Obesity in the older adult

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Abstract

Introduction
Our population is aging, and along with this increase in the number of older adults, the prevalence of obesity is increasing. This has a number of potential public health concerns, in that obesity has an impact not only on the cardiovascular risk factors and mortality, but also in the functioning and disability factors in older adults. There are very few randomised controlled trials in older adults. This review will outline some of the evidence available in older adults and demonstrate their outcomes. Additionally, we will explore some of the issues revolving around bariatric surgery in older adults and present evidence and controversies noting that it potentially may be a suitable alternative to lifestyle measures.

Conclusion
Further research is required in older adults with obesity pursuing weight loss regimens.

Introduction

Obesity in older adults is a growing public health concern. Recently, the National Health and Nutrition Examination Surveys (NHANES) demonstrated that the prevalence of obesity, defined as a body mass index (BMI) of ≥ 30 kg/m², is increasing.¹ The percentage of men over the age of 60, classified as being obese and overweight is 37.1% and 78.4% respectively, while in women it is 33.6% and 68.6%, respectively.² Although these estimates have plateaued over the past decade, the trends have multiple ramifications not only on personal health, but also on the cost of acute and long-term healthcare. Body mass index is recognised as the standard for assessing obesity in clinical practice. In older adults, BMI has less diagnostic sensitivity and specificity for identifying obesity than in a younger population,³⁴ with a reported sensitivity and specificity of 50% and 90% respectively. This might result in 50% of patients undiagnosed with obesity.⁵ BMI accounts both for fat and muscle mass, and as people age, the ratio of fat to muscle may increase.⁶ ⁷ Those with elevated BMI may also have higher degrees of muscle mass, thereby obscuring the true measure of the degree of adiposity one may have. While waist circumference can be considered an easier surrogate measure for obesity,⁸ its diagnostic accuracy is challenged as compared to highly accurate yet clinically impractical measurements such as dual X-ray absorptiometry, computer tomography, and magnetic resonance imaging. Waist circumference may indeed be a more accurate measure for unhealthy overweight status and can exhibit a correlation with BMI.⁹ While BMI continues to be used as a crude indicator for adiposity, clinicians should be made aware of its diagnostic limitations, particularly in the older adults. This review discusses some of the evidence available and outcomes for obesity in older adults.

Discussion

The authors have referenced some of their own studies in this review. These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institution in which they were performed. All human subjects, in these referenced studies, gave informed consent to participate in these studies.

Consequences of obesity

Obesity leads to cardiometabolic manifestations including elevated cholesterol,⁹ coronary heart disease,¹⁰ hypertension,¹¹ obstructive sleep apnoea,¹² and diabetes,¹³ and has been noted to lead to premature mortality¹⁴ and lower life expectancy.¹⁵ With the evolution of lipid lowering and anti-hypertensive medications, mortality from coronary artery disease has concordantly decreased but its rate of decline has reached a plateau due to the rise of obesity, diabetes, and sleep apnoea rates.¹⁶ ¹⁷ While overweight and obesity are associated with a higher risk of death from overall and cardiovascular causes of death, the relationship is not as robust in older adults.¹⁸ A recent systematic review noted that all-cause mortality is higher in normal BMI subjects compared to those who are merely overweight, while those with class II and III obesity have higher mortality rates.¹⁹ Interestingly, class I (BMI 30–35 kg/m²) obesity demonstrated equivocal outcomes, possibly due to their inclusion/exclusion criteria, whereby the authors excluded studies with patients having chronic illnesses or cancer, who otherwise would have been less healthy. Additionally, BMI outcomes do vary with different age groups.²⁰ The majority of the studies contributing to the “paradox of obesity” involve a younger cohort of patients or those with significant co-morbidities, including congestive heart failure, hypertension, diabetes, and a history of cardiovascular disease.²¹ ²²

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heart failure or coronary artery disease.21,22 Hence, these findings should only be cautiously generalised to an older population. While mortality is an outcome of significant interest, functional status and quality of life tend to become increasingly important in older adults. Obesity in older adults is associated with greater increase in functional impairments and limitations of their activities of daily living23, while overweight subjects are associated with the lowest risk of disability24. Outcomes in older adults should focus on function, disability, and quality of life.

