Effect of Weight Loss, Diet, Exercise, and Bariatric Surgery on Nonalcoholic Fatty Liver Disease

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KEYWORDS

• Nonalcoholic fatty liver disease • Weight loss • Diet • Exercise • Bariatric surgery

KEY POINTS

- Lifestyle modifications to include diet, exercise, and weight loss remain the most effective therapy for nonalcoholic fatty liver disease (NAFLD).
- Weight loss of 3% to 5% is associated with decreased steatosis; however, a 7% to 10% decrease is necessary to achieve NAFLD/nonalcoholic steatohepatitis remission and fibrosis regression.
- Independent of weight loss, exercise reduces hepatic steatosis and improves metabolic indices.
- No specific dietary intervention or exercise regimen has proven beneficial beyond calorie restriction coupled with energy reduction.
- Bariatric surgery in morbidly obese individuals who have failed to lose weight through lifestyle modifications can improve steatosis, inflammation, and fibrosis.

INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) now represents the most common form of liver disease in developed countries with an estimated prevalence of 20% to 30% and increasing to 50% in diabetics and 70% in obese individuals.[1] Worldwide, obesity

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has become a major global health care concern, with the number of obese and overweight individuals reaching 2.1 billion in 2013.[2] The United States alone accounts for 13% of obese people globally.[2] With NAFLD representing the hepatic manifestation of the metabolic syndrome, the rates of NAFLD continue to increase as obesity reaches pandemic proportions. Of those with NAFLD, the prevalence of biopsy-proven nonalcoholic steatohepatitis (NASH) has been estimated at 12.2% in a prospective community cohort.[3] Importantly, individuals with NASH and fibrosis have a substantial risk of progression to advanced disease, and increased body mass index has been associated with advanced fibrosis in NASH.[4] Because of the established role of obesity in the pathophysiology of NAFLD, efforts targeted at obesity reduction remain the primary therapeutic intervention. In this review, the authors summarize the effects of weight loss, diet, exercise, and bariatric surgery on NAFLD.

WEIGHT LOSS

Because obesity plays such a central role in the underlying pathophysiology of NAFLD, efforts at weight reduction represent the mainstay of management and first line therapy for NAFLD. The beneficial effects of weight loss on NAFLD have been demonstrated in numerous clinical trials.[5–9] In 2012, Musso and colleagues[10] evaluated the effects of weight loss in NAFLD from 8 randomized controlled trials, 4 of which included posttreatment histology. From their metaanalysis, a 5% or greater weight loss improved hepatic steatosis, and a 7% or greater weight loss also showed improvement in the NAFLD Activity Score (NAS). Unfortunately, only 50% of subjects were able to attain a weight loss of 7% or greater even with significant intervention. Overall fibrosis was unchanged. Most recently, Patel and colleagues[11] demonstrated a reduction in body mass index of at least 5% was associated with significant decreases in liver fat and volume in patients with biopsy-proven NASH. In a study by Promrat and colleagues,[7] 8 participants achieved a 10% or greater weight reduction with a trend toward reduced NAS for those who lost more weight. Similarly, Harrison and colleagues[5] showed improvement in steatosis, ballooning, inflammation, and NAS in those subjects who lost 9% or more of body weight compared with those who did not. In a recent seminal paper by Vilar-Gomez et al,[12] the effects of weight loss through lifestyle modifications from 261 patients with paired liver biopsies were evaluated. Their results demonstrate the degree of weight loss is associated independently with improvements in all NASH-related histology. Further, for those individuals who lost 10% or more of body weight, 45% had regression of fibrosis, 90% had resolution of steatohepatitis, and 100% demonstrated improvements in NAS. Finally, Wong and colleagues[13] demonstrated through proton-magnetic resonance spectroscopy that weight loss of 3% to 4.9% was associated with remission of NAFLD in 41% of patients, whereas those with more than 10% weight loss had 97% remission of NAFLD. Although the exact upper limit for weight loss in the treatment of NAFLD has not been established, current evidence suggests that weight loss of at least 7% is essential to improved histologic disease activity. Current practice guidelines from the American Association for the Study of Liver Diseases recommends that loss of at least 3% to 5% of body weight seems to be necessary to improve steatosis, but a greater weight loss (up to 10%) may be needed to improve necroinflammation[14] and fibrosis[12] (**Fig. 1**).

DIETARY INTERVENTIONS

Current guidelines suggest that individuals at metabolic risk should follow a low calorie diet with a 30% energy deficit.[15,16] Although strategies to obtain significant weight loss