Weight Characteristics Comparison Through BMI Calculation and Waist Circumference Measurement in a Sample of Piedmont Elderly Subjects

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KEY WORDS: Body Mass Index, waist circumference, obesity, ageing.

Introduction

The Body Mass Index (BMI) is curr used as an indicator useful to evaluate the nutritional status (Flegal et al., 2009), but, as reported by many studies (Roche et al., 1981; Wellens et al., 1996), it doesn't give information on adiposity level. Therefore, alternative methods are used to evaluate the body fat mass: an important one is the waist circumference (WC), that is correlated with the abdominal fat distribution (Douketis et al., 2005) and the risk level to develop chronic illnesses (Visscher et al., 2001; Guallar-Castillón et al., 2009). The aim of our research, concerning anthropometric characteristics of a sample of elderly Piedmont people, is to compare the evaluations of obesity incidence and health risk levels, carried out using BMI and those using waist circumference measure. We also would like to identify not only the better anthropometric index for weight screening of ageing people, but also which of the two index permits to obtain data with a particularly tactful approach.

Materials and Methods

The research involved a sample of 180 Piedmont elderly subjects aged 60-89 (55 males and 125 females) living at home, participating to the "Act on ageing" project (2010-2012. Coord Prof. Ciairano-www.actonageing.eu). We measured the anthropometric variables (waist circumference, stature and weight) according to ISO 7250-1/2008, while to identify the overweight and obesity cases we used the BMI cut-off values from World Health Organization (2008) tables, while, to evaluate risk level to develop chronic illnesses, we used the waist circumference cut off values proposed by National Health guidelines (2001).

Results

Data regarding BMI show that 43,3% of subjects (45,5% of males and 42,4% of females) are overweight and 36,1% obese (34,5% of males and 36,8% of females). Waist circumference measurements point out an average risk level to develop chronic illnesses for 20,6% of the subjects (30,9% for males and 16% for females) and a high risk for 57,2% of them (34,5% for males and 67,2% for females). Actually both methods, with different percentages, reveal an high incidence of weight excess in our sample. According to BMI, only 20% (both males and females) of the elderly has a normal weight condition, while the waist circumference is "desirable" only for 16,8% of females and 34,5% of males. Both the parameters, but in particular the waist circumference, show a more serious health risk level for females, although our results are comparables with those of the literature about this age mainly for males (Visscher et al., 2001). In fact, Visscher et al. (2001) sustain that the screening of overweight/obesity in elderly, or the risk level to develop chronic illnesses, is the same if BMI

WAIST CIRCUMFERENCE	MALES		
	BMI		
	Normalweight 18.5-24.9 Kg/m^2	Overweight 25.0-29.9 Kg/m^2	Obesity ≥ 30 Kg/m^2
< 102 cm	20.0%	41.9%	3.6%
> 102 cm	0,0%	3.6%	30.9%
WAIST CIRCUMFERENCE	FEMALES		
	BMI		
	Normalweight 18.5-24.9 Kg/m^2	Overweight 25.0-29.9 Kg/m^2	Obesity ≥ 30 Kg/m^2
< 88 cm	17.6%	15.2%	0,0%
> 88 cm	3.2%	27.2%	36.8%

Risk levels:

☐ Least risk ☐ Increased risk ☐ High risk ■ Very high risk

Fig. 1. *Health risk levels according to Douketis* et al. *(2005) matrix*

or waist circumference measurement is used. However, it's known that with ageing there is a gradual decrease in stature due to the reduction of the intervertebral disk thickness and to the curvature of the spine and also an important increase of the abdominal fat mass, in particular in females (Gallagher et al., 1996). So, to evaluate weight problems in elderly people, the use of just the BMI is inadequate because it doesn't provide any information

about fat distribution and even the waist circumference measurement alone is insufficient, as it isn't correlated with the stature. So, to estimate the relationship among BMI, waist circumference and risk level to develop chronic illness, we employed the matrix proposed by Douketis *et al.* (2005) that combines BMI and WC categories to define 4 levels of overall risk assessment of health problems (Fig. 1). Applying this method 7,2% of males and 27,2% of females show an high disease risk level, while 30,9% of males and 36,8% of females show a very high risk level.

Discussion

To evaluate weight characteristics in elderly it's important to consider not only BMI, but also waist circumference measure (Janssen *et al.*, 2005; Li *et al.*, 2007): our results confirm that the Douketis *et al.* (2005) classification of health risks levels derived from these two variables, represents a simple and fast screening method, applicable to a large sample, to identify the different levels of health risk in a balanced way. A more careful body composition and fat mass percentage evaluation requires the use of complex methods and of precision and expensive instruments, as plicometry or bioelectric impedance measurement, not always and everywhere applicable. Actually, in the *Act on Ageing* project above mentioned, we will measure on the same sample fat mass percentage and other parameters based on bioelectric impedance to evaluate how they influence much the risks incidence assessment.

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