16 out of 91 girls had NAFLD disease. According to the analysis, there was a significant relationship between the risk of fatty liver and sex and the chance for NAFLD was higher in boys. (P<0.05)

In the study of age groups, these subjects were divided into two age groups of less than 12 years of age and over 12 years old to determine the relationship between age and the probability of non-alcoholic liver disease, in which there was no significant relationship between the risk of disease Non-alcoholic fatty liver disease and age (P=0.469).

In this study, the relationship between body mass index and non-alcoholic fatty liver disease was measured, which indicated a strong correlation between the increase in BMI and the increased risk of NAFLD disease (P<0.05).

In this study, the mean level of AST and ALT liver enzymes was measured in NAFLD patients based on fatty liver grade and also based on body mass index. In measuring the level of enzymes based on the disease grade, according to the results, the mean of AST and ALT in the Grade 1 disease was higher than the normal maximum, but with increasing severity of the disease (from Grade 1 to 2), no significant increase was observed in the mean level of enzymes (Figure 1).

Also, in assessing the level of liver enzymes based on the severity of obesity, according to the results, the mean levels of AST and ALT increased with an increase in obesity, and this figure also reached 2 times the normal maximum in people with severe obesity (Figure 2).

It should be noted that these measured values only represent the average level of enzymes in some subjects, because despite the presence of NAFLD in some patients, they had no increase in the level of enzymes.

Figure 1: shows the mean liver enzyme levels based on the disease grade. According to this chart, the average level of enzymes in Grade 1 is higher than the Upper Limit of normal.

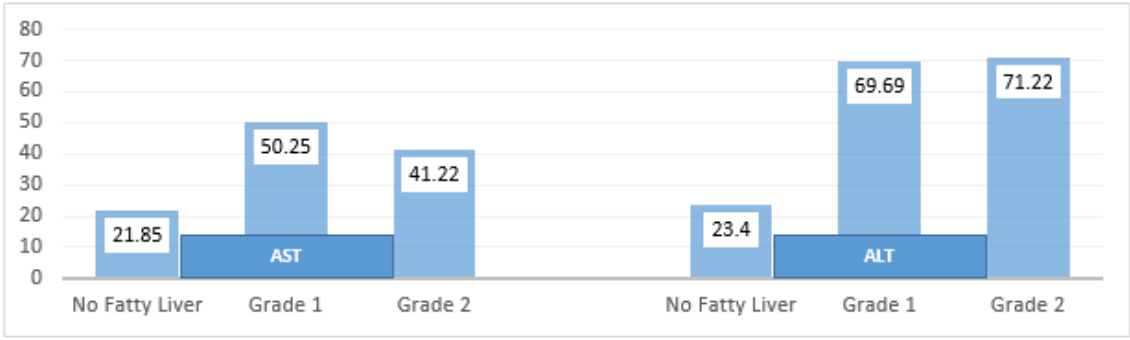

Figure 1: Comparison of mean levels of liver enzymes in NAFLD patients based on disease grade

Figure 2: shows the average level of liver enzymes based on the severity of obesity. According to this chart, the average level of enzymes increases with an increase in the severity of obesity and in severe obesity it reaches about 2 times the normal maximum.

