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The effect of holding a workshop (group and face-to-face training method) on nutrition adjustment on anthropometric indices in children with chronic liver disease

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Abstract:

BACKGROUND: Complications of chronic liver disease (CLD) in children play an important role in mortality and disability. This disease is one of the health problems of the country and due to its chronic and irreversible disease, it needs care and treatment education programs. Therefore, this study was performed to determine the effect of nutrition adjustment training program on anthropometric indices in children with CLD.

MATERIALS AND METHODS: This clinical trial study was performed on 75 children (45 in the intervention group and 30 in the control group) with CLD in the nutrition clinic of Ghaem Educational-Research Center in Mashhad. Children and caregivers with inclusion criteria entered the study after completing written consent. Anthropometric indices (abdominal circumference, body water level, body fat, height, weight, body mass index, arm circumference) were measured and recorded in children at the beginning of the study. Children and their caregivers were randomly divided into control and intervention groups. The intervention group underwent nutritional adjustment (calculation of energy and carbohydrates, lipids and proteins, vitamins and minerals, calculation and selection of diet) training (face to face) for 6 sessions (each session 90–120 min, three times a week for 2 weeks). Twelve weeks after the start of the study, children in both intervention and control groups were evaluated for anthropometric indices. The collected data were analyzed by SPSS software version 16 and descriptive and analytical statistical tests (Mann–Whitney and Wilcoxon).

RESULTS: The results of Wilcoxon statistical test showed that children in the intervention group at the end of the study compared to the beginning of the study had significant changes in scores around the abdomen ($P = 0.001$), total body water ($P = 0.009$), total fat (0.001 > P), height ($P = 0.001$), weight ($P < 0.001$), body mass index ($P < 0.001$), arm circumference ($P < 0.001$). The mean scores at the end of the study increased compared to the beginning of the study, but the mean scores of the studied indices in the control group did not change significantly.

CONCLUSION: The results of this study showed that diet adjustment training program can be effective on anthropometric indices of children with CLD. For this purpose, the use of this educational method is recommended to improve the anthropometric indices of these children.

Keywords:

Anthropometric indices, children, chronic liver disease, education, nutrition assessment

Introduction

Liver and biliary diseases are one of the leading causes of death in children. The term chronic liver disease (CLD) means a long-term irreversible change in the structure of the liver that may lead to complications such as cirrhosis

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leading to premature death.[1] The exact prevalence of CLD in children is unknown, although in the United States, CLD is reported to cause approximately 15,000 children to be admitted each year.[2] Furthermore, the results of the Gheibi *et al*. (2019) study showed that fatty liver was diagnosed in 9.5% of overweight children and 21.4% of obese children. The prevalence of nonalcoholic fatty liver disease (NAFLD) in obese children was 9.26% for the age group 2–9.5 years, 22.3% for the age group 6–9/11 years, and 35.5% for the age group 12–19 years.[3] Pediatric liver disease includes a variety of disorders, including infections, growth abnormalities, genetic and metabolic disorders, which eventually lead to gradual changes in the structure of the liver and may lead to cirrhosis and its consequences.[4] Complications of CLD play an important role in mortality and disability and reduce patient well-being. This disease is one of the health problems of the country and due to its chronic and irreversible disease, it needs care and treatment education programs.[1,5] The disease leads to complex pathophysiological damage to the liver, and since the liver is the major organ of food metabolism and energy,[6] damage to it impairs the digestion, absorption, distribution, storage, and utilization of food in children with chronic disease. Whatever the underlying cause of CLD in children, it can lead to liver failure and cirrhosis, and ultimately to severe cholestasis with itching, malabsorption, malnutrition, and stunted growth. Malnutrition in CLD is complex and involves several mechanisms including decreased food intake, increased gastrointestinal wasting, malnutrition, increased energy consumption, and defective metabolism of various substrates.[7] The effects of secondary malnutrition due to CLD are different and include general growth disorder, gastrointestinal dysfunction.[8] Nutrition therapy is performed to prevent or treat malnutrition, prevent catabolic status, and improve protein metabolism.[9] Optimal nutrition improves growth and immunological status. Optimal nutrition is effective in preventing further liver damage.[6] Proper nutritional measures are essential in providing optimal care in children with liver disease.[10] These nutritional measures should be planned based on the nature and degree of malnutrition of the infant or child with CLD.[11] The goal is to achieve 180%–130% of the recommended calories for dry weight age[12] and will increase in cases of stress (infection).[13] A good balance of macronutrients, micronutrients, and vitamins is essential to improve nutritional status.[14] The nurse, as a nutrition consultant, evaluates the patient's nutritional status, examines the balance between nutrient intake and the need for it, and thus plays a role in facilitating nutritional care. In other words, it helps the patient by intervening and educating the patient about nutrition and recommending adequate consumption, as well as monitoring the patient's performance.[15] In this way, nurses can play an important role in determining the nutritional needs and diet of the patient through nutrition education and empowerment.[16] On the other hand, the effectiveness of health education programs largely depends on the correct use of health education methods. At present, the most common educational approaches in health education programs are training through workshops and in groups.[17-20] A workshop is an organized set that provides opportunities for individuals to learn through thought, action, and discussion and is not a pointless, incoherent session that deals specifically with feelings and emotions. Workshops are designed with specific and predetermined goals to develop skills in the people being trained.[17-22] Due to the fact that this disease is one of the health problems of the country and due to the chronic and irreversible nature of the disease, it needs care and treatment education programs and lifestyle modification and diet change.[14-17] Unfortunately, proper nutrition in providing micronutrients for children with liver disease is not well known. However, proper nutritional measures are essential to provide optimal care in children with CLD. As a result of early and appropriate food interventions, there are many benefits for these children. The aim of this study was to determine the effect of nutrition adjustment workshop on anthropometric indices in children with CLD.

