

The Effect of Nutritional Counselling on Hepatic, Muscle and Adipose Tissue Fat Content and Distribution in Non-Alcoholic Fatty Liver Disease.

E. L. Thomas¹, A. E. Brynes², G. Hamilton^{3,4}, N. Patel^{3,4}, A. Spong^{3,4}, R. D. Goldin⁵, G. Frost², J. D. Bell¹, S. D. Taylor-Robinson⁴

¹Molecular Imaging Group, MRC Clinical Sciences Centre, Hammersmith Hospital, Imperial College, London, United Kingdom, ²Department of Nutrition and Dietetics, Hammersmith Hospital, Imperial College, London, United Kingdom, ³Robert Steiner MRI Unit, Imaging Sciences Department, MRC Clinical Sciences Centre, Hammersmith Hospital, Imperial College, London, United Kingdom, ⁴Division of Medicine (Medicine A), Faculty of Medicine, Hammersmith Hospital, Imperial College, London, United Kingdom, ⁵Histopathology Department, Faculty of Medicine, College London, St Mary's Hospital, London, United Kingdom

Background: Incidence of non-alcoholic fatty liver disease (NAFLD) has increased rapidly over the last few years and is now one of the commonest causes of abnormal liver function test (LFT) results in patients presenting to hepatology clinics in both Europe and the USA.¹ Recent studies have suggested that hepatic steatosis may be prevalent in more than 30% of the population.² To date, no study has looked at the effects, on body composition and liver function, of first line treatment in clinical management algorithms offered to most people attending outpatient clinics with NAFLD. The aim of this study was therefore to assess the impact of current United Kingdom nutritional clinical practice to reduce body adiposity and its impact on liver fat content and measures of hepatic function.

Methods: Ten patients with abnormal liver function tests (LFTs) were recruited. All were clinically obese with a mean body mass index of 31.6 ± 4.6 kg/m². All had increased echogenicity on ultrasound, compatible with hepatic steatosis.

Intervention: All patients were referred to the Hammersmith Hospital 'Lifestyle Clinic'. The aim was a gradual weight loss of 5-10% of initial body weight within 6 months. Subjects attended 7 appointments with a registered dietitian over the 6 month study, with fortnightly phone calls in-between. All subjects were sedentary. Subjects were given advice on modifying their diets, centering on behaviour change around dietary intake, as previously described.³ The aim was to induce a 500 kcal energy deficit in the diet. Activity was encouraged in the form of walking using the '10,000 steps a day' campaign.

Biochemistry: Fasting blood was obtained for measurement of glucose, insulin, cholesterol, triglycerides, HbA_{1c}, AST, ALT and γ GT.

Total body adipose tissue content: Rapid T₁-weighted MR images (TR 36ms, TE 14ms) were acquired as previously described.⁴ Subjects were imaged prone with arms straight above head and were scanned from fingertips to toes acquiring 10mm-thick transverse images with 30mm gaps in arms and legs, and 10mm gaps in the trunk. Images were analysed using SliceOmatic (Tomovision, Montreal, Canada). Total AT, subcutaneous, total internal, subcutaneous abdominal and intra-abdominal AT volumes were measured.

MRS of the liver: ¹H MR spectra were obtained from the right lobe of the liver using a PRESS sequence (TR 1500ms, TE 135ms) without water saturation, with 128 signal averages.⁵

MRS of muscle: IMCL was measured in the soleus (S-IMCL) and tibialis (T-IMCL) muscles by ¹H MR with TR 1500ms, TE 135 ms, 256 averages. IMCL were measured relative to the total muscle creatine signal, after correcting for T₁ and T₂.⁶

Results: All patients lost weight, with a mean loss of -3.5 kg (range -0.6 to -10.0 kg, p=0.006). Total AT content was also reduced, with a mean reduction of -3.5 litres (range -0.75 to -10.43, p=0.003). There was also a significant reduction in waist circumference -6.65 cm (range -2.5 to -13.0 cm, p=0.0001). There were significant decreases in most AT depots. The largest decrease was in intra-abdominal AT (-11.4%), with slightly smaller quantities of subcutaneous AT lost from both abdominal (-10.2%) and peripheral areas (-9.7%). There was a strong relationship between the amount of abdominal AT lost subcutaneously and internally (r=0.81, p<0.01). The only AT depot not to be significantly reduced as a result of the intervention was the non-abdominal internal fat.

A reduction in AST and ALT was observed following the 6 month intervention, although the latter did not reach significance. Although, seven of the 10 subjects showed marked reductions in IHCL (-57.2%), three subjects showed increases (33.2%), despite no significant difference between the groups in terms of weight loss. Thus, as a group the decrease in IHCL did not reach significance (-39.9%, p=0.12). There was a significant correlation between changes in IHCL, weight loss (r=0.74, p<0.01) and intra-abdominal AT changes (r=0.83, p<0.01). This relationship was also significant for changes in IHCL and abdominal subcutaneous depot (r=0.76, p<0.01). There was a significant decrease in T-IMCL levels, but not for S-IMCL. There was a significant correlation between change in intra-abdominal AT and change in T-IMCL (r=0.73, p<0.02) but not with S-IMCL. That there were significant correlations between change in S-IMCL and subcutaneous adipose tissue in both abdominal (r=0.81, p<0.01) and peripheral regions (r=0.69, p<0.05). Only changes in intra-abdominal AT were able to predict changes in AST, ALT and IHCL.

Discussion

In this study we have shown that a modest weight loss, obtained through a routinely available hospital dietetic clinical care regimen, can have considerable effects on whole body adiposity, hepatic and muscle fat content and LFTs in NAFLD patients. These findings indicate that current UK clinical practice is effective in promoting a lifestyle change that has a positive effect on reducing adiposity.

References

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