Journal of Home Economics
Volume 30, Number (1), 2020
http://homeEcon.menofia.edu.eg

Journal of Home Economics
ISSN 1110-2578

Comparison Study between Antioxidants Therapy and Diet Therapy in Non-Alcoholic Fatty Liver Patients

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Abstract

Background: Nonalcoholic fatty liver disease (NAFLD) is a common liver disease that can progress to cirrhosis. Vitamin E and C can be used in its treatment owing to their antioxidant effects. Prescriptive diet therapy also seems to have a promising effect in Nonalcoholic fatty liver disease (NAFLD) management.

Aim of the work: This study aims to investigate that the effect of therapeutic diets with some natural foods rich in Vitamin C and E on non-alcoholic fatty liver disease.

Subject and methods: This cross-sectional study including 90 patients who were divided into three groups (30 in each). The first group (nutritional therapy group) received nutritional therapy according Individualized nutritional therapy only, the second group (Vitamin C group) received nutritional therapy combined with doth of vitamin C (430 mg), while the third group (Vitamin E group) received nutritional therapy combined with high doth of vitamin E (50mg) Follow-up continued for 3month.

Results: There were significant improvement in ALT, AST, hemoglobin, glucose, weight, body mass index (BMI), muscles, fats, target Body Weight (TBW), Waist-Hip Ratio (WHR) and ultrasonography findings after treatment of NAFLD with vitamin E and C and the diet therapy in comparison with their value before treatment. In addition, there were highly statistically significant differences between both vitamin E and C and the diet therapy group.

Conclusion: Vitamin E and C as well as prescriptive diet therapy induced significant improvement in hepatic condition in NAFLD patients in terms of biochemical, anthropometric measurements and ultrasonography findings; however Vitamin E and C had more significant results compared to the nutritional therapy group.

Keywords: Vitamin E, Vitamin C, Prescriptive diet, Nonalcoholic fatty liver disease and liver patients

Introduction

NAFLD is characterized by excessive hepatic fat accumulation, associated with insulin resistance (IR), and defined by the presence of steatosis in >5% of hepatocytes according to histological analysis or by the proton density fat fraction (PDFF, providing a rough estimation of the volume fraction of fatty material in the liver >5.6% assessed by proton magnetic resonance spectroscopy (1 H-MRS) or quantitative fat or water selective magnetic resonance imaging (MRI). NAFLD includes two pathologically distinct conditions with different prognoses: nonalcoholic fatty liver (NAFL) and non-alcoholic steatohepatitis (NASH); the latter covers a wide spectrum of disease severity, including fibrosis, cirrhosis and hepatocellular carcinoma (HCC) (**Karger and Freiburg, 2016)**.

NAFLD represents the hepatic manifestation of the insulin resistance or metabolic syndrome and is particularly associated with obesity, type 2 diabetes mellitus, high triglyceride levels, and low high-density lipoprotein cholesterol levels **(Younossi *et al*., 2002 and Clark ,2006).**

Oxidative stress appears to be the result of an imbalance between provident and antioxidant processes in the liver. Such imbalance is likely to be the consequence of: induction of the microsomal cytochrome P450 2E1, which is overexpressed in steatohepatitis because of impaired insulin signaling, mitochondrial release of reactive oxygen species, H2O2 production from peroxisomes oxidation of fatty acids, and cytokine released from activated inflammatory cells **(Younossi *et al*., 2002).** Thus, genes for pro-oxidant (ie, CYP2E1 polymorphism) and antioxidant pathways could also have a role in susceptibility to NASH **(Farrell, 2003).**

In addition, these oxidative processes induce a depletion of the potent antioxidants glutathione and vitamin E. The latter is believed to be the ’last antioxidant defense in lipid membranes. Antioxidant supplements, therefore, could potentially protect cellular structures against damage from oxygen-free radicals and reactive products of lipid peroxidation **(Lirussi *et al*., 2007).**

Insulin resistance, metabolic syndrome, and oxidative stress are the key pathologies in NAFLD. Lifestyle modifications consisting of diet, exercise, and weight loss are still considered the first line treatments for NAFLD **(Haufe *et al*., 2011*)* and(Asrih and Jornayvaz,**

