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Determination of Overweight and Obesity in Wheelchair Bound Patients

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Overweight, Obesity, Weight loss, Body mass index (BMI).

Introduction
Definitive guidelines for determining ideal body weight, overweight, and obesity of wheelchair bound patients do not exist. We learned this by accident when we were about to start a weight loss study for wheelchair bound individuals. For all weight loss studies, it is important to obtain a baseline weight from which to obtain an ideal body weight (IBW) and calculate a healthy body mass index (BMI), which determines overweight or obesity. The purpose of this study is to review the literature for determining IBW and BMI in wheelchair bound individuals.

Specific to this article, the reasons for being wheelchair bound are from various causes such as spinal cord injuries (SCI), stroke, neurological conditions, and others.

Determining Ideal Body Weight and Body Mass Index
The Academy of Nutrition and Dietetics
The Academy of Nutrition and Dietetics recommends against using BMI, as it is not reflective of obesity (adiposity) in individuals with SCI [1]. BMI was developed for able-bodied individuals and is a screening tool that represents the percentage of fat mass in that population [2]. However, BMI does not account for the changes in body composition specific to patients with SCI. After injury, an initial loss of lean body mass (LBM) occurs due to the lack of neurological stimulation and decreased physical activity [2]. This loss of LBM is typically associated with an increase in fat mass, especially abdominal adiposity.

Patients with SCI have 8-18% higher fat mass for the same BMI in able-bodied individuals [3]. In a direct comparison of body composition with similar BMIs between SCI patients and able-bodied individuals using dual-energy x-ray absorptiometry (DEXA), total lean mass was 8.9 kg lower, and body fat mass was 7.1 kg higher in the SCI group [4].

The correlation between the percentage fat mass (FM) and BMI was explored in a SCI population [2]. Using a BMI of 30 kg/m^2, which is obesity in able-bodied individuals, failed to identify 73.9% of SCI individuals with obesity. Instead, using the percentage FM to determine obesity is preferable in SCI. In one study, males with SCI had an average BMI of 22.1 kg/m^2, indicating they were normal weight. However, their corresponding FM was 22.4% on average, indicating obesity based on age. This cohort had an average age of 43.5 ± 11.5 years which corresponds to obesity in a group of able-bodied males aged 18-40 years [4]. Compared to older males, this group of SCI patients, with a mean 22.4% FM, would not be considered to be obese (> 25% FM; 41-60 years of age). Use of the percentage FM in the SCI population leads to a lower BMI cutoff more accurately representing obesity. Based on this study, it seems prudent to consider BMI >22 kg/m^2 as obesity in individuals with SCI [2].

Metropolitan Life Tables
There is limited evidence, according to the Academy of Nutrition and Dietetics, to use to the Metropolitan Life Insurance tables to adjust the ideal body weight for individuals with SCI [1]. These tables determine ideal body weight based on frame size for both males and females of similar heights [5]. Frame size is categorized as small, medium, or large, and may be determined using wrist circumference and height for each gender [6]. The recommendations suggest using a 10% to 15%, and 5% to 10% reduction in the Metropolitan Life Insurance Table weight for quadriplegia and paraplegia, respectively [1]. However, these tables have not been validated in a SCI population before [3].

Body Composition Measurements
There is some evidence for the use of body composition

measurement devices (i.e. bioelectric impedance analysis or dual-energy X-ray absorptiometry), but these tests may be expensive, inconvenient, and are not practical in the clinical setting [1]. Clinical studies using these devices in SCI patients are lacking, so their use is not recommended.

Clinical Application

This review was prompted by a clinical trial we were about to conduct in wheelchair bound patients. We planned to look at the effect of nutrient-rich, functional foods on weight loss. Previously, the foods were shown to be efficacious in promoting healthy weight loss in able-bodied individuals [7,8].

The entry criteria initially included SCI patients with BMIs of 25 kg/m² or greater. However, upon completion of this literature review, we subsequently re-evaluated SCI patients enrolled in our study who had BMIs < 25 kg/m². Next, we considered an adjusted ideal body weight based on the Metropolitan Life Insurance tables (1). One quadriplegic patient with a BMI of 22 kg/m², who was initially rejected into the weight loss study, was subsequently included. Another SCI patient's IBW went from 54 kg to 44-49 kg after adjustment, now indicating that they were overweight. Eligibility was re-calculated based on an adjusted IBW (10-15% lower in quadriplegics), frame size, and gender. This supports a rationale to use the Metropolitan Life Tables to determine an adjusted IBW as a surrogate for overweight for all SCI patients.

Conclusion

No evidence-based recommendations exist for calculating IBW and overweight/obesity classification based on BMI of wheelchair bound patients. Due to changes in body composition in SCI patients, BMI is unable to predict overweight or obesity in all patients. Able-bodied individuals have a lower percentage FM per BMI unit. To determine overweight or obesity in wheelchair bound patients, we recommend using IBW and applying a correction factor to reduce IBW by an additional 5-10% for paraplegics and 10-15% for quadriplegics. It is likely that a small percentage of SCI patients with normal BMIs will be reclassified as being overweight. Clearly more work is needed to more accurately predict IBW and BMI in wheelchair bound patients.

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