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 dyslipidemia, cardiovascular disease and mortality. Diet, exercise, medication and laparoscopic gastric banding all demonstrate important potential for achieving safe weight loss and cholesterol lowering in the elderly. This evidence, however, remains minimal and a case specific approach is recommended until more robust guidelines can be developed.

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Key points:

- Weight loss and cholesterol lowering in the elderly remains a controversial issue.
- Weight loss achieved by diet and exercise results in improvements in triacylglycerols and total cholesterol.
- Statin therapy appears to be a safe approach for cholesterol lowering in the elderly.
- More research in the use of Xenical for weight loss and potential cholesterol lowering in the elderly is required.
- Laparoscopic gastric banding may be an important option for weight loss and improvement in dyslipidemia in the elderly.
- There is a need for more research in the effects of weight loss and cholesterol lowering in the elderly.

Introduction

As the obesity rates increase along with our aging population, we are encountering more cases of elderly obese individuals (1). The subject of weight loss in the elderly has been a controversial issue for a number of years, as it is often associated with increased mortality rates (2). There are caveats, however, as this is shadowed by voluntary versus involuntary weight loss, where involuntary weight loss has been shown to result from concomitant diseases such as cancer, renal disease, heart failure and chronic obstructive pulmonary disease. Some evidence has demonstrated that individualised voluntary weight loss can have beneficial effects in terms of mortality, cardiovascular disease, arthritis, osteoporosis and quality of life. Obesity is considered to be problematic in the elderly as a result of associated dyslipidemia with concomitant development of cardiovascular disease and increased mortality in older adults {{959 DeFronzo,R.A. 1991;1008 Wong,N.D. 1991; 1000 Weijenberg,M.P. 1996; 1001 Corti,M.C. 1997; }}. As with obesity, elevated cholesterol levels are not always associated with elevated all-cause mortality (3), and there is even evidence of the contrary where there is an increased all-cause mortality rate with lower cholesterol levels , the latter being associated with concomitant disease (e.g. cancer) (4-7). As in obesity, however, lower cholesterol levels may be indicative of concealed diseases such as cancer. In addition, individuals surviving longer with elevated cholesterol levels may be less susceptible to complications of dyslipidemia, while those susceptible are likely to have died before reaching the age of 75 (3). Despite this, current recommendations are that lipid lowering treatment remains favourable in patients aged 65 and older (8)

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

There have been a number of interventions assessing the benefits of changes in diet and exercise in the elderly. Positive outcomes of diet and exercise have resulted in improvement in blood pressure (9), inflammation (10), insulin resistance (11) quality of life (12,13), osteoarthritis (14). Few of them, however, actually assess the benefits of weight loss on cholesterol lowering. These are summarised in Table 1. The first study to assess the effects of lifestyle modification on CVD risk was carried out by Villareal and colleagues (15). They carried out a 6 month randomised controlled trial where subjects were assigned to either 26 weeks of treatment with a low-calorie diet and exercise training or no treatment. The treatment approach resulted in significant weight loss and improvements in triacylglycerols in the intervention group compared to both baseline values and the control group (15).

Two recently published interventions compared the use of exercise only compared to exercise and calorie restriction in older obese individuals with impaired glucose tolerance (16) and metabolic syndrome (17) over a period of 12 weeks. Both papers reported significant weight loss in both the control and treatment groups although it was greater in the exercise plus diet group. Total cholesterol, triacylglycerols and LDL cholesterol were significantly reduced in both the treatment and control groups. They suggested that the improvements in circulating lipids were likely due to exercise-related improvement in free fatty acid (FFA) -induced insulin resistance linked to increased intracellular FFA utilization. In the patients with metabolic syndrome, those in the exercise and calorie restriction group did achieve greater weight loss, but without greater improvement in biochemical markers of CVD. Some evidence suggests that older individuals lose more lean body mass as opposed to fat mass in response to energy restriction when compared to younger adults (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 calorie-restricted group (17). This evidence suggests that caution needs to be exercised when prescribing an energy-restricted diet in the elderly.

In another study {{912 Kallings,L.V. 2009; }}, a group of obese 68 year olds were randomised to either physical activity on prescription or a minimal intervention for 6 months. These results are not presented in Table 1 as the data were reported in absolute change and confidence intervals (CI). Weight loss was significant in the intervention group (mean (standard deviation): -1.8 (0.05); 95% CI: -2.8 to -0.8). Individualised exercise on prescription also improved body composition (percentage body fat: -1.2 (0.4) with 95 % CI: -2.0 to -0.5; fat mass: -1.7 (0.4) with 95% CI: -2.5 to -0.9; waist circumference: -2.3 (0.6) with 95 % CI: -3.5 to -1.1). Total cholesterol decreased significantly more in the intervention compared to the control group after 6 months ($P = 0.042$).

Limitations in terms of studies assessing weight loss in the elderly obese, are that aging is associated with a loss of bone and lean mass, water (18) and an increase in abdominal obesity (19). The current definitions of body mass index are not necessarily suitable for the definition of obesity in the elderly (20) and future studies may require to define obesity in terms of body fat or abdominal adiposity. One recently published systematic review (21) 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 which may have included younger adults and blurred the outcomes for those 65 years of age or older (21).

Table 1: Weight and lipid changes for lifestyle intervention studies.