2014). However, the attrition and dropout rates during lifestyle modification regimens can be as high as 40% and 50%, respectively **(Lin and Huang, 2019).** According to the European Association for the Study of the Liver (EASL), pharmacological therapies should be considered in cases of progressive NAFLD where lifestyle modifications are producing inadequate results **(EASL, 2016).**

Vitamin E is being currently recommended for the treatment of NAFLD by the American Association for the Study of Liver Diseases (AASLD) and the National Institute for Health and Care Excellence (NICE), UK **(Leoni *et al*., 2018).** Mitochondrial dysfunction and endoplasmic reticulum stress lead to increased lipid peroxidation. This causes an imbalance in pro-oxidants and antioxidants leading to increased oxidative stress and liver dysfunction in NAFLD (**Masarone *et al*., 2018).** In the context of NAFLD, vitamin E exerts a variety of effects. It acts as an antioxidant and reduces reactive oxygen species; increases the antioxidants like glutathione and superoxide dismutase, and lowers the hepatic inflammation and fibrosis **(Hadi *et al*., 2018).**

SUBJECTS AND METHODS

The Used Materials: Wheat germ oil 100 % natural cold pressed from Imtenan market in Tanta ,it is a rich source of vitamin E , The date of its production 18/3/2019 . And daily fresh fruits and vegetables (guava, kiwi and green pepper) were obtained market in Mahalla from local.

Subjects:

The study was conducted in Mahalla Hepatology Teaching hospital – Gharbia Governorate, Egypt. The study was included (90) patients from (male and female) with non-alcoholic fatty liver disease (NAFLD) treated with antioxidants and nutrition therapy. Inclusion criteria patients with non-alcoholic fatty liver disease (NAFLD) aged 18-60 years old who fulfilled the following criteria for treatment with nutritional therapy follow up in nutrition clinic in Mahalla Hepatology Teaching Hospital according Individualized nutritional therapy, Individualized nutritional therapy combined with doth of vitamin C and Individualized nutritional therapy combined with high doth of vitamin E for 3 months, both males and females, not hospitalized and receiving regular diet. Exclusion criteria: end stages liver diseases, clinical or surgical hospitalization in the last 30 days, ongoing enteral or parenteral nutrition, refusal to cooperate with the study and Data was collected by

structured questionnaire which was filled by doing interview with each patient. The collected data covered Socio-demographic characteristics of the patient as sex, occupation, marital status and educational level; it also covered the clinical manifestations of the disease, symptoms and signs of malnutrition and associated other chronic diseases if present. The sample patients were randomly selected for each group so the was included This cross-sectional study including (30) patients based on nutritional therapy follow up in nutrition clinic in Mahalla Hepatology Teaching Hospital according Individualized nutritional therapy, (30) patients based on Individualized nutritional therapy combined with dose of vitamin C (430 mg) daily fresh fruits and vegetables It includes the following (100g fresh guava ,100g fresh kiwi and 100g fresh green pepper) delivered to the patient daily from the Mahalla Hepatology Teaching hospital kitchen and (30) patients based on Individualized nutritional therapy combined with high doth of vitamin E (50mg) Wheat germ oil Delivered to the patient from the Mahalla Hepatology Teaching hospital Follow-up continued for 3month

Methods:

The patient was interviewed weekly and followed up at the Nutrition Clinic at Mahalla Hepatology Teaching hospital with a Nutritionist for 3 months. Data was collected from patients using a predesigned structured questionnaire:

1- **Socio-demographic data**: including: Sex, Marital status: which included four categories; single, Married, divorced and widowed, occupation which included office employee, unemployed, level of education which included: not educated, educated, residence which included urban and rural residence**(Wei *et al*., 2016)**.