Materials and Methods

Study design and setting

This study was a two-group randomized clinical trial. This study was performed on 75 patients (45 patients in the intervention group, 30 patients in the control group) of children with CLD in the age range of 2–8 years in the nutrition clinic of Ghaem Educational-Research Center in Mashhad.

Study participants and sampling

The sample size was estimated by a pilot study which, taking into account the sample loss, the sample size in each group was estimated to be 45 people. However, due to the lack of samples and also the hospitalization of a number of children in the control group in the hospital, the final volume of the control group was 30 people. Sampling was performed by available methods. Sampling was performed through the HIS system of the hospital and the files available in the gastrointestinal clinic of Ghaem Hospital. The following keywords were searched in the HIS system of Ghaem Hospital: CLD, cirrhosis, ascites, biliary atresia, neonatal idiopathic hepatitis, congenital metabolic diseases, autoimmune hepatitis, Wilson disease, chronic viral hepatitis, chronic drug hepatitis. Patients who were eligible for the study based on the contents of the file, their telephone numbers were extracted from the HIS file and they were contacted. Patients who were willing to cooperate and had other

inclusion criteria were selected. Subjects were randomly divided into intervention and control groups using a table of random numbers. Using the lottery method, the intervention group of even days and the control group of single days were referred.

Inclusion criteria for the study for children were: age 2–8 years, with liver disease that is at least 6 months after their illness, Iranian citizenship and resident of Mashhad, consent to participate in the study, no mental or physical illness (except for CLD). Exclusion criteria for children related to the study were: unwillingness to continue cooperation, need for TPN nutrition, need for tube feeding. The inclusion criteria for a competent caregiver were: willingness to participate in the study, having a minimum level of literacy in the third level of guidance, it was possible to make a phone call. Exclusion criteria related to the competent caregiver were unwillingness to continue cooperation, unwillingness to participate in workshops.

Data collection tool and technique

The researcher referred to Ghaem Hospital after obtaining permission from the University Ethics Committee and receiving a written letter of introduction from the Deputy of Education of the Faculty of Nursing and Midwifery of Mashhad. After presenting the licenses to the director of this center and introducing the research and its objectives, the researcher referred to the HIS department of the mentioned hospital with the permission of the officials. The patients' telephone numbers were then extracted from the HIS file. Patients were selected as the research unit if they met the inclusion criteria. The selected samples were invited to attend the special clinic of Ghaem Hospital on a specific date (for liver examination and other variables). The research units were randomly divided into control and intervention groups. In this study, the working method consisted of 3 stages (before the workshop, the course of the workshop, and the period after the workshop).

