abstract

There is a high prevalence of obesity in older adults up to the age of 80. While women generally gain body weight during the menopausal transition, men tend to accumulate an excess of fat mass earlier in life for as yet unknown reasons. Consequently, an increasing proportion of older adults are now obese. Obesity's association with metabolic diseases such as metabolic syndrome, type II diabetes, and cardiovascular disease is widely recognized. However, recent evidence shows that, in older adults, obesity is also related to functional impairment and decreased quality of life. This review addresses the actual prevalence and definition of obesity in older adults, the energy-balance equation, and the known consequences of obesity. Finally, the heterogeneity of obesity in older adults regarding its association with metabolic diseases and functional capacity will be discussed, as well as how obesity treatment should be conducted in this population.

Key words: obesity, metabolic syndrome, diabetes, weight loss, impaired functional capacity

Obesity in Older Adults

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Introduction

The proportion of obese older adults in industrialized countries has been estimated to range from 15 to 20%, decreasing sharply after the age of 60.[1,2] In individuals over the age of 80, the prevalence of obesity is only approximately one-third to one-half of that observed in 50 to 59-year-old adults.[3] This may be partly due to the increased mortality of obese patients at younger ages. Although this number is lower than what has been reported for younger age groups, it is likely that obesity rates in older adults will increase over the coming years due to the aging baby boomer generation that already presents a high prevalence of obesity and the improved medical approaches to treat obesity-related complications, which will increase the life expectancy of obese persons. This is important since obesity in the older population, and its physical consequences, already contribute greatly to the cost of health care and utilization in developed countries.[4]

Body mass index (BMI) has been determined to be the most accurate clinical assessment for the presence of obesity. In 1998, the World Health Organization stated that BMIs ≥30 kg / m^2 represented obesity (Table 1).[5] Although it has been suggested that actual BMI cutoffs for younger adults may not be suitable for older adults, no specific recommendations for change have been made.

Causes of Obesity: The Energy-Balance Equation

It has long been understood that an imbalance between energy expenditure and intake underlies excess gains in body fat mass.[6] The amount of food consumed by Western populations has dramatically increased in the last few decades because of large portion sizes and the high fat and sugar contents of modern food.[7] On the other hand, energy expenditure has significantly decreased during the same period, as new technologies have reduced the effort required for numerous daily tasks, such as food preparation, transportation, housekeeping, professional activities, etc. In addition to these societal lifestyle changes, older adults experience decreases in resting metabolic rate and reduced intensity and duration of physical exertion, which contribute to their reduced daily energy expenditure. Although time potentially devoted to daily recreational physical activities has increased over the past decade,[8] it has not compensated for the overall energy expenditure decreases. Moreover, this increase in recreational physical activity is minimal in the older population,[9] despite the efforts of health organizations to promote physical activity to them. The energy imbalance induced by lifestyle changes during the last decades has promoted the increase in obesity in all age groups, including the older population.

Consequences of Obesity in Older Adults

Metabolic Diseases: Heterogeneity of Obesity

Obesity is frequently associated with several metabolic disorders[10–12] and mortality.[13,14] However, obesity is a heterogeneous condition since not all obese individuals present metabolic abnormalities associated with an increased risk of heart disease. In the 1980s, the existence of a subgroup of healthy obese individuals was already

postulated by a few investigators, but it was unclear why some obese individuals failed to show traditional risk factors associated with the metabolic syndrome.[15,16] Subsequent studies in the past decade indicated that about 30% of obese individuals are not characterized by the presence of any coronary risk factors for coronary heart disease.[17,18] One of our studies conducted in obese postmenopausal women showed that lower levels of visceral adipose tissue, as measured by computed tomography, and an earlier age-related onset of obesity explain, to a certain extent, the normal profile of obese individuals.[10]

Results from the literature on the heterogeneity of obesity have important clinical and public health implications. A body mass index of 30kg / m^2, which is now an international reference to diagnose and treat human obesity, must be interpreted with caution since 1) a reasonable number of obese individuals do not have metabolic abnormalities, and 2) numerous older individuals with a body mass under that threshold present low amount of muscle mass and high levels of body fat.[19] As a result, it is important to separate the notions of "general obesity" and "central obesity." The latter, also known as "abdominal" or "visceral" obesity, is better correlated with disturbances in the lipid profile, type II diabetes, and coronary artery diseases.[10,20,21] Easy to use body fat distribution indices such as the waist-to-hip ratio (WHR), the waist circumference (WC), and the sagittal diameter have been proposed and used in clinical practice in order to identify higher-risk individuals and to treat patients with central fat accumulations.[22–24] Despite the fact that these indices were shown to be associated with the amount of visceral fat, their predictive values vary considerably regarding the obesity level. Clinically, the sensitivity is decreased in obese subjects with a body mass index over 35–40 kg / m^2 due to their high levels of subcutaneous adipose tissue.[10,25] In order to bypass limitations associated with the BMI and the WC, Zhu *et al.*[25] recently proposed combining measures of BMI and WC to provide a higher overall test performance in order to better identify individuals at high risk for coronary artery diseases.

