130 - PERCENTAGE OF BODY FAT AND NUTRITIONAL STATUS: A STUDY OF PEOPLE IN VALE DO SINOS, SOUTHERN BRAZIL.

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INTRODUCTION

Nutritional status, which is closely associated with body weight, is often used to estimate current body energy reserves in a population. Body fat is also calculated for similar purposes. For men and women, energy reserves are determined according to different specific factors.

According to Duarte (2007), nutritional assessment is vitally important to detect fat as well as protein and calorie malnutrition. Fat, which can be determined using analytical methods, is classified as metabolically active mass or energy reserves.

Calculations of surface area based on height, weight and skin folds may be used to estimate body composition in different age groups (OMCARDLE et al., 1996).

Adipose tissue is one of the major energy stores of the human body. According to Heyward and Stolarczyk (2000), studies about adipose tissue provide information to assess the risk associated with extremely high or extremely low total or intra-abdominal fat, the correlation with certain diseases, and the body changes according to age.

This study investigated the association of percentage body fat, calculated according to anthropometric measures, and nutritional status, according to body mass index, in a group of adults aged 20 to 80 years in Vale do Sinos, southern Brazil.

METHODS

This descriptive study enrolled a convenience sample of 1004 adults (323 men) aged 20 to 80 years living in the Vale do Sinos, southern Brazil. Participants were classified according to 5 age brackets: 20 to 29, 30 to 39, 40 to 49, 50 to 59, or older than 60 years of age. All participants signed an informed consent term, and data were collected from January 2005 to July 2007.

Body mass index (BMI) was used to assess nutritional status, and values were classified according to age and gender using the cut-off points recommended by the World Health Organization (WHO, 1998): BMI < 18.4kg.m$^{-2}$ = underweight; 18.5 to 24.9kg.m$^{-2}$ = normal weight; 25.0 to 29.9kg.m$^{-2}$ = overweight; and 30.0kg.m$^{-2}$ = obesity. A balance beam scale (Welmy) was used to measure weight to the nearest 0.1 kg, and a height rod (Welmy), to measure height to the nearest 0.1 cm.

To estimate percentage body fat (%BF), the method described by Jason and Pollock (1985) was used to measure seven skinfolds: subscapular, triceps, biceps, suprailiac, abdominal, thigh and leg. A skinfold caliper (Lange) was used to collect measures to determine subcutaneous fat, which was used to calculate body fat.

RESULTS AND DISCUSSION

Table 1 Sample distribution according to absolute and relative frequencies of gender and age (n=1004).

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>119</td>
<td>60</td>
<td>66</td>
<td>43</td>
<td>35</td>
<td>10.84</td>
<td>323</td>
</tr>
</tbody>
</table>

Table 2 Distribution of relative differences between percentage body fat and nutritional status of study participants (n=536$^*$).

<table>
<thead>
<tr>
<th>Nutritional Status (I)</th>
<th>Nutritional Status (J)</th>
<th>%BF (I)</th>
<th>%BF (J)</th>
<th>(I - J)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Normal</td>
<td>31.381</td>
<td>24.723</td>
<td>6.658</td>
<td>0.000**</td>
</tr>
<tr>
<td>Overweight (N=329)</td>
<td>Obesity</td>
<td>39.165</td>
<td>21.227</td>
<td>17.938</td>
<td>0.000**</td>
</tr>
<tr>
<td>Normal</td>
<td>Overweight</td>
<td>31.381</td>
<td>24.723</td>
<td>6.658</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

* "N" refers to data that were statistically different. (p=0.01).

Table 2 shows significant differences (p=0.01) in percentage body fat between all the nutritional statuses except "underweight" and "normal-weight", which suggests a pre-obesity status for men and women.

According to Wang et al. (2002), the prevalence of overweight and obesity has grown markedly in developed and developing countries in the last decades. Brazil is no exception as it follows this worldwide trend (WANG et. al., 2002; VEIGA et. al., 2004).

Table 3 Distribution of relative and absolute differences between percentage body fat according to age groups and percentage body fat recommended by the WHO for women (N=681).