It should be noted that in this study, children and their primary caregivers were included in the study because a workshop was held for primary caregivers of children with CLD. Anthropometric studies were performed on children with CLD. In other words, the participants in this study were children with CLD and their main caregivers.

The stage before holding the workshops

First, the nutrition adjustment guide was developed by studying the articles and valid scientific sources in an integrative manner at both specialized and general levels by the Delphi method. After finalizing the guidelines, their validity was evaluated by experienced professors of pediatric gastroenterology, pediatric nursing, research method, and nutrition by content validity method. Then, educational slides based on the guideline for training in the workshop and the educational content of the workshops were prepared separately for the sessions. An educational brochure on CLD was developed for patient use. At the first visit of the children to the nutrition and diet therapy clinic of Ghaem Hospital, they were visited by a nutritionist. In this session, the researcher introduces himself and the purpose of the research to the competent caregiver and by obtaining their consent to participate in the research, he\she completed a demographic information questionnaire based on the statements of the competent caregiver and the patient's file.

The researcher reviewed the 3-day food intake of the research unit and developed a 24 h 3-day reminder by asking the competent caregiver. The researcher also examined the anthropometer, Body Composition by BIA device. At the end of the session, the researcher invited the intervention group to attend the workshop sessions on a specific date. The workshops were held for 6 sessions over 2 weeks. The control group was asked to return to the clinic 12 weeks after the first visit. The researcher reminded the meetings of the workshop by calling the research units of the intervention group. The researcher also reminded the clinic to return to the clinic by calling the research units.

The stage of holding workshops

The workshop was six sessions, each session lasting 120–190 min, for 2 weeks (3 times a week). Details of the workshop plan are given below.

First session

Materials related to liver function and nutrition, introduction of proteins, fats, vitamins, and CLD were presented. At the end of the session, the above materials were printed and provided to the caregivers.

Second session

Content on the clinical findings of CLD, malnutrition, intolerance and impairment-related digestive disorders, changes in protein and fat metabolism were presented. At the end of the session, the above materials were printed and provided to the caregivers.

Third session

Introduction and calculation of energy for the child, the share of carbohydrate calories in the child's diet, how to calculate and select carbohydrates for the child were discussed. At the end of the session, the above materials were printed and provided to the caregivers.

Fourth session

Introduction and calculation of fat and protein, the share of caloric fat and protein in the child's diet, how to calculate fat and protein in the child's diet, identifying

useful sources of fat and protein for children with CLD. At the end of the session, the above materials were printed and provided to the caregivers.

Fifth session

The purpose of this meeting was to introduce and calculate minerals and vitamins. At the end of the session, the presented materials were given to the audience in writing.

Sixth Session: The practical session for calculating total energy, carbohydrates, proteins, fats, and vitamins was conducted by a competent researcher and caregiver. This session included reviewing past material and practical exercises. Finally, the patient's guide was provided to the caregiver in the form of a booklet.

The stage after holding the workshop

The follow-up of the research units included 12 weeks in which the patient's caregiver was expected to apply what he had learned to the patient during the workshop sessions. To ensure this goal, three telephone call tools, regular counseling sessions, and 3-day recall 24-h forms were used. During the first 4 weeks, once a week, and during the second 4 weeks every 2 weeks, caregivers attended counseling sessions. In these meetings, their questions about following the above regime were answered. The 3-h recall 24-h and 24-h record 24 forms were reviewed and the caregiver was reportedly successful in following the recommended regimen.

After a 12-week follow-up phase, reassessment was performed in terms of anthropometric variables. The obtained data were analyzed by SPSS software (IBM, SPSS Inc., Chicago, Illinois, USA). First, the normality of the data was evaluated using the KolmogorovSmirnov test. According to the results of this test, the data were abnormal, so nonparametric tests were used to examine the data. Wilcoxon test was used for before and after comparisons within the group (intervention and control). MannWhitney test was used for intergroup comparisons before and after training. 95% confidence interval was considered in all tests. A significance level of 0.05 was considered.

