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Changes in liver health biomarkers following consumption of energy restricted diets containing almonds compared with carbohydrate-rich snack foods for 9 months

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Energy restricted diets improve liver function[1] and habitual nut consumption has been associated with a lower prevalence of fatty liver[2]. This study examined the effect of incorporating almonds in an energy restricted diet on liver health biomarkers. One Hundred and forty adults (42M:98F, 47.5 ± 10.8 years, BMI 30.7 ± 2.3 kg/m^2) enrolled in a 9-month (9M) dietary intervention comprising 3 months (3M) weight loss (30% energy restriction) followed by 6 months (6M) of weight maintenance. Participants were randomly assigned to consume almonds (n = 68, AED) or isocaloric carbohydrate-rich snacks (n = 72, CRD) which provided 15% of total daily energy. At baseline (BL), 3M and 9M, fatty liver index (FLI) scores (0-100)[3] were calculated using body mass index (BMI), waist circumference (WC), fasting serum gamma-glutamyl transferase (GGT) and triglyceride (TAG) levels, and other liver health biomarkers were assessed by ultrasound (volume, visual appearance and elastography (a marker of stiffness due to fibrosis)). Intention to treat analyses were conducted using mixed effects modelling (fixed effects group and time, with participants as the random effect). Significant reductions from BL occurred over time (all $p<0.001$ for 3M and 9M) with no difference between groups (AED vs CRD, $P>0.05$) in BMI (3M: −2.44 ± 0.20 vs −2.32 ± 0.20, 9M: −2.83 ± 0.19 vs −2.81 ± 0.19 kg/m^2), WC (3M: −8.04 ± 0.79 vs −7.00 ± 0.81, 9M: −8.72 ± 0.83 vs −9.14 ± 0.81 cm), TAG (3M: −0.24± 0.08 vs −0.22 ± 0.09, 9M: −0.37 ± 0.09 vs −0.21 ± 0.09 mmol/L), FLI score (3M: −23.8 ± 2.0 vs −17.6 ± 2.1, 9M: −23.8 ± 2.0 vs −17.6 ± 2.1), and liver volume (3M: −134.56 ± 38.30 vs −100.96 ± 37.25, 9M: −113.68 ± 37.42 vs −110.64 ± 35.47cm^3). Significantly greater reductions occurred for AED compared to CRD at 3M and 9M in GGT ($p = 0.003$) (3M: −9.68 ± 1.93 vs −0.01 ± 2.00, 9M: −7.75 ± 2.06 vs −2.78 ± 2.15 IU/L) and liver visual assessment scores ($p = 0.03$) (3M: −0.58 ± 0.24 vs −0.45 ± 0.23, 9M: −1.33 ± 0.23 vs −0.50 ± 0.22). There were no significant changes in liver elastography over time or between groups. Energy restriction improved body composition and reduced the extent of fatty liver and liver size but did not change liver stiffness. The inclusion of almonds in an energy restricted diet demonstrated additional benefits to some liver health biomarkers providing support for almonds being incorporated into lifestyle interventions to improve liver function.

Keywords: weight loss; liver health; obesity; dietary interventions

Ethics Declaration

Yes

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