Taken together, we could speculate on the need for treating obese older adults when they have no metabolic abnormalities associated with an increased risk of cardiovascular diseases. It is also believed that obesity does not decrease longevity in older individuals[26] and that being obese at an older age may protect them from hip fractures associated with falls.[27,28] However, obesity has several other major negative effects that might have a significant impact on other components associated with autonomy, quality of life, and health in older individuals.[29]

First, it is well known that obesity is correlated with sedentary lifestyle, low fitness levels, cardiovascular diseases, and type II diabetes. These factors have been shown to have an impact on cognitive impairments in the older population.[30–32] Consequently, early onset of obesity in combination with the aging process might increase the risk of displaying these problems, which in turn would increase the risk of cognitive impairments. In particular, Baumgartner *et al.*[33] reported that older individuals at greatest risk of cognitive impairment are those who are simultaneously sarcopenic (that is, have low muscle mass) and obese. In agreement, recent studies reported an association between body composition (muscle and adipose tissue mass) and cognitive impairment,[34] dementia,[35] and Alzheimer's disease.[36]

Obesity and Impaired Physical Functioning

Regardless of the heterogeneity of metabolic and cognitive problems associated with obesity, physical impairment remains the most prevalent health problem associated with obesity in older adults. Recent evidence suggests a strong relationship between body weight and functional impairment in older adults. In fact, it was shown that in U.S. adults aged 60 years or older, the prevalence of significant knee, hip, and back pain increased with elevated BMI.[37] In addition, the odds ratio for obesity in association with arthritis problems has been shown to be significantly elevated for both sexes at 1.6.[38] In this sense, an increase in the probability of functional limitation has been observed to correlate with increases to body fat and BMI values.[39] In accordance, another study reported that women in the highest quintile for percentage of body fat and women with a BMI of 30 or greater were twice as likely to report functional limitations than women with lower BMIs.[40] The same study also reported a similar association, though weaker, in older men. Overall, these obesity-associated physical impairments are very likely to augment the probability of lower mobility, which in turn may exacerbate the reduced functional capacity. It is thus not surprising that obese older individuals have lower quality of wellbeing than those of normal body weight.[41] In fact, even after adjustments for age, race, education, smoking, and alcohol intake, obese older adults reported impaired quality of life, particularly worse physical functioning and physical well-being, and poorer physical and social functioning (women only).[42]

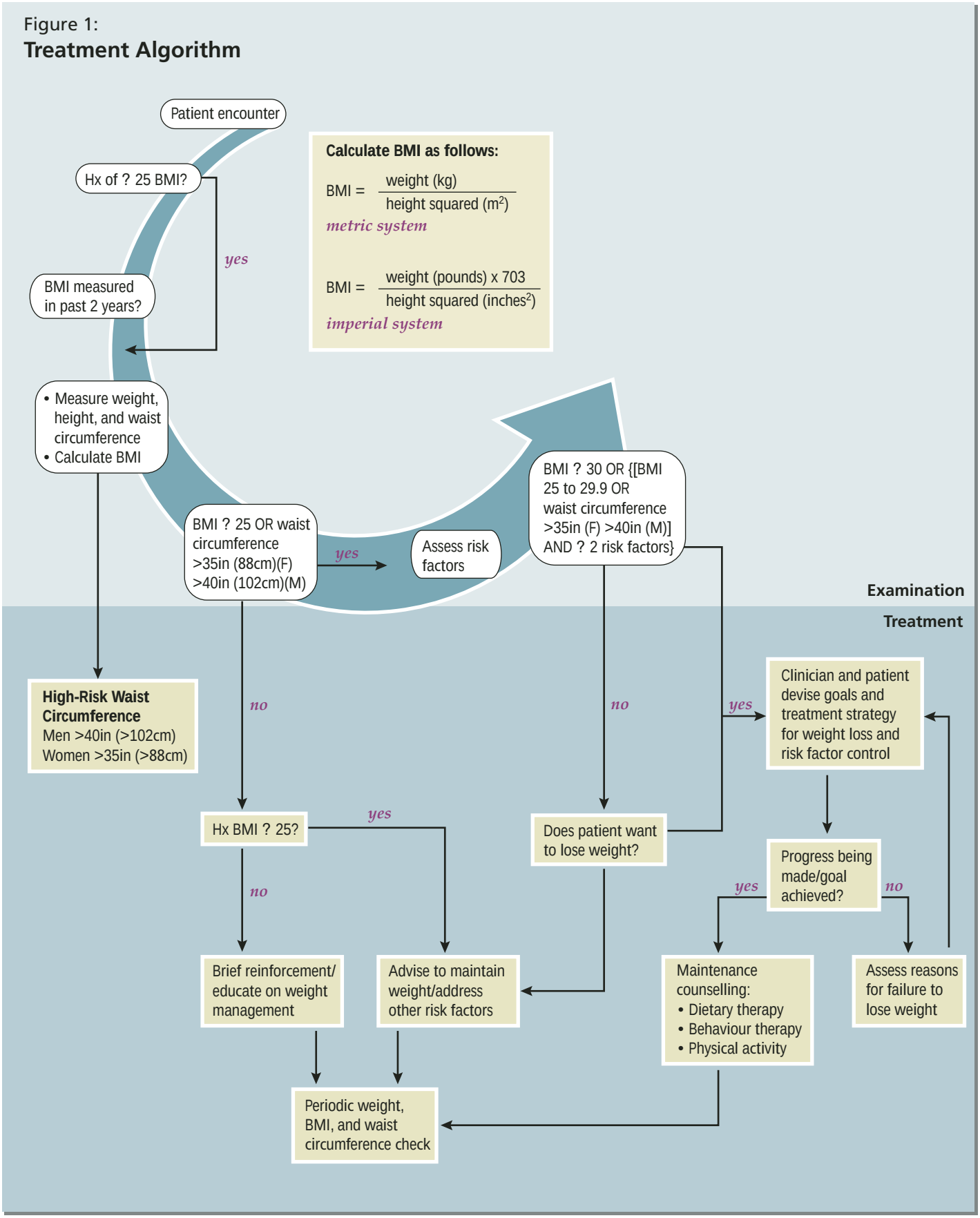
For all the reasons above, physicians working with obese older individuals with and without metabolic complications should encourage and help their patients to lose weight. To aid physicians in their task, the National Heart, Lung, and Blood Institute, in collaboration with the North American Association for the Study of Obesity, offer on their respective websites a comprehensive guideline with an