2-**Vitamins were estimated and doses were calculated as follows:** Vitamin C was estimated on the basis of food composition tables for Egypt as follows : 100 grams guava containing (227 mg of vitamin C) , 100 grams kiwi containing (95 mg of vitamin C) and 100 grams green pepper containing (110 mg of vitamin C) **(A.R.E. National Nutrition Institute,2006).** Vitamin E was estimated as follows: Wheat germ oil, 1 tablespoon containing (25mg of vitamin E) **(U.S. Department of Agriculture, 2019).**

3-**Anthropometric assessment**: including 1-Weight:weight was measured in kg using beam balance (Beurer BG42) scale by bioelectric impedance technique with minimum clothing without

shoes, reading we taken to the nearest 0.5 kg **(Tai, *et al.*, 2010)**. 2-Body mass index: body mass index (BMI) was calculated according to the following equation, weight in (kg) / height in metre^2 (kg/m^2). The participant was considered underweight when BMI <18.5kg/m^2, normal weight when BMI was 18.5-24.9kg/m^2, overweight when BMI >25-29.9kg/m^2 , obese class 1 when BMI was 30-34.9kg/m^2, obese class 2 when BMI was 35- 39.9kg/m^2 and morbid obese when BMI was ≥ 40kg/m^2 **(Smith, 2016).**3-Body composition: body fat percentage, body water percentage and body muscle percentage were documented before treatment and after treatment using bioelectric impedance analysis In Body 170 **(Bering, *et al.*, 2018 and Kyle, *et al.*, 2004**).4-Waist\hip ratio: Waist\hip ratio (WHR) is obtained from dividing the waist circumference by the hip circumference**(Smith, 2016).**

4-Dietary assessment: 24 hours recall method: obtaining accurate amounts of foods and beverages consumed by patients in the three days preceding data collection, and the data from the 3 days dietary recall were used to arrive at estimates of daily nutrient intake from standard recipes (in 24 hours) **(Martin, 2005).**

5-Biochemical analysis: Records were reviewed to investigate the changes in AST, ALT, ultra sound, glucose and hemoglobin before treatment and after treatment **(Taneja, *et al.*, 2018).**

6-Statistical analysis of data: Results were expressed as the arithmetic mean ± standard deviation (SD). Data for multiple variable comparisons were analyzed by one-way analysis of variance (ANOVA statistical measure). For the comparison of significance between groups, Duncan's test was used as a post hoc test according to the statistical package program (SPSS version 17.0) **(Kim, 2015).**

RESULTS AND DISCUSSION

Table (1) the demographic data of studied groups are shown in table (1). The study included 3 groups: Nutrition therapy (n= 30), vitamin C (n= 30) group and vitamin E (n= 30) groups. Each group included 15 males and 15 females. The mean ages of Nutrition therapy, vitamin C group and vitamin E groups were 39.90, 41.77 and 39.83, respectively. Regarding the marital status, the main percentages of each group were married i.e. 23 (76.7%), 26 (86.7%) and 22 (73.4%) for Nutrition therapy, vitamin C group and vitamin E groups, respectively. The mean heights of the studied groups were 167.30,168 and 164.43 for

Nutrition therapy, vitamin C group and vitamin E groups, respectively. Regarding education, 24(80%) only persons of the Nutrition therapy group were educated compared with 28 (93.3%) persons of vitamin C group compared with 25 (83.3%) persons of vitamin E group. Regarding the Job, 20 (66.7%) only persons of the Nutrition therapy group had an employee compared with 20 (66.7%) persons of vitamin C group compared with 20 (66.7%) persons of vitamin E group. The main residence for the studied persons was in rural areas (20, 23 and 21 persons for Nutrition therapy, vitamin C group and vitamin E groups, respectively) while the rest of each group was from urban areas.

By comparison, (**Kawanaka *et al*., 2013)** conducted their study on twenty-three patients with NASH (ten men and 13 women, Matteoni classification 3 or 4, mean age 53.1 ± 14.9 years). Twenty patients had a body mass index > 25 kg/m2. Nineteen patients had hypertension and 18 patients had hyperinsulinemia and dyslipidemia. Before pretreatment, all patients had been diagnosed as having NASH by liver biopsy.

