Weight loss and cholesterol lowering in the elderly

Weight loss and cholesterol lowering in the elderly remains a controversial issue. Obesity is considered to be problematic as a result of associated dyslipidaemia, cardiovascular disease and mortality. Diet, exercise, medication and laparoscopic gastric banding all demonstrate important potential for achieving safe weight loss and cholesterol lowering in older people. This evidence, however, remains minimal and a case specific approach is recommended until more robust guidelines can be developed.

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As the number of people who are obese increases alongside our ageing population, we (as healthcare professionals) encounter more cases of elderly patients who are obese.1 The subject of weight loss in the elderly is controversial because it is associated with an increased mortality rate.2 But, this association is shadowed by the difference between involuntary weight loss and voluntary weight loss. Whereas involuntary weight loss has been shown to result from concomitant diseases such as cancer, renal disease, heart failure and chronic obstructive pulmonary disease, individualised voluntary weight loss may have beneficial effects in terms of mortality, cardiovascular disease, arthritis, osteoporosis and quality of life.3,4

Obesity is problematic in older patients because of the associated dyslipidaemia, which is linked to concomitant development of cardiovascular disease and increased mortality in older adults. As with obesity, elevated cholesterol levels are not always associated with elevated all-cause mortality.5 There is even some evidence to suggest that the rate of all-cause mortality is increased in patients with lower cholesterol levels, the latter being associated with concomitant disease (eg, cancer).6-9 But, similar to involuntary weight loss, lower cholesterol levels may be indicative of concealed diseases such as cancer. Additionally, individuals surviving longer with elevated cholesterol levels may be less susceptible to the complications of dyslipidaemia, while those more susceptible are likely to have died before reaching the age of 75 years.5 Despite the ambiguous evidence base, current recommendations are that lipid lowering treatment remains favourable in patients aged 65 years and older.10

We aim to review the current literature relating to voluntary weight loss and other approaches for cholesterol management in the elderly and to determine if such a clinical management decision is beneficial in this population group.

Lifestyle modification

A number of studies have assessed the benefits of changes in diet and exercise in older age groups. Positive outcomes of diet and exercise have resulted in improvements in blood pressure,11 inflammation,12 insulin resistance,13 quality of life,14,15 and osteoarthritis.16 A few of them, have reviewed the benefits of weight loss on cholesterol lowering (Table 1).

Villareal and colleagues were the first to study the effects of lifestyle modification on risk for cardiovascular disease (CVD).17 They carried out a six-month randomised controlled trial in which subjects were assigned to either 26 weeks of treatment with a low-calorie diet and exercise training or no treatment. Treatment resulted in significant weight loss and improvements in triacylglycerols compared with both
baseline values and no treatment.\textsuperscript{17}

Two recently published studies compared the use of exercise only with exercise and calorie restriction in older obese individuals with impaired glucose tolerance and metabolic syndrome over a period of 12 weeks.\textsuperscript{18,19} Both papers reported significant weight loss with exercise alone and with exercise and calorie restriction. But, these reductions were greater in patients undertaking a calorie-restricted diet as well as exercise. Total cholesterol, triacylglycerols and low-density lipoprotein (LDL) cholesterol were also significantly reduced in all patient cohorts. Solomon et al suggested that the improvements related improvement in free fatty acid (FFA)-induced insulin resistance linked to increased intracellular FFA utilisation. Of patients with metabolic syndrome, insulin resistance linked to increased intracellular FFA utilisation.

