Analysis of the association between body composition and liver health in patients with NAFLD

Introduction

Nonalcoholic fatty liver disease (NAFLD) is a condition that is characterized by a buildup of fat in the liver of individuals who drink little to no alcohol (≤ 2 drinks per day in men & ≤ 1 drink per day in women).[1] Nonalcoholic steatohepatitis (NASH) is a progressive form of NAFLD where the liver has been damaged and fibrosis is present.[1]

Obesity is associated with an increased risk of NAFLD. The prevalence rate of steatosis is approximately 15% in individuals with a BMI below 30.0 kg/m^2, 65% in individuals with a BMI between 30.0–39.9 kg/m^2, and 85% in individuals with a BMI ≥ 40.[2] From 1999–2000 through 2017–2020, obesity prevalence in the United States increased from 30.5% to 41.9%.[3] With rising obesity rates, NAFLD is also becoming more prevalent. Currently, there are no medications that can reduce the amount of fat in the liver, and the most effective way to reverse NAFLD is a balanced diet and weight loss.

The objective of the present study was to assess the effectiveness of a 6-week nutrition program in improving body composition and reversing NAFLD. The primary goals of the study were fat loss and decrease in CAP scores.

Materials and Methods

In the present study, purposive sampling was utilized in order to select individuals who were established patients at the clinic, had been previously diagnosed with NAFLD, and had a FibroScan® (Echosens) within the previous month. 11 participants were initially selected, and 9 of those individuals completed the study.

The required criteria for each participant included a previous diagnosis of NAFLD, no history of alcohol abuse, and consent to participate. The objectives of the study were explained, and written consent was obtained from each of the participants. Exclusion criteria for the study included individuals with an implanted medical device and individuals who have been diagnosed with cirrhosis. The study included 9 individuals (5 women, 4 men; age = 51.7 ± 11.5 years). Participants ranged from overweight to severely obese, with an average BMI of 33.2 ± 6.1 kg/m^2.

The objectives of the study were explained, and informed consent was obtained from each participant. Participants filled out a questionnaire that assessed their knowledge on nutrition and portion sizes, estimated daily activity levels, and evaluated current eating habits. A nutritionist provided nutritional counseling to participants, encouraging a Mediterranean diet and increased exercise. An InBody 570 Body Composition Analyzer was used to measure body composition values including percent body fat, visceral fat level, basal metabolic rate, weight, BMI, and lean mass. The InBody machine is more effective at accurately representing fat loss that a household scale because it breaks down weight into fat, muscle, and water percentages. A FibroScan® machine was used to measure steatosis using CAP scores (dB/m) and amount of fibrosis of the liver (kPa). Participants followed a Mediterranean diet for 6 weeks while tracking food, exercise, and caloric intake in a food diary. Participants were encouraged to eat in a ~300 calorie deficit per day as calculated by basal metabolic rate and estimated exercise levels. Weekly check-ins took place by phone to track progress and encourage diet modifications. At the conclusion of the study, body composition values and FibroScan® scores were recorded for a second time to assess changes. Participants were asked to fill out a second questionnaire in order to assess increased knowledge about nutrition.

Mean values were used to evaluate quantitative data and standard deviation was used to measure variability. The Pearson correlation coefficient (r) was used to measure the strength of the relationship between body composition changes and CAP scores. One tailed t-tests were used to assess improvement in scores and p-values equal to or less than 0.05 were considered significant.

Results

At the conclusion of the study, the InBody machine revealed participants lost an average of 7.2 pounds (SD=5.5) throughout the 6 weeks. Significant improvement was seen in each of the additional body composition measurements, as seen in Table 1.