In addition, **(Murer *et al*., 2014)** conducted their study on the placebo group consisted of 21 children (11 males, 10 females; age: 12.7 ± 1.6 y) and the treatment group of 23 children (11 males, 12 females; age: 12.8 ± 1.4 y). Randomization at baseline between the treatment and Nutrition therapy groups was effective; there were no significant differences between the groups in age, gender, or anthropometric or metabolic parameters, except for higher baseline concentrations of α-CEHC, uric acid, AST, and ALT in the treatment group ($P < 0.05$).

Moreover, **(Wei *et al*., 2016)** conducted their study on a total of 3741 subjects (1550 males and 1921 females) aged from 40 to 80 years old. The overall prevalence of NAFLD in the study population was 28.8%. The comparison of the two groups (NAFLD versus non NAFLD) exhibited significant differences in terms of sex ratio, nutritional supplementation, education background, BMI, obesity, menopause, dietary energy intake, fiber intake, fat intake and vitamin E intake.

While, **(Lavine, 2011)** add another group as they included one hundred seventy-three patients who were randomized to receive vitamin E (n = 58), metformin (n = 57), or placebo (n = 58). Ages ranged from 8 to 17 years (mean, 13.1 years), and the majority were male (81%) and Hispanic (61%). Most patients were peripubertal, obese, and insulin resistant. Baseline characteristics were similar for all 3 treatment groups

with respect to demographics, anthropometrics, quality-of-life assessments, pertinent laboratory data, and liver histology.

Table (1): Socio-demographic data of the studied groups:

Items	Nutrition therapy group N (%)	Vit Cgroup N (%)	Vit E group N (%)
Gender			
Male	15(50%)	15(50%)	15(50%)
Female	15(50%)	15(50%)	15(50%)
Total	30(100%)	30(100%)	30(100%)
Age			
>20year	1(3.3%)	7(23.3%)	1(3.3%)
20-40 year	16(53.3%)	10(33.3%)	14(46.7%)
41-60 year	13(43.4%)	13(43.4%)	15(50%)
Total	30(100%)	30(100%)	30(100%)
Mean ±S.D	39.90±11.94	41.77±13.64	39.83±13.47
Martial statues			
Single	4(13.3%)	4(13.3%)	4(13.3%)
Married	23(76.7%)	26(86.7%)	22(73.4%)
Divorced	3(10%)	0(0%)	0(0%)
Widow	0(0%)	0(0%)	4(13.3%)
Total	30(100%)	30(100%)	30(100%)
Height (cm)			
Mean ±S.D	167.30±9.08	168±8.51	164.43±8.68
Education			
Educated	24(80%)	28(93.3%)	25(83.3%)
Uneducated	6(20%)	2(6.7%)	5(16.7%)
Total	30(100%)	30(100%)	30(100%)
Job			
employee	20(66.7%)	20(66.7%)	20(66.7%)
unemployed	10(33.3%)	10(33.3%)	10(33.3%)
Total	30(100%)	30(100%)	30(100%)
Residence			
urban	10(33.3%)	7(23.3%)	9(30%)
rural	20(66.7%)	23(76.7%)	21(70%)
Total	30(100%)	30(100%)	30(100%)

Results in **Table (2)** showed the anthropometric measurements of the three studied groups, there were no statistically significant differences between the study groups as regards the means of weight, BMI, muscles, fat, TBW and WHR levels before Nutrition therapy, vitamin C and vitamin E treatments. This date, indicate that all cases were comparable in results prior to their participation in the study.

Table (2): Anthropometric assessment of the three studied groups of non-alcoholic fatty liver disease (NAFLD) before treatment regimens.

Parameter	Groups before treatment	Mean±S.D	F	p-value
Weight(kg)	Nutrition therapy group	107.80±11.54	0.252	0.778
	Vit C group	108.20±13.24		
	Vit E group	105.47±21.65		
BMI	Nutrition therapy group	38.37±4.06	0.270	0.764
	Vit C group	38.13±5.19		
	Vit E group	39.40±10.39		
Muscles(kg)	Nutrition therapy group	33.80±9.25	2.090	0.130
	Vit C group	34.57±6.44		
	Vit E group	31.57±6.23		
Fat (kg)	Nutrition therapy group	49.87±5.68	0.050	0.951
	Vit C group	50.33±7.57		
	Vit E group	49.50±14.89		
TBW	Nutrition therapy group	43.87±6.52	1.027	0.363
	Vit C group	43.83±6.43		
	Vit E group	41.63±7.73		
WHR	Nutrition therapy group	1.01±0.04	0.059	0.943
	Vit C group	1.02±0.04		
	Vit E group	1.01±0.034		

