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Short-term effects of a very low carbohydrate diet compared to a high carbohydrate, low fat diet on physical function in overweight and obese subjects

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Background - Dietary restriction and increased physical activity are recommended for obesity treatment. Very low carbohydrate diets are increasingly used to promote weight loss, but there is some concern that a low carbohydrate intake may impact negatively on exercise function.

Objective – To determine the short-term effects of a very low carbohydrate diet (LC) and a conventional high carbohydrate, low fat diet (HC) on aerobic capacity, fuel utilization and the heart rate response to exercise and muscle strength in obese men and women.

Design - 58 subjects (mean±SD, age: 49.1 ± 8.5; BMI 33.5 ± 4.0 kg/m²) were randomly assigned to either an energy restricted (~6-7 MJ, 30% deficit), planned isocaloric LC or HC with mixed carbohydrate sources for 8 weeks. At Weeks 0 and 8 subjects performed an incremental treadmill test to exhaustion and handgrip and isometric knee extensor muscle strength were assessed. Subjects were asked to maintain their habitual levels of physical activity during the study.

Outcomes – At Week 0, there was no difference between groups in aerobic capacity (VO₂peak; LC 27.6 ± 6.5 ml/kg/min⁻¹, HC 27.7 ± 4.9 ml/kg/min⁻¹, P=0.96) or peak heart rate (LC 171.3 ± 13.6 beats/min⁻¹, HC 166.6±13.8 beats/min⁻¹; P=0.21) and these did not change during the study in either diet group (P≥0.18). After weight loss, heart rate recovery (HRR-defined as the reduction in heart rate from the cessation of exercise to 1 minute recovery) had improved in both groups by Week 8 (LC 0.9±6.2 beats/min⁻¹, HC 3.4±9.5 beats/min⁻¹, P<0.05 for time) with no effect of diet (P=0.21). Fat oxidation during submaximal exercise increased in LC but remained unchanged in HC (LC 0.12 ± 0.03 g/min⁻¹, HC -0.03 ± 0.02 g/min⁻¹; P<0.001 time x diet effect). Maximal handgrip strength decreased similarly in both groups (P<0.001 time effect). Peak isometric knee extensor muscle strength did not change in either diet group (P=0.51).

Conclusions – Metabolic adaptation occurs following a LC weight loss diet that causes a shift in fuel utilisation to favour greater fat oxidation during exercise, but has no detrimental effect on other markers of aerobic exercise performance or muscle strength compared to an isocaloric HC diet. Both diets improved HRR suggesting both a HC and LC diet could be used in lifestyle interventions that combined increased physical activity with energy restriction; but further studies are required to determine the long-term health effects.

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Body size and body composition in NZ Chinese

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Background – Using World Health Organisation obesity criteria, Chinese, which is the largest Asian group in New Zealand, apparently has the lowest obesity rate in all Asian groups, yet is at higher risk of disease than NZ Europeans at equivalent body mass index (BMI).

Objective – To compare the relationships between BMI and percentage body fat (%BF) of European (M29F37), Maori (M23F23), Pacific Island (M15F23), and Asian Indian (M29F25) people (existing data) with NZ Chinese aged 30-39y.

Design – Stratified (men and women) convenience study of NZ Chinese (M20F23) selected by BMI to cover a range of body fatness. Total body fat was measured by whole-body dual X-ray absorptiometry.

Outcomes – For the same %BF of 21.2%, BMI in Asian Indian and Chinese men was 4.8 and 1.6kg.m⁻² lower than European men respectively. The table shows BMI equivalents in five NZ ethnic groups for women and men at two levels of body fat (corresponding to BMI 25.0 and 30.0 kg.m⁻² in Europeans).

<table>
<thead>
<tr>
<th>Sex</th>
<th>%BF</th>
<th>BMI equivalents (kg.m⁻²)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>European</td>
</tr>
<tr>
<td>F</td>
<td>34.0%</td>
<td>25.0</td>
</tr>
<tr>
<td>F</td>
<td>40.6%</td>
<td>30.0</td>
</tr>
<tr>
<td>M</td>
<td>21.2%</td>
<td>25.0</td>
</tr>
<tr>
<td>M</td>
<td>28.1%</td>
<td>30.0</td>
</tr>
</tbody>
</table>

Conclusions – The results show that Asian Indian and Chinese differ in the relationship between body fat and BMI. Therefore different BMI thresholds for obesity may be required for these ethnic groups.