<table>
<thead>
<tr>
<th>Age group</th>
<th>Total (n)</th>
<th>Total (%)</th>
<th>Overweight (n)</th>
<th>Overweight (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>179</td>
<td>100</td>
<td>158</td>
<td>88.3</td>
<td>0.000**</td>
</tr>
<tr>
<td>30-39</td>
<td>129</td>
<td>100</td>
<td>118</td>
<td>91.5</td>
<td>0.000**</td>
</tr>
<tr>
<td>40-49</td>
<td>151</td>
<td>100</td>
<td>137</td>
<td>90.7</td>
<td>0.000**</td>
</tr>
<tr>
<td>50-59</td>
<td>124</td>
<td>100</td>
<td>105</td>
<td>84.7</td>
<td>0.000**</td>
</tr>
<tr>
<td>60+</td>
<td>98</td>
<td>100</td>
<td>92</td>
<td>93.9</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

The analysis of women in the different age groups revealed significant differences between mean percentage body fat and referential percentages in all groups (WHO, 1998).
The analysis of results in the group of men, however, showed significant differences only in the groups of participants aged 30 to 39 years or older than 60 years. The current high prevalence of obesity seen in most countries, regardless of age or gender, may be responsible for several health problems. It may decrease functioning, increase susceptibility to other diseases, and trigger other health disorders. The results of this study confirm these possibilities. We found that many of the study participants, both men and women, had pre-obesity characteristics.

Because of the growing numbers of overweight and obese people and of associated cardiovascular risk factors, interventions should focus on reducing body weight, particularly excessive body fat. Monteiro (2000) suggests that such interventions should prevent and control cardiovascular diseases in the population. Rush et al. (1997) found that the prevalence of obesity may be assigned to environmental factors that, when interacting with genetic factors, may explain the accumulation of excessive body fat in large percentages of the world population.

Several techniques are used to determine body composition, and anthropometric measurements have been widely used for this purpose. These measurements have a low operational cost and are relatively simple, especially the calculation of body mass and height measurements (MONTEIRO, 1998).

Kamimura et al. (2003) suggested that body composition may be used to diagnose nutritional anomalies. Changes in body fat and lean mass indicate several metabolic disorders and detect health risks early on, when levels of body fat are high or low or when there is loss of muscle mass. Although BMI does not directly measure percentage body fat and does not define its distribution, studies with large population samples found a high correlation between BMI and body fat and an increased risk of death associated with high BMI (WHO, 1998).

In addition, decreases in energy use, if not reversed or compensated for with reductions in calorie intake, may perpetuate this obesity epidemics and its consequences to health (MACDONALD et al., 2006).

CONCLUSION
Men and women have hormone differences that play an important role in body mass. Reference values do not mean that both genders should make efforts to achieve the body composition suggested by those models. They are useful as reference standards for statistical comparisons and data interpretation when analyzing studies with different groups, such as athletes, individuals taking part in physical training, and underweight or overweight people.

Regardless of gender or age, regular physical activity, either moderate or intense, produces measurable physiological improvement. It reduces obesity risks, which are constantly associated with the development of disorders and diseases, avoids high expenses with health, and, consequently, extends life expectancy.

REFERENCES

Rua Clodomiro Machado, 330 - Bairro Santo Antônio - Montenegro, RS, Brazil. CEP: 95600-000 Matheus Ferrareze matferrareze@hotmail.com João Carlos Jaccottet Piccoli joaopiccoli@fievale.br
Este estudo comparou o percentual de gordura corporal e o estado nutricional de indivíduos de ambos os gêneros, entre 20 e 80 anos, residentes na região do vale do Sinos, Rio Grande do Sul, Brasil. O estudo descritivo com 1004 indivíduos, 323 do gênero masculino e 681 do feminino, divididos por cinco faixas de idade, selecionados por conveniência, analisou a correlação entre o percentual de gordura e o estado nutricional, caracterizando pre-obesidade nas categorias com percentual de gordura acima do recomendado. O gênero masculino apresentou significância (p<0,05) no percentual médio de gordura entre todas as categorias, ou seja, a maioria dos homens avaliados estavam acima do percentual normal de gordura corporal, caracterizando um estado de sobrepeso. Para o gênero feminino, a comparação entre as médias encontradas e recomendadas por sexo não mostrou diferença significativa (p>0,05) nas categorias do estado nutricional, indicando uma prevalência de sobrepeso entre as mulheres também. Através do Índice de Massa Corporal, investigou-se o estado nutricional. O percentual de gordura foi obtido com um equipamento de balança de precisão e estadiómetro, evidenciando que a maioria dos indivíduos avaliados apresentavam um percentual de gordura acima do recomendado.