Results in **Table (3)** showed the anthropometric measurements of the three studied groups, there were no statistically significant differences between the study groups as regards the means of Weight, BMI, Muscles and Fat after Nutrition therapy, vitamin C and vitamin E treatments. There were statistically significant differences between the study groups as regards the means of TBW and WHR after Nutrition therapy, vitamin C and vitamin E treatments.

TBW was significantly decreased from 38.70±5.43 in Nutrition therapy group to 33.23±5.79 in vitamin C group and 36.60±6.09 in vitamin E group. However, no statistically significant difference in TBW was found between vitamin C and vitamin E groups after treatment indicating the comparable efficacy of both vitamins in reducing TBW.

WHR was significantly decreased from 0.97±0.05 in Nutrition therapy group 0.89±0.17 in vitamin C group. However, no statistically significant difference in WHR was found between control group and vitamin E group or between vitamin C and vitamin E groups after treatment indicating that vitamin C was better than vitamin E in reducing WHR.

In accordance, **(Murer *et al.*, 2014)** revealed that, mean weight gain was 2.2 ± 3.5 and 1.9 ± 4.2 kg in the placebo and treatment groups, respectively. In addition weight as well as BMI did not differ between groups (P > 0.05).

In the same line,**(Akcam *et al.*, 2011)** demonstrated that the administration of vitamin E for six months improves the parameters of body composition and insulin dynamics in obese adolescents with liver steatosis. The mean changes in fasting insulin and BMI-SDS, and insulin sensitivity (homeostasis model assessment) were greater in vitamin E group than in the group given dietary and exercise advice alone.

From all previous researches, the current study concluded that, although vitamin E has been the most studied with NAFLD, other vitamins have gained interest as well. However, direct comparisons between these vitamins and vitamin E have not been done to deem whether these vitamins have a greater or lesser therapeutic effect than vitamin E. Vitamin C is very similar to vitamin E in that it is also a strong antioxidant and thus can decrease the oxidative stress seen in patients with NAFLD and NASH. Vitamin C has been used with vitamin E as a combination ant oxidative treatment in several studies to treat NASH and NAFLD **(Kawanaka *et al.*, 2013) and (Murer *et al.*, 2014).**

Table(3): Anthropometric assessment of the three studied groups of non-alcoholic fatty liver disease (NAFLD) after treatment regimens.

+ - +Parameter	Groups after treatment	Mean±S.D	F	p-value	Tukey test
Weight(kg)	Nutrition therapy group	96.93±11.03	1.451	0.240	--------
	Vit C group	93±10.79			
	Vit E group	90.83±18.84			
BMI	Nutrition therapy group	34.43±3.71	0.644	0.528	--------
	Vit C group	32.63±4.15			
	Vit E group	33.80±9.25			
Muscles(kg)	Nutrition therapy group	31.23±6.83	1.916	0.153	--------
	Vit C group	32.40±6.41			
	Vit E group	29.20±5.96			
Fat (kg)	Nutrition therapy group	40.67±5.62	2.899	0.060	--------
	Vit C group	35.33±5.65			
	Vit E group	39.13±13.06			
TBW	Nutrition therapy group	38.70±5.43	6.842	0.002*	G1&G2->0.001*
	Vit C group	33.23±5.79			G1&G3->0.341
	Vit E group	36.60±6.09			G2&G3->0.067
WHR	Nutrition therapy group	0.97±0.05	4.863	0.010*	G1&G2->0.008*
	Vit C group	0.89±0.17			G1&G3->0.124
	Vit E group	0.92±0.04			G2&G3->0.517

As shown in **Table (4)**, there were no statistically significant differences between the study groups as regards the means of AIT, AST, HGB and glucose levels before Nutrition therapy, Vitamin C and vitamin E treatments. Such date, indicate that all cases were comparable in results prior to their participation in the study.