Ethical consideration

This study was performed after receiving the code of ethics from the Vice Chancellor for Research of Mashhad University of Medical Sciences (922144) and registration in the clinical trial system (IRCT2015091424019N1). Written consent was obtained from all participants in the study. All caregivers of children with CLD participating in the study were assured that participating in the study would not pose a risk to the children or themselves and that their information would be kept confidential. In order to comply with the ethical principles, 6 workshop sessions and a 12-week follow-up phase that was held for the intervention group were also held for the control group, and the nutritional adjustment guideline was provided to the parents of the children in the control group.

Results

Most of the subjects in both intervention (27 = 0.60%) and control (18 = 60%) were boys. Chi-square test did not show a significant difference in terms of gender frequency between the two groups (P = 1.00), i.e., the two groups are homogeneous in terms of this variable. Furthermore, independent t-test shows that the mean age in the two groups of intervention and control is not significantly different (P = 0.07), i.e., the two groups are homogeneous in terms of this variable. The mean duration of CLD was in the intervention group (4.6 ± 1.8 years) and in the control group (5.1 ± 1.9 years).

The results of data analysis with Mann–Whitney test showed that the mean scores around the abdomen, body water, body fat, weight, and body mass index between the control and intervention groups had significant changes [Table 1].

The results of data analysis with Wilcoxon intragroup test showed that the mean scores of abdominal circumference, body water, body fat, height, weight, body mass index at the beginning and end of the study in the intervention group had significant changes but

Table 1: Comparison of changes in mean scores of anthropometric indices between control and intervention groups at the beginning and end of the study

Variable	Group		*P*, Man-Whitney
	Intervention	Control	
Around the abdomen			
Before intervention	57.8±10.6	64.9±7.1	<0.001
After the intervention	61.1±10.4	63.3±7.0	<0.001
Body fat			
Before intervention	15.6±8.4	23.08±10.1	0.002
After the intervention	18.7±8.5	23.3±10.3	0.005
Body water			
Before intervention	18.57±3.6	19.03±8.4	0.082
After the intervention	20.07±4.2	19.7±4.2	0.024
Height			
Before intervention	122.5±23.1	135.2±29.3	0.064
After the intervention	123.8±23.0	135.1±29.3	0.40
Weight			
Before intervention	26.0±13.9	28.3±18.5	0.103
After the intervention	27.6±15.4	28.0±18.9	0.045
BMI			
Before intervention	15.9±2.6	16.0±3.4	0.082
After the intervention	16.8±3.2	16.1±3.2	0.024
Arm circumference			
Before intervention	18.1±3.1	18.3±3.3	0.742
After the intervention	18.2±3.0	18.3±3.2	0.831

BMI=Body mass index

in the control group, no significant change was found in any of the studied indicators [Table 2].

Discussion

The results of this study showed that after the intervention, the differences between the means of abdominal circumference, total body water, total body fat, weight, height, arm circumference, body mass index between the two groups before and after the intervention were significant and nutrition adjustment training has been effective. In this regard, the study of Youshari *et al*. showed that the median weekly frequency of fruit consumption and the share of fructose in energy in all patients and also the median weekly frequency of fruit consumption in women with abdominal obesity were significantly higher than healthy individuals. Although total fructose intake showed a significant positive correlation with Body mass index (BMI) in healthy individuals, no significant difference was observed in terms of the average weekly frequency of consumption of fruits and vegetables as natural sources of fructose at different BMI levels. After controlling for confounding factors, the only predictor of Wolff-Parkinson-White syndrome disease was found and other factors did not play a role in NAFLD.[23] The results of a review study by Paknahad and Zeraei-Bidgoli showed that the global increase in the prevalence of obesity is associated with an increase in the prevalence of NAFLD and also an increased risk of type 2 diabetes. Although there is no specific treatment for nonalcoholic fatty liver, diet modification has a special role in its treatment. Diets rich in fruits and vegetables were associated with a lower prevalence of metabolic syndrome. High meat intake was associated with components of the metabolic syndrome, especially impaired glucose tolerance. Intake of trans fatty acids from hydrogenated oils has been associated with an increase in inflammatory markers. A diet high in carbohydrates and saturated fatty acids and more fiber and omega-3 fatty acids appear to be helpful in controlling metabolic syndrome. It is recommended that patients with NAFLD limit their intake of fructose-rich foods and beverages. The results showed an inverse relationship between coffee consumption and metabolic syndrome due to the lower prevalence of hypertriglyceridemia. It has been suggested that coffee intake may reduce the risk of NAFLD. Furthermore, a program of gradual weight loss and physical activity is still a gold standard in the treatment of NAFLD. Regular consumption of fruits and vegetables is recommended to reduce the risk of developing metabolic syndrome.[24] The results were consistent with the present study because changes in diet and movement toward improvement can affect the anthropometric indices of patients with CLD. The study of Ghaemi *et al*. showed that in the study group under the diet, total diastolic blood pressure (Low-density lipoprotein), triglycerides, liver enzymes, and cytokeratin 18 had a significant decrease. It is recommended for patients with NAFLD.[25] The study of Bahrololumi *et al*. (2014) showed that a diet rich in pure olive oil in patients with nonalcoholic fatty liver significantly reduces weight, waist circumference, and BMI. Alanine aminotransferase and aspartate aminotransferase enzymes also decreased significantly. They also showed that consuming a diet rich in olive oil, along with mild weight loss, enhances the beneficial effects of weight loss in reducing liver enzymes.[26] According to the present study and studies done, it seems that changing lifestyle and having a proper diet can improve the anthropometric problems of children with chronic diseases.[27] In the studies, the study population was different from the present population. They also reviewed a variety of diets for alcoholic and NAFLD, which reported positive results. The liver is an essential organ in the digestion and absorption of food and food metabolism, and the inability of the liver to perform its functions can have irreversible consequences on a person's health. Proper diet seems to be very effective in these patients and is an effective step toward their health and improvement. A recurrent complication of liver cirrhosis is malnutrition, which is associated with the development of liver failure and is associated with a higher incidence of complications including infection, hepatic encephalopathy, and ascites. Malnutrition,