Table 1: Body Mass Index Cut-offs for Obesity

BMI (kg/m^2)	Classification
< 20	Underweight
20–25	Normal weight
25–30	Overweight
30–35	Obesity – Stage I
35–40	Obesity – Stage II
40 +	Obesity – Stage III

Source: Adapted from WHO 1998.[5] Reprinted with permission.

Figure 1:
Treatment Algorithm



algorithm using BMI and WC to identify and treat obese individuals.[43] It is important to mention, however, that the algorithm has been developed for the adult population and should be used with discernment in older individuals. As we previously stated, actual BMI cutoffs for younger adults (<60 years old) may not be suitable for older individuals, since body weight after 65 does not necessarily correlate with changes in fat mass and lean body mass.

Sarcopenic Obesity

Sarcopenia is the age-associated loss of muscle mass that is coupled with significant losses in physical function.[44] Severely obese individuals experience sarcopenia to a greater extent than leaner persons,[39] likely because of the sedentary lifestyle associated with the difficulty of bearing the excess weight. This condition, which is called sarcopenic obesity, has been shown to induce the greatest risk of physical disability in older adults[45] and suggests that treatment of obesity in older adults should be aimed at maintaining muscle mass as well as managing body weight.

Treatment of Obesity in Older Adults

Although the threshold for initiating a weight-loss treatment may be higher in older than in younger adults, conditions associated with obesity in older adults, especially with regard to physical impairment, do warrant that attention be paid to body weight problems in this population. As demonstrated above, functional limitations are highly prevalent in obese older adults. More noteworthy is the fact that overweight and heavier individuals aged 65 to 75 have been shown to be at greater risk of hospitalization and institutionalization than their normal-weight counterparts.[46] Aggressive interventions such as weight-loss medicine and bariatric surgery are generally not recommended in older adults for health reasons (Figure 1).[3,47] However, recent studies have confirmed that diet and exercise have beneficial effects on body weight, physical function, and quality of life in this age group.[3,48]

On the one hand, dieting should be undertaken with caution. In fact, older adults are known to present some nutritional deficiencies[49] that could be exacerbated by a restrictive diet. Close medical and nutritional supervision may be needed. On the other hand, although clinicians who intend to encourage increased ambulation in older obese persons should consider possible barriers posed by musculoskeletal pain,[50] supervised moderate exercise can be performed by most obese older adults and should combine aerobic, strength training, and balance exercises.[51] Interestingly, even in the absence of a program specifically aimed at weight loss, small amounts of physical activity inducing slight increases in fitness and decreases in fatness are associated with a better health-related quality of life and mood in older persons.[52]

Conclusions

It has been demonstrated that preventing obesity in middle-aged individuals may lessen the burden of disease and functional impairment, which degrade quality of life in old age.[53] Though not all obese older adults will present with metabolic disorders and cognitive impairments, a high proportion of them will be afflicted by various physical incapacities possibly leading to physical dependency. This suggests that a weight-managing program, including moderate, supervised exercise and a nutritional diet (under medical supervision), should be undertaken and will provide improvements in several aspects of the quality of life.

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