Table 1: Weight and lipid changes for lifestyle intervention studies

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>N</th>
<th>A</th>
<th>I</th>
<th>W (kg)</th>
<th>HDL Base</th>
<th>End</th>
<th>TGL Base</th>
<th>End</th>
<th>LDL Base</th>
<th>End</th>
<th>Total Cholesterol Base</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villareal et al (2006)</td>
<td>10</td>
<td>69</td>
<td>No TX</td>
<td>26</td>
<td>103 base</td>
<td>103.7</td>
<td>1.11 (0.13)</td>
<td>1.09 (0.13)</td>
<td>1.50 (0.44)</td>
<td>1.50 (0.68)</td>
<td>3.08 (0.54)</td>
<td>3.19 (0.70)</td>
</tr>
<tr>
<td>Villareal et al (2006)</td>
<td>17</td>
<td>12</td>
<td>CR + EX</td>
<td>100 base (14)</td>
<td>91.8± (0.24)</td>
<td>1.24 (0.23)</td>
<td>1.21 (0.23)</td>
<td>2.03 (0.96)</td>
<td>1.53* (0.62)</td>
<td>2.85 (0.85)</td>
<td>2.69 (0.65)</td>
<td></td>
</tr>
<tr>
<td>Yassine et al (2009)</td>
<td>12</td>
<td>65</td>
<td>EX</td>
<td>12</td>
<td>99.7± (15.7)</td>
<td>95.9± (14.6)</td>
<td>0.96 (0.21)</td>
<td>0.97 (0.20)</td>
<td>1.91 (0.71)</td>
<td>1.52 (0.42)*</td>
<td>2.82 (0.74)</td>
<td>2.63 (0.60)*</td>
</tr>
<tr>
<td>Yassine et al (2009)</td>
<td>8</td>
<td>66</td>
<td>CR + EX</td>
<td>94.9± (16.5)</td>
<td>88± (14.5)</td>
<td>0.89 (0.15)</td>
<td>0.87 (0.20)</td>
<td>1.93 (0.59)</td>
<td>1.32* (0.54)</td>
<td>3.06 (0.45)</td>
<td>2.70 (0.49)</td>
<td></td>
</tr>
<tr>
<td>Solomon et al (2009)</td>
<td>8</td>
<td>66</td>
<td>EX</td>
<td>96± (6.1)</td>
<td>92.8± (6.0)</td>
<td>2.22 (0.51)</td>
<td>2.19 (0.29)</td>
<td>5.42 (0.25)</td>
<td>5.26* (0.27)</td>
<td>5.77 (0.62)</td>
<td>5.04* (0.27)</td>
<td></td>
</tr>
</tbody>
</table>

Key: N = numbers; A = Age; I = Interventions: W = Weight; HDL = High-density lipoprotein; LDL = Low-density lipoprotein; TX = treatment; CR = calorie restricted; EX = Exercise. All data are presented as mean and standard deviation unless described otherwise. Significant difference from corresponding baseline value: * P<0.05. Significant difference in change between the two groups: 1 P<0.05.

Some evidence suggests that older individuals lose more lean body mass as opposed to fat mass in response to energy restriction when compared with younger adults.\textsuperscript{2} Interestingly, in the patients with metabolic syndrome, although lean body mass was mostly preserved, there was a trend for a greater loss of muscle mass in the exercise and calorie-restricted group.\textsuperscript{19} This evidence suggests that caution should be used when prescribing an energy-restricted diet in elderly patients.

In another study, a group of obese 68-year-olds were randomised to either physical activity on prescription or a minimal intervention (low-intensity interventions, including one page of written information about the importance of physical activity for health benefits for six months). These results are not presented in Table 1 as the data were reported in another study.\

The limitations of assessing weight loss in the elderly obese are that ageing is associated with a loss of bone and lean mass, water\textsuperscript{21} and an increase in abdominal obesity.\textsuperscript{22} The current definitions of body mass index are not necessarily suitable for
the definition of obesity in the elderly, and future studies need to define obesity in terms of body fat or abdominal adiposity. One recently published systematic review did not report a significant improvement in cholesterol in response to a moderate but significant weight loss in older (≥60 years) obese people. These results may have been influenced by the lack of a proper definition for obesity in the elderly as well as the fact that the review included papers with mean ages from 60–69 years, which may have included younger adults and blurred the outcomes for those 65 years of age or older.

Medication

Similarly to the evidence for the benefits of dieting, the literature for the use of weight-loss medication and for cholesterol lowering in older age groups is limited. Until very recently, there were two drugs available for the treatment of obesity in the UK. Unfortunately, after the findings of the Sibutramine Cardiovascular Outcome Trial (SCOUT), in which it was associated with increased complications of cardiovascular disease, sibutramine was removed from the market by the European Medicines Agency (EMEA). This leaves us with only one drug, orlistat, for the management of obesity. At present, no trials have directly assessed the use of orlistat in an older cohort. One study, however, has indicated that it could be used safely in an older population, and that (in combination with a reduced-calorie diet) it is associated with weight loss and improvements in cardiovascular markers.