**Lifestyle measures trials**
While obesity may result in disease long-term, co-morbidity can be reversible with even as little as 5% to 10% weight reduction25. Ideally, preventative measures are necessary to prevent its onset. The cornerstone of any weight loss strategy is dietary (caloric) restriction, behavioural counselling and physical activity, which often fail to lead to consistent and maintained weight loss26. Loss of weight is also complicated by loss of muscle mass and function, termed sarcopenia27. This is a growing concern in the obese population28. The Centres for Medicare and Medicaid have specifically outlined a benefit to beneficiaries addressing the growing rate of obesity2 making it a grade B recommendation for intensive counselling with behavioural modifications to improve “intermediate outcomes such as glucose metabolism, lipid levels, and blood pressure...” How to achieve these outcomes is unclear as there is a paucity of weight loss trials, specifically targeting the older adult population.

One trial focusing on weight loss in adults with the average age of 58.7 ± 6.8 years (Look–Ahead) examined the effectiveness of intensive lifestyle modifications involving weight reduction through group and individually tailored meetings to aggressive reduction in calorie intake and increase in physical activity compared to the control group (Diabetes Support and Education)29. The study found that although there was a decrease in cardiovascular risk factors in the treatment group, after 9.3 years of follow up, there was no difference in the cardiovascular outcomes. However, the intensive group did have increased functional status, more physical activity, and initially improved cardiovascular risk profile. At one year post treatment, the intensive lifestyle modification group achieved higher metabolic equivalent (METs) (7.3 ± 2 vs. 6.8 ± 1.9) suggestive of increased stamina and decreased all cause mortality25. The ADAPT (Arthritis, Diet and Activity Promotion Trial)30 looked at mortality at 18 months with diet and exercise, or either one of them respectively. Overall, no change was detected in the 18-month mortality period using the data from the entire cohort, but in the sub-analysis of the older population greater than 67.1 years of age, they observed significant reduction in mortality –HR 0.4 (95% CI 0.2 – 1.0; p = 0.04). Additionally, when examining weight loss, exercise tolerance, pain and mobility, exercise and diet was the most effective intervention with diet alone being statistically significant for weight loss as well. For example, the diet and exercise group was superior in both the 6 min walk test and the stair climb test. Additionally, the diet and exercise group had improved Western Ontario and McMaster Universities Osteoarthritis Index scores suggesting improved function and decreased arthritic pain. In summary, physical activity, mobility, and pain were improved with exercise and exercise plus diet while weight loss was significant with diet plus exercise and diet alone30.

Reducing co-morbidities may not directly affect frailty and longevity. The difference in functional ability, exercise tolerance, and weight loss with the larger goal of analysing frailty has been investigated32. Their conclusions confirmed, using a randomised control trial design, that a combination of aerobic and resistance exercises plus diet restriction may reduce frailty than either of them would do individually. The exercise group consisted of three sessions that included aerobic activity, weight training, and flexibility and balance. Aerobic exercises included a stationary bike, walking, and stair climbing with their heart rate goal of 70%-85% of capacity. The importance of this study cannot be understated; frailty is a precursor for early disability and institutionalisation. Voluntary weight loss likely does not increase mortality in individuals. Importantly, this study did not include weight loss via bariatric surgery.

**Bariatric surgery**
When lifestyle interventions fail, primary care clinicians often recommend that their patients be evaluated for bariatric surgery (BSx). This technique has been well-studied and shown to be very effective in a younger population, especially Caucasians, and women with ≥ 30 kg/m² BMI31. Although endorsed by the National Institutes for Health in 199132 at that juncture, its safety in those ≥65 years is questionable and hence not recommended. Unfortunately, the data used then was sparse and did not have the benefit of bariatric centres and laparoscopic procedures. A recent European statement suggested that patients >60 years should be evaluated individually33. Several studies have looked at the safety and efficacy of bariatric surgery in older populations. Data identifying Medicare beneficiaries demonstrated no difference in patients between the ages 18 and 59 years and 60 and 66 years with regard to length of stays, yet there was an observed three-fold higher mortality risk in those > 55 years old34; other studies demonstrated mortality rates of 4.8% vs. 1.7% in patients older than 65 years.
compared to younger patients, with a significantly higher mortality rate of 19.1% in those > 75 years. Higher lengths of stays and higher rates of medical/surgical complications have additionally been observed in older adults.