Table (4): Biochemical assessment of the three studied groups of non-alcoholic fatty liver disease (NAFLD) before treatment regimens .

Parameter	Groups before treatment	Mean±S.D	F	p-value
AIT	Nutrition therapy group	67.10±21.53	0.098	0.907
	Vit C group	66.10±7.17		
	Vit E group	68.03±18.53		
AST	Nutrition therapy group	66.27±20.44	0.259	0.722
	Vit C group	63.70±7.62		
	Vit E group	66.40±18.12		
HGB	Nutrition therapy group	11.97±1.81	0.694	0.502
	Vit C group	11.80±1.75		
	Vit E group	11.40±2.16		
Glucose	Nutrition therapy group	133.3±33.29	1.148	0.322
	Vit C group	133.10±32.23		
	Vit E group	145.27±41.87		

As shown in **Table (5)**, there were statistically significant differences between the study groups as regards the means of AIT and AST but not HGB and Glucose levels after vitamin C and vitamin E treatments.

AIT was significantly decreased from 45.43±10.39 in Nutrition therapy group to 37.80±6.13 in vitamin C group and 36.03±5.40 in vitamin E group. However, no statistically significant difference in AIT was found between vitamin C and vitamin E groups after treatment indicating the comparable efficacy of both vitamins in decreasing AIT.

AST was significantly decreased from 45.03±10.55 in Nutrition therapy group to 36.27±5.34 in vitamin C group and 34.73±5.25 in vitamin E group. However, no statistically significant difference in AIT was found between vitamin C and vitamin E groups after treatment indicating the comparable efficacy of both vitamins in decreasing AIT.

This mechanism action of both vitamin E&C can be explained by their antioxidant effects. As in cases with nonalcoholic fatty liver, there were marked increases in oxidative stress generation which mainly interfere with its pathogenesis **(Murer *et al*., 2014).**

Similarly,**(Murer *et al.*, 2014)** conducted their study on a Nutrition therapy group and a case group (administrated vitamin E, 400 IU; vitamin C, 500 mg; selenium, 50 μg)) ((n = 44; mean ± SD age: 12.7 ± 1.5 y)) and revealed that, there was a significant effect on alanine aminotransferase (P<0.009) a trend toward a significant effect on aspartate aminotransferase (P=0.09).

In agreement with the current study, (**Sanyal *et al.*, 2010)** who demonstrated that, serum alanine and aspartate aminotransferase levels were reduced with vitamin E in comparison with placebo (P<0.001), and vitamin E was associated with reductions in hepatic steatosis (P=0.005) and lobular inflammation (P=0.02) but not with improvement in fibrosis scores (P=0.24 for vitamin E).

An experimental study, conducted by **(Oliveira *et al.*, 2003)** reported that, vitamin C reduced oxidative stress and markedly inhibited the development of experimental liver steatosis induced by choline-deficient diet, while vitamin E neither prevented the development of fatty liver nor reduced the oxidative stress in this model. They observed moderate macro- and micro vesicular fatty change in the perioral zone in control and vitamin Entreated rats, whereas in vitamin C-treated rats did not develop liver steatosis in this model.

In addition, the levels of AST and triglycerides were increased to a similar extent in vehicle, vitamin E or vitamin C-treated rats. On the other hand, vitamin C prevented the rise of luminescence values in the animals fed a choline-deficient diet plus vitamin C (1080 ± 330 cpm/mg/minx103) as compared to the animals fed a choline-deficient diet plus vitamin E or control (2247 ± 790; 2020 ± 407 cpm/mg/ minx103) ($p < 0.05$).

Thus, **(Oliveira *et al.*, 2003)** suggested that NAFLD may be associated with oxidative stress and that the treatment with vitamin C may block the development of and NAFLD, while vitamin E may not. Future investigations are necessary to elucidate the role of ascorbic acid in NAFLD prevention.

In addition, **(Harrison *et al.*, 2003)** demonstrated that vitamin E and vitamin C, were well tolerated and were effective in improving fibrosis scores in NASH patients. While they were in disagreement with the current study in that, there was no improvement in necroinflammatory activity or ALT was seen with this combination of drug therapy.