Table 1: Average Changes in Body Composition from Initial to Final Visit

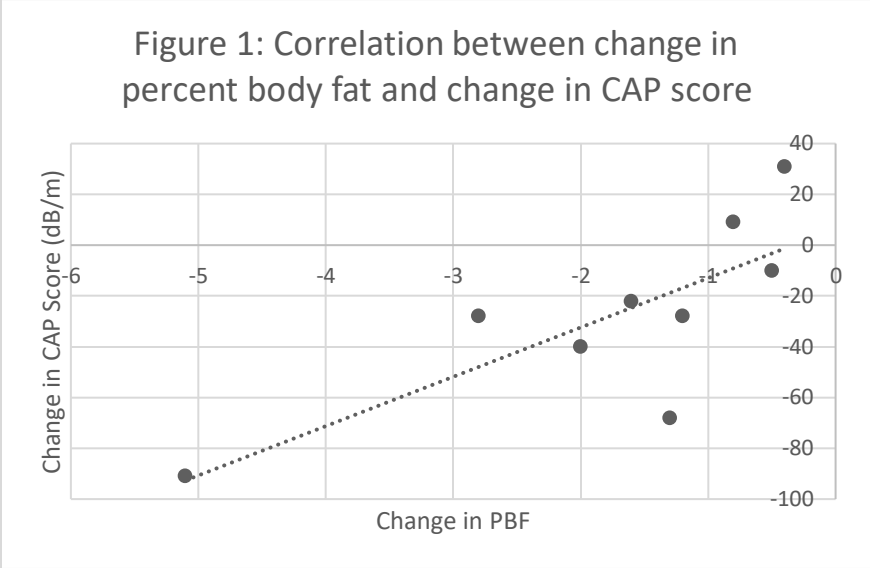
	Total Body Weight (lbs)	Percent Body Fat	Visceral Fat Level (cm^2)	Body Mass Index (kg/m^2)
Percent change (%)	-3.4*	-5.1*	-7.2*	-3.4*
Standard deviation (%)	± 2.5	± 4.3	± 8.6	± 2.5

* Denotes a p-value less than or equal to 0.05

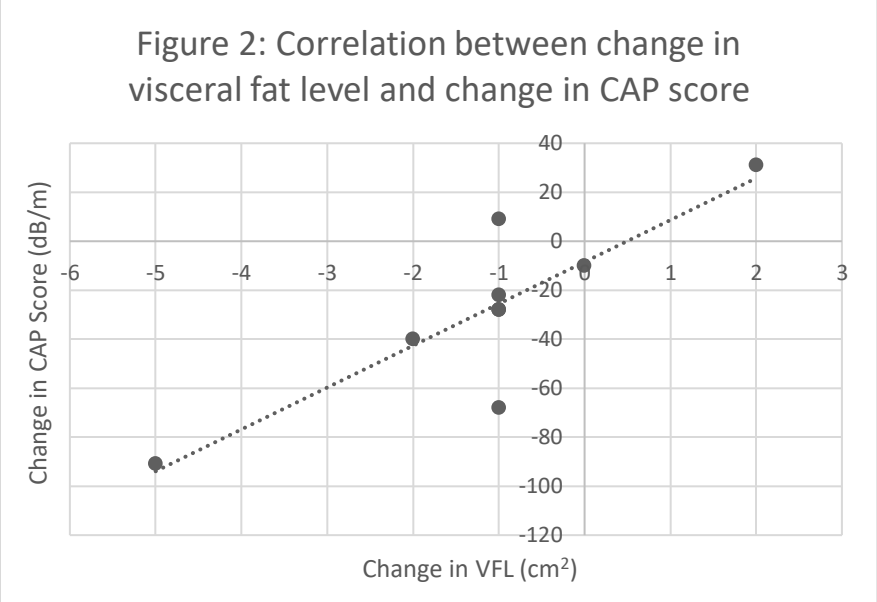
In this study, the average CAP score decreased by 27.4 dB/m (SD = 34.8, $p < 0.05$). The average fibrosis score decreased by 0.8 kPa (SD=1.8), with a p-value of 0.12. This p-value reveals that the change in fibrosis cannot be considered statistically significant. We can conclude that the 6-week nutrition program resulted in a significant decrease of fatty involvement on the liver but did not result in a significant decrease in scarring.

Certain body composition elements had a stronger correlation with improvements in liver health. Below, figures 1 and 2 show comparisons of body composition values with changes

in CAP scores for each participant along with the data trendline. The correlation coefficient (r) for Figure 1 is 0.77 which denotes a strong positive correlation between improvement in percent body fat and improvement in CAP score.



The correlation coefficient for Figure 2 is r = 0.88, showing a very strong positive relationship between change in visceral fat level and change in CAP scores.



Discussion

The present study analyzed the effectiveness of lifestyle changes on liver health and the association between body composition and liver health in patients with NAFLD. The study found that the 6-week nutritional program can cause a significant improvement in body composition as well as a significant decrease in fatty involvement on the liver. No conclusions could be made about decreased scarring of the liver.

The main limitation of the present study was its small population size. Population size was limited due to logistical and economic reasons. The population size decreases the reliability of the study because there is a greater margin of error.

The main difference between the present study and previous studies is the timeframe. The present study lasted 6 weeks, which is shorter in length than previous studies that have also analyzed nutritional changes and liver health. Previous studies proved that long term diets and large amounts of fat loss caused improvement in NAFLD. The results seen in this study are unique because they prove that short-term lifestyle changes can also cause significant improvements in NAFLD. Another strength of the present study is the use of body composition values as opposed to only weight. Access to the InBody Body Composition Analyzer allowed for more accurate tracking of fat loss.

References

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