Numerous analytical limitations potentially account for some of these differences in morbidity and mortality. Most of the larger studies include Medicare beneficiaries under the age of 65 years which may suggest another disability predisposing them to poorer outcomes if they qualified for Medicare at an earlier age. In older adults, the observed-to-expected morbidity and mortality is < 1 suggesting that bariatric surgery in this select population is safer than or just as safe as other gastrointestinal surgeries, a finding that is often understated. This is corroborated by the age-adjusted risk for open or laparoscopic procedures like cholecystectomies that is higher than bariatric surgery, noting that these mortality differences approximate those observed in intra-abdominal surgery. This study data suggests that this procedure is safe in subjects carefully selected up to 66 years of age. However, there continues to remain little data on the safety of laparoscopic gastric bypass in the elderly using larger cohorts of patients. In patients > 60 years (mean 66.3, range 60–79), overall morbidity was shown to be 8.4% without any deaths, and age-adjusted percentage of excess weight loss between the younger and older cohorts was comparable at 43% at four years. These findings further demonstrate the safety and efficacy of bariatric surgery in the elderly, albeit on a smaller scale. An attempt at a larger study was examined through the subgroup from the American College of Surgeons National Surgical Quality Improvement Program of 1,638 subjects aged 65–69 years and > 70 years revealing that overall 30-day mortality was not statistically different between the younger age groups and the older age groups, with only eight patients over age 65 dying. More importantly, age was not found to be a predictor of adverse events, but rather BMI > 50 kg/m², low albumin < 3 and a higher American Society of Anaesthesiologists physical status classification score had the most postoperative risks while those undergoing laparoscopic procedures in lower BMI patients had the best outcomes. This is contrary to the initial guidelines set in 1991. Comparing laparoscopic bariatric procedures in older adults with other intra-abdominal procedures, bariatric surgery has proven to be safer. Suggesting that bariatric surgery is not safe in the elderly came from studies prior to the implementation of bariatric centres, known to have superior outcomes than low-volume surgical centres. Recent data does in fact highlight that this procedure may have a role in selected patients, particularly if laparoscopic procedures are utilised and less radical procedures are performed.

Healthcare costs and quality of life
Studies demonstrate that improved weight loss, exercise tolerance can improve the quality of life of individuals, although there remains very little information on the long-term effects of weight loss in the elderly, especially after aggressive measures like bariatric surgery. Quality of life (QOL) improves with weight loss, although most studies focus on younger populations. Weight loss with diet and exercise has been shown to significantly improve quality of life in older patients. Survey data using the Short Form 36 health survey questionnaire in a population with an average age between 69 and 70 years divided into a control group, diet, diet plus exercise, and exercise group showed a 15% improvement from the baseline with regard to the QOL survey in the diet and exercise group who had lost 9% of their initial weight, and 14% in the diet group alone who lost 10% of their weight from baseline. Although this is not a study that only examines QOL, it does have QOL as one of the outcomes based on weight loss in the older population. While there are a number of studies examining quality of life adjusted life years in younger populations, to our knowledge there are few if any studies specifically examining this in older adults. One such study does show that bariatric surgery improves quality of life and functional status, and this has been replicated in one study with 197 participants over the age of 65 (67.3 years ± 2.3) finding an improvement in QOL at six months from a baseline of 51.3 ± 29.2 to 72.7 ± 26.4. However there is very little information on the long-term effects on QOL using larger cohorts in older adults. This can be partially explained by the limited number of elderly people engaging in bariatric surgery resulting in very few studies examining quality of life in the elderly after bariatric surgery. Future research should examine longer-term geriatric specific outcomes including QOL, functional status, and disability following bariatric surgery and intentional weight loss.

Conclusion
Obesity in older adults is a rapidly growing health concern, which potentially may lead to long-term disability, morbidity, and mortality. A paucity of studies exists in older adults examining quality of life, functionality, and implications of conservative strategies for obesity. While bariatric surgery is an effective yet aggressive strategy in younger populations, little data supports its use in elders. In the past, it was once speculated that older individuals may be at higher perioperative risk in addition to not reaping benefits of co-morbidity reduction, however, recent data suggests that in carefully selected patients, it might be safe. Long-term outcomes are desperately needed in...
those investigating weight loss measures to identify their true impact on physical disability and function. Further research is required in older adults pursuing bariatric surgery as a weight loss regimen.

Abbreviations list
ADAPT, Arthritis, Diet and Activity Promotion Trial; BMI, body mass index; BSx, bariatric surgery; NHANES, National Health and Nutrition Examination Surveys.

References
Review

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