INTRODUCTION

Many of the alterations to physiological structure and organic function that take place during aging result in a lack of involvement in adequate physical activities. Appropriate behavioral patterns for health promotion practiced by the elderly population, especially exercise and adequate nutrition, may constitute critical factors for maintaining these individuals' independence for the longest time possible. Such behavior would postpone the need for interventions by the health system, considering that these factors can delay the onset of incapacitating processes (WOO, 2000). In this light, regular practicing of physical activity has been recommended for the prevention of and rehabilitation from many diseases, by various health associations around the world. These recommendations are based on epidemiological studies that have demonstrated a direct relationship between physical inactivity and the presence of multiple risk factors, and which have shown that regular practicing of physical activity prevents beneficial effects for preventing and treating a variety of complaints (ACSM, 1998; CIOLAC & GUIMARÃES, 2002).

Daily activities and energy expenditure

The total daily energy expenditure includes the sum of the basal metabolism, thermal effect from foods and expenditure on physical activity. This last item represents 15 to 30% of the daily energy expenditure and varies according to the individual's physical activity level. It consists of the sum of the planned physical activities, muscle activities that do not produce specific movements (such as tremors) and all the activities carried out in day-to-day life. The latter form the most important adaptable component of daily energy expenditure (MARDLE, KATCH, KATCH, 2003). The energy expenditure in a large number of daily tasks and physical exercises over a 24-hour period can be determined, thus facilitating the calculation of calorie expenditure and allowing measurement of the frequency of day-to-day activities and the intensity of the individual's involvement with them. After taking into account periods of inactivity and the light, moderate and intense activities performed, individuals can be classified into categories of "high", "medium" and "low" levels of physical activity (AADALH & JORGENSEN, 2003).

Although it is recommended that the adult and elderly population should take up habitual and structured physical activities as a means of preventing and controlling diseases, the benefits that a large amount of physical activity undertaken while performing day-to-day activities may bring for such individuals should not be disregarded. Despite the low intensity, muscle contractions undertaken over the course of the whole day's activities require a series of physiological responses from the body's systems, especially the cardiovascular system. With the aim of maintaining cellular homeostasis when faced with constant changes in metabolic demands, certain mechanisms will be put into action to allow the system to operate effectively under a variety of circumstances throughout the aging process. Descriptions of daily habits, the time spent on activities of different intensities and estimates of total energy expenditure make it possible to obtain a picture of the habitual level of physical activity among the elderly population. This picture allows the possible need for intervention at primary levels to be discerned, with the aims of preventing and delaying incapacitating processes and of maintaining the autonomy and functional independence of this segment of the population.

Starting from the considerations above, the present study was developed with the objectives of describing physical activity levels and their relationship with energy expenditure in the daily activities of a group of adult and elderly women, and of identifying their degree of involvement with this exercise, classifying them into the categories of "low", "moderate" or "high" levels of physical activity.

METHOD

This study was developed together with the Municipal Program for the Third Age (MPTA) in the city of Viçosa, State of Minas Gerais. The sample consisted of 75 women aged 50 years or over who were regularly enrolled in the MPTA. They all agreed to participate voluntarily, and signed or placed their fingerprint on a statement of free and informed consent. These women were selected using the criterion of greatest accessibility (POLIT & HUNGLER, 1989), and those who agreed to participate were individually interviewed in a location reserved for this purpose.

Two instruments were applied to each participant. One questionnaire recording personal data and characterized the sample, including items for identification (name, age and marital status), schooling level, occupation, economic situation, family situation, presence of chronic diseases and whether guided physical activities were practiced. The other was the International Physical Activity Questionnaire (IPAQ) - short version (BARROS, NAHAS, 2000). This instrument has been utilized internationally for measuring physical activity levels, and consists of questions relating to the amount of time that individuals spend doing physical activities over a normal week or habitually, including manual work activities, moving around, leisure, sports and domestic activities. The questionnaire asks that only activities performed for at least 10 minutes continuously on each occasion should be recorded, specifying the number of days per week and the number of hours/minutes of this total per day. The activities are specified by division into four distinct blocks: vigorous activities that require great physical effort and cause breathing that is much deeper than normal; moderate activities that require some physical effort and cause breathing that is a little deeper than normal; walking; and time spent sitting down. The classification of physical activity levels was done according to the criteria of the IPAQ Scoring Protocol, which classifies individuals into three levels of physical activity: "light or low", "moderate" and "high", in accordance with the energy expenditure expressed as the metabolic equivalent (MET).

