

## Physical Activity and Nonalcoholic Fatty Liver Disease

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### Article commented:

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Nonalcoholic fatty liver disease, characterized by elevated liver enzymes, central obesity, and insulin resistance, is becoming increasingly prevalent. The effects of changes in physical activity on the metabolic profile of this group have not been reported. We assessed at 3 months the impact of a behavior change-based lifestyle intervention on physical activity and the effects of this change on the metabolic profile of people with fatty liver disease. In all, 141 participants with nonalcoholic fatty liver disease were prospectively enrolled into either a low- or moderate-intensity lifestyle intervention or to a control group. Physical activity was assessed using a validated reporting tool and physical fitness was measured using the YMCA protocol on a cycle ergometer.

Individualized counseling to increase physical activity was provided. Overall, 96% of participants attended the 3-month follow-up assessment. Participants in the moderate- and low-intensity intervention groups were 9 times more likely to increase physical activity by an hour or more per week compared to controls. Patients increasing or maintaining their reported physical activity to > 150 minutes/week, and those who increased their objective levels of fitness, had the greatest improvements in liver enzymes and other metabolic indices compared

to those who were least active. This effect was independent of weight loss and was corroborated by an objective measure of fitness. There was no dose-response effect on liver enzymes with incremental increases in physical activity above 60 minutes/week. *Conclusion:* Lifestyle counseling interventions are effective in improving physical activity behavior. Maintaining or increasing physical activity provides health benefits for patients with fatty liver, independent of changes in weight.

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In the present study, St George et al.<sup>1</sup> found that both moderate and low-intensity lifestyle interventions resulted in changes in physical activity (PA) behavior in patients with nonalcoholic fatty liver disease (NAFLD). These changes in turn resulted in significantly improved some metabolic parameters. In fact, this group of researchers observed that patients who increased PA by an hour or more a week had the greatest improvements in metabolic and obesity-related variables, whereas those who remained or became sedentary had no improvement, and a clear trend toward deterioration in several metabolic parameters. Interestingly, improvement in liver enzymes was similar in both groups, those who increased PA and those who maintained the recommended amount for health benefits, despite the latter group's not achieving improvement in other metabolic indicators.

NAFLD is a pathologic condition that is closely related to insulin resistance, as well as other cardiovascular risk factors, such as obesity, diabetes mellitus and hyperlipidaemia.<sup>2</sup> NAFLD includes a broad spectrum of clinic presentation ranging from simple steatosis to steatohepatitis and liver cirrhosis.<sup>3</sup> The current first-line management in these patients is a prescription of diet, exercise and weight loss.<sup>2,4,5</sup>

Regarding the effect of exercise in NAFLD, Zelber et al.<sup>6</sup>, in one population-based study carried out in a subgroup of the Israeli National Health and Nu-

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trition Survey, found that the percentage of subjects performing any type of PA was much lower (13%) in NAFLD group than in individuals without NAFLD (23%). Also, the PA was correlated with higher levels of adiponectin and lower levels of leptin. Those findings pointed out the importance of PA in the improvement of NAFLD resulting in decrease in risk factors. Interestingly, those researchers also reported a stronger association between strength exercise and decreased risk factors for NAFLD than those with aerobic exercise.

On the other hand, there are few randomized clinical trials that have evaluated the effect of exercise by itself, regardless weight loss in NAFLD patients.<sup>4,7,8</sup> For example, Shah et al.<sup>7</sup> found differences in health outcomes between sedentary elderly obese patients in a 6-month diet program group and a diet plus exercise group in the same period. The latter group showed improvement in parameters such as peak oxygen uptake (VO<sub>2</sub>peak), plasma triglyceride, and LDL-cholesterol concentration. However, both groups showed improvement of insulin sensitivity and therefore decreased spectroscopy-measured fat content. Moreover, Shojaee et al.<sup>8</sup> reported that a 6-weeks moderate intensity exercise (60 to 85% VO<sub>2</sub>peak) program in sedentary overweight patients with no changes in eating habits, displayed improvement in insulin sensitivity. Although there was a reduction of circulating fatty acids, there was no decrease in liver fat in these patients.

Unfortunately, it should be mentioned that currently there is no standardized method to measure PA and fitness, because some of them have been shown disadvantages such as bias due to subjectivity and results variability. The effect of temperature, type of exercise, coexisting diseases, etc. is also important.<sup>4</sup>

Based on St. George et al.<sup>1</sup> results on liver enzymes improvement, several questions arise: how much physical activity is necessary to improve liver enzymes, and insulin sensitivity?, or What type of physical exercise is recommended for NAFLD patients with or without comorbidities, such as diabetes mellitus, heart disease, etc?

We believe that the effects of PA in patients with NAFLD deserves further studies, as does its intensity, duration, frequency and type. However, the results presented by St. George et al provide evidence supporting the benefits of PA in the treatment of these types of patients.

## REFERENCES

1. St. George SA, Bauman A, Johnston A, Farrell G, Chey T, George J. Independent Effects of Physical Activity in Patients with Nonalcoholic Fatty liver Disease. *Hepatology* 2009; 50(1): 68-76.
2. Méndez-Sánchez N, Arrese M, Zamora VD, Uribe M. Treating nonalcoholic fatty liver disease. *Liver Int* 2007; 27: 1157-65.
3. Méndez-Sánchez N, Arrese M, Zamora VD, Uribe M. Current concepts in the pathogenesis of nonalcoholic fatty liver disease. *Liver Int* 2007; 27: 423-33.
4. Caldwell S, Lazo M. Is exercise an effective treatment for NASH? Knowns and unknowns. *Ann Hepatol* 2009; 8(1): Supplement: S60-S66
5. Méndez-Sánchez N, González V, Chávez TN, Ramos MH, Uribe M. Weight reduction and ursodeoxycholic acid in subjects with nonalcoholic fatty liver disease. A double-blind, placebo-controlled trial. *Ann of Hepatol* 2004; 3(3): 108-12.
6. Zelber-Sagi S, Nitzan-Kaluski D, Goldsmith R, Webb M, Zivbel I, Goldiner I, Blendis L, Halpern Z, Oren R. Role of leisure-time physical activity in nonalcoholic fatty liver disease: a population based study. *Hepatology* 2008; 48(6): 1791-8.
7. Shah K, Stufflebam A, Hilton TN, Sinacore DR, Klein S, Villarreal DT. Diet and exercise interventions reduce intrahepatic fat content and improve insulin sensitivity in obese older adults. *Obesity* (Silver Spring) 2009 Apr 23.
8. Shojaee-Moradie F, Baynes KC, Pentecost C, Bell JD, Thomas EL, Jackson NC, et al. Exercise training reduces fatty acid availability and improves the insulin sensitivity of glucose metabolism. *Diabetologia* 2007; 50: 404-13.