Author (year)	N	Age	Intervention	Duration (weeks)	Weight (Kg)		HDL (mmol/L)		Triacylglycerols (mmol/L)		LDL (mmol/L)		Total cholesterol (mmol/l)	
					Baseline	End	Baseline	End	Baseline	End	Baseline	End	Baseline	End
Villareal et al (2006){{987 Villareal,D.T. 2006; }}	10	69 (5)	No TX	26	103 (20)	103.7 (-)	1.11 (0.13)	1.09 (0.13)	1.50 (0.44)	1.50 (0.68)	3.08 (0.54)	3.19 (0.70)	-	-
	17		CR + EX		100(14)	91.8 (-)*[1]	1.24 (0.23)	1.21 (0.23)	2.03(0.98)	1.53 (0.62)*[1]	2.85 (0.85)	2.69 (0.65)		
Yassine et al (2009){{991 Yassine,H.N. 2009; }}	12	65.5 (5)	EX	12	99.7 (15.7)	95.9 (14.6)*	0.96 (0.21)	0.97 (0.20)	1.91 (0.71)	1.52 (0.42)*	2.82 (0.74)	2.63 (0.60)*	4.68 (0.96)	4.19 (0.84)*
	12		CR + EX		94.9 (16.5)	88.0 (14.5)*[1]	0.89 (0.15)	0.87 (0.20)	1.93 (0.59)	1.32 (0.54)*	3.06 (0.45)	2.70 (0.49)*	4.69 (0.62)	4.07 (0.72)*
Solomon et al (2009){{990 Solomon,T.P. 2009; }}	8	66 (1)	EX	12	96.0 (6.1)	92.8 (6.0)*	-	-	2.22 (0.51)	1.90 (0.29)*	-	-	5.42 (0.25)	5.26 (0.27)*
	8		CR + EX		88.4 (4.6)	81.7 (4.4)*[1]			2.37 (0.29)	1.93 (0.31)*			5.77 (0.82)	5.04 (0.27)*[1]

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] $P<0.05$. Abbreviations: TX – treatment; CR – calorie restricted; EX - exercise

Medication
Similarly, with diet therapy, there is limited literature relating to the use of medication for weight loss and for cholesterol lowering in the elderly.

Until very recently, there were two drugs available for the treatment of obesity in the UK. Unfortunately, following the findings from the Sibutramine Cardiovascular Outcome Trial (SCOUT) where sibutramine was associated with increased complications of cardiovascular disease, this drug has been removed from the market by the European Medicines Agency (EMEA). This leaves us with only one available drug, Xenical, in the management of obesity. No trials assessing the use of Xenical in the elderly have been conducted to date. One study, however, suggested that Xenical could be used safely in an older population, and that in combination with a reduced-calorie diet, weight loss and improvements in cardiovascular markers were observed (22)

A number of studies have assessed the use of statins and fibrates in the management of dyslipidemia (23-29). Few of these, however, directly assessed the use in elderly subjects (23,25,30-33), although some did present subset analyses (24,26,34-36,36,37). The limited amount of evidence available does suggest that the first-line of drug therapy should be statins for the general population (38). There have been significant reductions in the incidence of coronary events and associated mortality observed in response to statin treatment in the elderly, but that long-term compliance is an important issue which needs to be addressed (30,31). In addition, there is some evidence of exacerbated joint pain and general muscular ache associated with statin (39) This impacts adversely on quality of life and it is the main reason for stopping statin treatment.

Surgery

There have been two observational restrospective studies carried out in the last few years (40,41). 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 and analysed according to co-morbidities, per-operative complications and weight loss (40). The results suggested that despite a lower weight loss than <60 year old group, significant improvement in dyslipidemia was 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 comordities such as dyslipidemia (Table 2). Nevertheless, the authors do state that, despite these benefits, in older patients whose comorbidities are unlikely to improve with weight loss and increase and where there is an increase in peri-operative complications, surgery remains contra-indicated (42). More recently, a restrospective cohort study of high-risk patients investigating survival rates and changes in weight-related comorbidities between individuals who underwent surgery to a similar cohort of patients who did not undergo surgery was carried out (41). The results suggested that bariatric surgery increased survival rates in these high risk individuals and a decrease in weight related comorbidities compared to those who did not undergo surgery. An-age related increase in peri-operative morbidity and mortality has, however, been observed in particular for gastric bypass compared to laparoscopic gastric band (LAGB) (43). This clearly

warrants the need for more clinical trials to evaluate the use of bariatric surgery in the elderly.

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

Author (year)	Intervention	Age (years)	Follow up	Mean BMI at baseline	Mean BMI at follow up	Presenting with dyslipidemia at baseline (N)	Improved dyslipidemia at follow up (N)
Taylor et al (2006){{985 Taylor,C.J. 2006; }}	Laparoscopic banding	≥ 60	Mean 27 months	42.2 (range 33-54)	-	21/35	17/21 (80%)
Busetto et al (2008){{982 Busetto,L. 2008; }}	Laparoscopic banding	≥ 60	5 year post-op	44.2 (SD 7.6)	35.9 (SD 7.6)	26/216 (11.9%)	10/26 (38.5%)

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 laparoscopic gastric banding appear to be effective options for cholesterol lowering in this population group. However, despite the association of increased CVD risk 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 assessing the individual's functional age, weight history, medication and comorbidities. Where weight loss and cholesterol lowering is 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.

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