Weight and height were also measured, to calculate the body mass index (BMI). The individuals' nutritional classification was derived from the BMI, on the basis of the values recommended by the World Health Organization (WHO, 1997).

For the data analysis, descriptive statistics were utilized, with the presentation of mean values, standard deviations and percentages of the variables studied. The simple linear regression test was used to analyze the relationships between MET, BMI and age group. To analyze associations between categorical variables (diseases reported and physical activity levels), the chi-squared association test was utilized. The statistical program utilized was Statística 8.0. The significance level adopted was p< 0.05.

RESULTS AND DISCUSSION

Table 1 presents the mean values and standard deviations of some of the sample characteristics (age, weight, height, MET and BMI), distributed according to IPAQ levels. With regard to schooling, there was a high frequency of elderly women who had been unable to complete their elementary education (70.6%). This figure was similar to what is usually found among the oldest segment of the population of Brazil (CHAIMOWICZ, 1998). According to TELAROLLI JR et al., (1996), schooling is an important indicator of socioeconomic characterization, along with income. In our study, the age group was the same as in other studies with samples coming
Among the diseases reported by the women who were classified as having a "low" level of physical activity, diabetes was mentioned by 2.67%, high cholesterol by 2.67% and arterial hypertension by 5.33%. Among the "moderately active" and "active" participants, the level of energy expenditure was greater than among the "low" activity group. These results confirm that the gradual replacement of muscle tissue with adipose tissue over the years is a reason why the mean BMI was greater among elderly women classified as having a "low" level of physical activity (32.74 kg/m²) compared to those with a "moderate" (28.27 kg/m²) and "high" (26.88 kg/m²) level of physical activity. Considering the most elderly individuals, this could be indicative that, despite not engaging in regular physical activities, they may spend more time on activities that are essential for developing a wide range of external activities. These activities could be of a more intense nature that demands more physically, such as when participating in regular physical activities, or could be of a less intense nature that demands a greater degree of cognition, such as when engaging in social activities, which are considered to be protective according to the criteria of the European Society of Cardiology (VIEBIG et al 2006). In our study, it was observed that 98.6% of the women interviewed solely performed the role of "housewife". They did a wide variety of domestic jobs every day, and 68% of them said that they did all the housework without help. The contribution of domestic activity towards health could be seen in a study that was conducted among 91 women aged 40 to 64 years who had been diagnosed with peripheral vascular disease and had records of hospitalization during the period from August 1995 to June 2001. It was observed in that study that such activities made a contribution of 43% towards the total energy expenditure. It is also important to highlight the high proportion of these women (74.7%) who were active despite their chronic-degenerative disease (SILVA & NAHAS, 2004). Thus, it seems that domestic activities have an important role in the energy expenditure demonstrated by the female population, and this may act as a prevention or stabilization factor for the disease cited above. In our study, the means and respective standard deviations for the MET values obtained were 5427.6 ml/min/kg ± 2092 for the low level; 2455.6 ml/min/kg ± 892.4 for the moderate level and 1334 ml/min/kg ± 937.9 for the high level, as presented in Table 1. Thus, the majority of these elderly women appear to be very active in their day-to-day lives, involving themselves in many activities that in combination imply high caloric expenditure.

The results also suggest that the mean age of the inactive elderly women was slightly greater than the mean for the active elderly women. Thus, a slight increase in sedentary lifestyle can be perceived with increasing age, i.e. these women's ages presented an inverse relationship with energy expenditure (r²=0.0705; p=0.0213). This result is similar to the findings of BARETTA (2005), even though there was no statistically significant difference between energy expenditure and age. Thus, although it seems that there is no relationship between physical activity levels and age for females, at the "high" level of physical activity the energy expenditure values tend to diminish as the age group increases (MATSUDO et al, 2002). With regard to age, it is important to emphasize that it is not a factor that homogenizes conditions between elderly people. On the contrary, as they advance in age, they become less alike and much more subject to all the consequences of the accumulation of a series of factors through the aging process. The factors of genetics, gender, race, economic condition, schooling, marital status, food intake and previous care regarding their health merge and become the determinants of their health and longevity.