In harmony with the present study, a cross-sectional study noted an inverse relationship between the incidence of NAFLD and dietary vitamin C intake in older adults eluding that dietary supplementation can provide a protective role against NAFLD **(Murer *et al*., 2014) and (Wei *et al*., 2016).**

In contrast, another two trials suggested that the combination of vitamin C and vitamin E supplementation did not achieve a better treatment effect than lifestyle intervention in children with NAFLD **(Nobili *et al*., 2006)and (Nobili *et al*., 2008).**

The discrepancies among the current study and both(**Nobili *et al*., 2006) and (Nobili *et al*., 2008)** researches may be due to the the independent effect of vitamin C supplementation, and there were significant differences between children and adults in terms of liver physiology, development and the features of NAFLD, which can result in different outcomes **(Papandreou *et al*., 2007).**

Table (5): Biochemical assessment of the three studied groups of non-alcoholic fatty liver disease (NAFLD) after treatment regimens.

Parameter	Groups after treatment	Mean±S.D	F	p-value	Tukey test
AIT	Nutrition therapy group	45.43±10.39	12.861	0.000**	G1&G2->0.001*
	Vit C group	37.80±6.13			G1&G3->0.000**
	Vit E group	36.03±5.40			G2&G3->0.606
AST	Nutrition therapy group	45.03±10.55	16.617	0.000**	G1&G2->0.000**
	Vit C group	36.27±5.34			G1&G3->0.000**
	Vit E group	34.73±5.25			G2&G3->0.707
HGB	Nutrition therapy group	12±1.86	0.084	0.920	--------
	Vit C group	12.13±1.55			
	Vit E group	11.97±1.59			
Glouse	Nutrition therapy group	124.50±28.11	1.034	0.360	--------
	Vit C group	121.10±20.53			
	Vit E group	130.87±30.47			

As shown in **Table (6)**, no statistically significant difference was detected in the US between the study groups before treatment and after treatment. However, there were statically significant difference between patients before treatment and patients after treatment in each group as regards US findings indicating improvement of the condition particularly the severe and marked disease.

In the same line, **(Kawanaka *et al.*, 2013)** demonstrated that significant improvements in liver fibrosis were reported in patients with NASH treated using a combination of vitamins C and E. Staging of fibrosis improved in four of 10 cases, grade of necroinflammatory activity decreased in eight of 10 cases, and grade of steatosis decreased in six of 10 cases. In four patients, the grade of steatosis remained unchanged, but the grade of necroinflammatory activity improved in all cases, and staging of fibrosis also improved in two cases. Fibrosis stage improved from F3 to F1, while the grading of necroinflammatory activity decreased from A3 to A1. However, no change in fatty deposition was evident. In addition, they demonstrated that, treatment with vitamins C and E also resulted in a decrease in 8-hydroxydeoxyguanosine levels

Similarly, **(Sanyal *et al.*, 2010)** reported that vitamin E (n = 84) in patients with NASH significantly improved serum alanine aminotransferase levels, hepatic steatosis, and lobular inflammation, as compared with placebo, but with no improvement in fibrosis.

Furthermore**, (Harrison *et al.*, 2003)** reported that 21 patients with NASH were given vitamin E 1000 IU and vitamin C 1000 mg or placebo daily for six months, yielding a significant improvement in fibrosis score among treated patients.

Table (6): **Ultrasonography of the three studied groups of non-alcoholic fatty liver disease (NAFLD) before and after treatment regimens .**