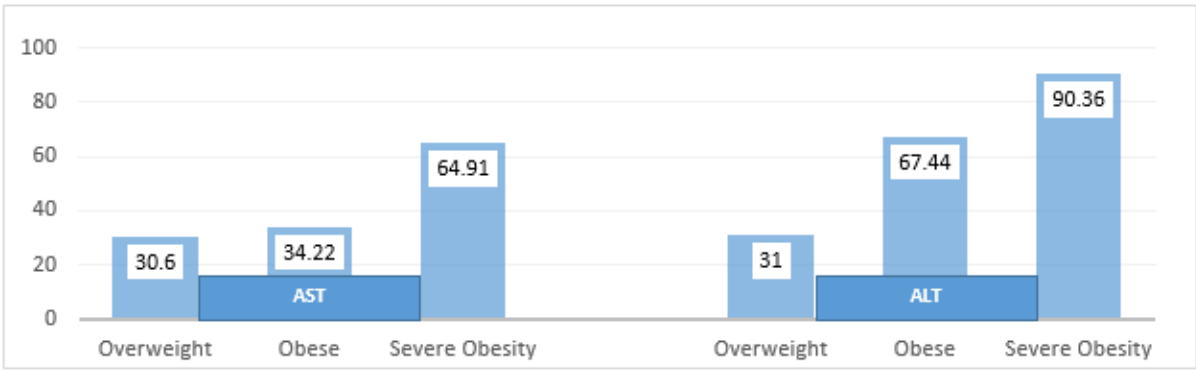

Figure 2: Comparison of mean levels of liver enzymes in NAFLD patients based on severity of obesity

Discussion

Awareness of Fatty Liver Disease can strengthen the child's and his family's motivation for diet and exercise, as well as new therapies for Fatty Liver Disease, helping to relieve the disease.[10] In this regard, our study was the first study in children in Ilam province.

According to the information obtained from this study, most of the patients with overweight and obesity were below the age of 12 years (73.6%) and the prevalence of fatty liver in the studied population was 23.6%, which in the group with overweight was 12.2%, in the group with obesity was 19.6% and in the group with severe obesity was 57.9%. Also, if we divide people into overweight and obesity groups, the prevalence was 12.2% in overweight people and 30.8% in those with obesity. In a study conducted by Dr. Adibi et al., The prevalence of fatty liver in overweight children was 10.5 and in obese children was 54.4%.[10] In the study of Shiasi Arani et al., The prevalence of non-alcoholic fatty liver in obese children was 55.3%.[6] The prevalence of non-alcoholic fatty liver disease in the United States is estimated to be between 16% and 23%, and in some studies it has reached 31%.[11] According to studies, the prevalence of non-alcoholic fatty liver disease in overweight and obese people is lower in this study than in other studies in Iran, which can be attributed to climatic conditions and nutritional status of the area. It should be noted, however, that the study population was smaller than other studies, and the vacancy of a wider study is also felt by the presence of people without overweight and obesity.

In the study of Pan and colleagues, the prevalence of fatty liver in some cases was higher in women and in some cases was higher in males.[12] In this study, there was a significant relationship between the risk of NAFLD and sex. The likelihood of having a NAFLD is greater in the boy's sex. Of course, this can be linked to the lower number of boys referring to the clinic, and more studies are required to review them.

In our study, there was no significant relationship between fatty liver disease and age of patients. In a study by Schwimmer and colleagues, there was a significant relationship between age and the risk of developing fatty liver disease.[13] However, we should note that our study was conducted on children, as well as the larger statistical population can change the results.

In our study, in patients with NAFLD, the mean level of liver enzymes was higher than that of healthy individuals, but with an increase in disease severity, there was no significant increase in the mean level of liver enzymes. Also, in this study, with an increase in the severity of obesity, the mean level of liver enzymes was higher in people with NAFLD and in the group with severe obesity it was up to 2 times the normal upper limit. In the study of Sanial et al., The level of ALT and AST enzymes in people with fatty liver disease is 1 to 4 times of normal, which is consistent with our study [(14)], but with regard to the level of enzymes there is a need for more studies based on the disease grade. However, in the study of Strangers et al., T was a significant relationship between BMI and serum levels of AST and ALT.[15]

Conclusion

Regarding the relatively high prevalence of non-alcoholic fatty liver disease in school-age children, and especially in adolescents, the need to educate parents and their children for proper nutrition and daily physical activity with the correct method is still felt, but the results of this study indicate that the prevalence of non-alcoholic fatty liver in the city of Ilam is lower than in other cities studied in Iran, and this can be due to various causes, including the climatic conditions of the city, the nutritional and social culture of the people of this region, Attention to physical activity and even genetic differences. Probably more studies to investigate the causes of overweight and obesity in Ilam can be helpful in identifying the factors affecting NAFLD disease in this area.

Conflict of interest statement: No potential conflict of interest relevant to this article was reported.

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