A number of studies have assessed the use of statins and fibrates in the management of dyslipidaemia. Few of these, however, have directly assessed the use of these drugs in elderly participants—although some did present subset analyses. These showed that the effects of statin therapy on the prevention of stroke remains variable, but the current evidence clearly suggests that cholesterol lowering and the use of statins significantly reduces the relative risk of cardiovascular death and the risk of myocardial infarction.

The limited amount of evidence available does suggest that the first line of drug therapy should be statins for the general population. There have been significant reductions in the incidence of coronary events and associated mortality observed in response to statin treatment in the elderly, but long-term compliance is an important issue that needs to be addressed. In addition, there is some evidence of exacerbated joint pain and general muscular ache associated with statin therapy. This impacts adversely on quality of life and it is the main reason for stopping statin treatment.

Surgery

There have been two observational retrospective studies carried out in the last few years. In a cohort study, 216 elderly (60 years and over) patients were selected from the database of the Gruppo Italiano Lap-Band after having undergone laparoscopic adjustable gastric banding (LAGB) and analysed according to comorbidities, per-operative complications and weight loss. The results suggested that despite a lower weight loss than the <60 year old group, significant improvements in dyslipidaemia were observed (Table 2).

In a prospective review of individuals 60 years of age and older who underwent LAGB, weight loss, complications, comorbidities, medication and quality of life were assessed. The results suggested that following LAGB, patients displayed a significant weight loss, improvement in quality of life and reduction in medication as well improvements in comorbidities such as dyslipidaemia (Table 2). Nevertheless, the authors do state that, despite these benefits, in older patients whose comorbidities (moderate-to-severe chronic obstructive airway disease, heart, liver or kidney failure and stroke) are unlikely to improve with weight loss and where there is an increased risk of peri-operative complications, surgery remains contra-indicated. More recently, a retrospective cohort study of high-risk patients compared the survival rates and changes in weight-related comorbidities of individuals who underwent surgery to a similar cohort of patients who did not undergo surgery. The results suggested that bariatric surgery increased survival rates and decreased weight-related comorbidities. An age related increase in peri-operative morbidity and mortality has, however, been observed (in particular for gastric bypass compared with LAGB) in another study. This clearly shows the need for more clinical trials to evaluate the use of bariatric surgery in the elderly.
Conclusion

There is currently a clear paucity of information about the use of diet, medication and surgery for weight loss and cholesterol lowering in the elderly. It also remains unclear what the overall risks and benefits of weight loss and cholesterol lowering are.

Diet, exercise, statin therapy as well as LAGB appear to be effective options for cholesterol lowering in this population group. However, despite the association of increased risk for CVD with increased cholesterol, there remains some evidence that elevated cholesterol levels in the elderly could have some benefits. Due to this controversy, and the lack of substantial evidence for clear guidelines, we suggest that additional research into the risks and benefits of weight loss and cholesterol lowering in the elderly is needed. In the meantime, weight and cholesterol management in the elderly requires a thorough clinical evaluation and a case-specific approach that assesses the individual’s functional age, weight history, medication and comorbidities. Where weight loss and cholesterol lowering are recommended, an exercise regimen should be the first line of treatment followed by the use of statins as second line therapy where exercise is either not possible or unsuccessful. There also remains an important scope for the use of gastric banding in those where exercise and drugs are not an option.

We have no conflict of interest.


Table 2: Studies investigating the use of bariatric surgery in elderly patients

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Intervention</th>
<th>Age</th>
<th>Follow up</th>
<th>Mean BMI at Base</th>
<th>Mean BMI at follow up</th>
<th>Dyslipidaemia at baseline</th>
<th>Improved Dyslipidaemia at follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor et al 2006</td>
<td>LAGB</td>
<td>≥60</td>
<td>Mean 27 months</td>
<td>42.2 (range 33–54)</td>
<td>21/35</td>
<td>17/21 (80%)</td>
<td></td>
</tr>
<tr>
<td>Buzetto et al 2008</td>
<td>Laparoscopic banding</td>
<td>≥60</td>
<td>5-year post op</td>
<td>44.2 (SD 7.6)</td>
<td>35.9</td>
<td>26/216 (11.9%)</td>
<td>10/26 (58.5%)</td>
</tr>
</tbody>
</table>
exercise modality on insulin resistance and functional limitation in older adults: a randomized controlled trial. Arch Intern Med 2009; 169: 122–131
36. Weverling-Rijnsburger AW, Blauw GJ, Meinders AE. Effect of atorvastatin on impaired vascular function in