Ultrasonography (US)					
Before treatment	**Nutrition therapy group N (%)**	**Vit C group N (%)**	**Vit E group N (%)**	χ^2	**p-value**
Free	0(0%)	0(0%)	0(0%)	0.056	0.812
Mild	0(0%)	0(0%)	0(0%)		
Moderate	9(30)	12(40%)	8(26.7%)		
Severe	15(50%)	10(33.3%)	13(43.3%)		
Marked	6(20%_	8(26.7%)	9(30%)		
Total	30(100%)	30(100%)	30(100%)		
After treatment					
Free	0(0%)	0(0%)	0(0%)	2.128	0.145
Mild	5(16.7%)	10(33.3%)	9(30%)		
Moderate	12(40%)	11(36.7%)	20(66.7%)		
Severe	13(43.3%)	9(30%)	1(3.3%)		
Marked	0(0%)	0(0%)	0(0%)		
Total	30(100%)	30(100%)	30(100%)		
χ^2	19.000	27.000	28.000	---------	---------
p-value	0.000**	0.000**	0.000**		

On the other hand, **(Oliveira *et al.*, 2003)** demonstrated that Vitamin E neither prevented the development of fatty liver nor reduced the oxidative stress in this model. However, they were in agreement as regards the role of Vitamin C. They demonstrated that Vitamin C reduced oxidative stress and markedly inhibited the development of experimental liver steatosis induced by choline-deficient diet.

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Journal of Home Economics, Volume 30, Number (1), 2020

دراسة مقارنة بين العلاج بمضادات الأكسدة والعلاج الغذائي في مرضى الكبد الدهني غير الكحولي

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أستاذ التغذية وعلوم الأطعمة- كلية الاقتصاد المنزلي- جامعة المنوفيه[1] ،زميل تغذية العلاجية- بمستشفي كبد المحلة التعليمي[2] ،باحثة ماجستير في الاقتصاد المنزلي تخصص التغذية وعلوم الأطعمة

الملخص العربى

الخلفية: مرض الكبد الدهني غير الكحولي (NAFLD) هو مرض كبدي شائع يمكن أن يتطور إلى تليف الكبد. يمكن استخدام فيتامين (هـ) و (ج) في علاجه بسبب آثارهما المضادة للأكسدة. يبدو أيضًا أن العلاج الغذائي الوصفي له تأثير مهم في علاج مرض الكبد الدهني غير كحولي (NAFLD).

هدف الدراسة : تهدف هذه الدراسة للتعرف علي تاثير الوجبات الغذائية المضافة لها بعض المواد الغذائية الغنية بفيتامين ج وه علي مرضي الكبد الدهني الغير كحولي .

المرضى والطرق: هذه الدراسة المقطعية شملت 90 مريضاً تم تقسيمهم إلى ثلاث مجموعات تحتوي كل مجموعة علي (30 مريض)تلقت المجموعة الأولى (مجموعة العلاج الغذائي) علاجًا غذائيًا وفقًا للعلاج الغذائي الفردي فقط ، بينما المجموعة الثانية (مجموعة فيتامين سي) علاجًا غذائيًا مع فيتامين سي (430 مجم) ، بينما المجموعة الثالثة (مجموعة فيتامين هـ) العلاج الغذائي العلاج مع جرعة عالية من فيتامين هـ (50 ملغ) استمرت المتابعة لمدة 3 أشهر.

النتائج: كان هناك تحسن كبير في ALT و AST والهيموجلوبين والجلوكوز والوزن ومؤشر كتلة الجسم (BMI) والعضلات والدهون ووزن الجسم المستهدف (TBW) ونسبة الخصر إلى الورك (WHR) ونتائج التصوير بالموجات فوق الصوتية بعد علاج NAFLD بفيتامين E و C والعلاج الغذائي بالمقارنة مع قيمتها قبل العلاج. بالإضافة إلى ذلك ، كانت هناك فروق ذات دلالة إحصائية عالية بين كل من فيتامين E و C ومجموعة العلاج الغذائي.

الخلاصة: أدى فيتامين (هـ) و (ج) بالإضافة إلى العلاج الغذائي الوصفي إلى تحسن كبير في حالة الكبد لدى مرضى الكبد الدهني غير الكحولي من حيث القياسات البيوكيميائية والقياسات البشرية ونتائج الموجات فوق الصوتية لكن كان لفيتامين E و C نتائج أكثر دلالة مقارنة بمجموعة العلاج الغذائي.

الكلمات الدالة : فيتامين هـ، فيتامين سي، نظام غذائي وصفي، مرض الكبد الدهني غيركحولي، مرضي الكبد.