Table 2: Comparison of intragroup changes in mean scores of anthropometric indices in control and intervention groups at the beginning and end of the study

Variable	Study time		*P* Wilcoxon
	Beginning of the study	End of the study	
Around the abdomen			
Intervention group	57.8±10.6	61.1±10.4	0.001
Control group	64.9±7.1	63.3±7.0	0.229
Body fat			
Intervention group	15.6±8.4	18.7±8.5	0.009
Control group	23.08±10.1	23.3±10.3	0.48
Body water			
Intervention group	18.57±3.6	20.07±4.2	<0.001
Control group	19.03±8.4	19.7±4.2	0.48
Height			
Intervention group	122.5±23.1	123.8±23.0	0.001
Control group	135.2±29.3	135.1±29.3	0.2
Weight			
Intervention group	26.0±13.9	27.6±15.4	<0.001
Control group	28.3±18.5	28.0±18.9	0.2
BMI			
Intervention group	15.9±2.6	16.8±3.2	<0.001
Control group	16.0±3.4	16.1±3.2	0.2
Arm circumference			
Intervention group	18.1±3.1	18.2±3.0	0.814
Control group	18.3±3.3	18.3±3.2	0.621

BMI=Body mass index

obesity, and sarcopenic obesity may worsen the prognosis of patients with liver cirrhosis and reduce their survival. Therefore, nutritional monitoring and intervention are very important in CLD. The most important strength of the present study was to pay attention to the pursuit of sustainability and adherence to diet and training tips. Furthermore, the training method was not used alone, so that in several sessions, patients' questions related to diet modification were answered and their adherence to the diet plan was considered. The presence of the child's primary caregivers in this program is also one of the strengths of the present study.

Limitation and recommendation

This study is one of the few studies performed on children with CLD to investigate the effect of diet on anthropometric indices and this made it impossible for the researcher to compare several studies in this field. Since this study is one of the most preliminary studies in this field, it can be considered as a leading study in future studies in this field. For this purpose, it is recommended to conduct multiple studies on children of different age groups and different cultures to increase the generalizability of the results. It should also be noted that this study can be used as a baseline study for further studies because it is one of the few educational studies performed in Iran on children with CLD to improve anthropometric indices.

Conclusion

The results of this study showed that after the intervention, the difference between the means of abdominal circumference, total body water, total body fat, weight, height, arm circumference, body mass index between the two groups before and after the intervention was significant and nutrition adjustment training has been effective. To this end, proper diet can be effective in improving the anthropometric indices of children with the disease and education can be an effective step in this regard.

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Conflicts of interest

There are no conflicts of interest.

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