Among the elderly women (n=22) who reported engaging in two or more regular physical activities (walking, water gymnastics or localized workouts) in addition to domestic activities, all of them were in the "high" IPAQ level, which may have contributed towards the high MET values found. However, among the 27 elderly women who reported that they did not do any type of regular physical exercise, 51.9% and 37% presented "high" and "moderate" levels of physical activity, respectively. This may be indicative that, even though the day-to-day activities were carried out in large volume and at low intensity (which is the general characteristic of domestic activities), they were also factors that contributed towards the high MET value obtained for this group. With regard to the women who performed a single activity per week (n=26; walking), all of them presented a "low" level of physical activity (57.7%). The possible explanations for this could also include low volume of domestic activities and the low intensity of the physical activity carried out.

One important feature to be considered as a possible influence on all the physical activity levels is the elderly women's marital status. Children moving away from the home and widowhood may be factors responsible for greater amounts of free time that could be utilized in more pleasurable activities, considering that there would be a decrease in domestic responsibilities and concerns with the diminution of the family. Such activities could be of a more intense nature that demands more physically, such as when participating in regular physical activities, or could be of a less intense nature that demands a greater degree of cognition, such as when learning a new ability, or could be devoted to socialization in which the physical activity becomes a means for increasing the relational environment with people of similar characteristics. On the other hand, being alone (widowed, single or separated) not only places elderly women's survival at risk because this situation directly or indirectly interferes in their social support networks, but also may lead to the accumulation of a series of structural inequalities over the course of time. This will be reflected in these women's quality of life and lead them to a greater number of situations of both physical and social fragility.

With regard to schooling, the literature indicates the existence of a positive relationship between schooling level and exercise, thus attributing an important role to access to information in relation to the adoption of healthy living habits. In the present study, the elderly women with incomplete elementary education were homogeneously distributed between the three levels of physical activity. According to BARETTA (2005), in a cross-sectional study among adults aged 20 to 59 years that investigated the patterns of energy expenditure and associated factors, it was found that the demands for energy expenditure were greater in this age group compared to the active individuals. Considering the most elderly individuals, this could be indicative that, despite not engaging in regular physical activities, they may spend more time on activities that are essential for developing a wide range of external activities. These activities could be of a more intense nature that demands more physically, such as when participating in regular physical activities, or could be of a less intense nature that demands a greater degree of cognition, such as when learning a new ability, or could be devoted to socialization in which the physical activity becomes a means for increasing the relational environment with people of similar characteristics. On the other hand, being alone (widowed, single or separated) not only places elderly women's survival at risk because this situation directly or indirectly interferes in their social support networks, but also may lead to the accumulation of a series of structural inequalities over the course of time. This will be reflected in these women's quality of life and lead them to a greater number of situations of both physical and social fragility.

Concerning BMI, the population in this study presented a high degree of overweight, and more specifically, pre-obesity (25-29.9 kg/m²), in conformity with the figures recommended by WHO (1997), since the mean for the whole group was 27.82 kg/m². Among the three activity levels, the mean BMI was greater among elderly women classified as having a "low" level of physical activity (32.74 kg/m²), although no significant relationship was found between this index and the energy expenditure expressed in MET (r² = 0.0125; p = 0.3395). In the study by VIEBIG et al (2006), their population presented a generally high degree of pre-obesity and obesity (BMI = 30.0 kg/m²), with greatest prevalence in the age group from 50 to 65 years. BARETTA (2003) also found a negative relationship between BMI and the level of energy expenditure. This gradual replacement of muscle tissue with adipose tissue over the course of time tends to be reflected in higher BMI values and consequently lower energy expenditure.

Among the diseases reported by the women who were classified as having a "low" level of physical activity, diabetes was mentioned by 2.67%, high cholesterol by 2.67% and arterial hypertension by 5.33%. Among the "moderately active" and "active"
Descriptive statistics were utilized; relationships between metabolic equivalent (MET), BMI and age group were verified using the chi-squared test (diabetes vs. MET: \( x^2 = 1.339286, df = 1, p = 0.24716 \); high cholesterol vs. MET: \( x^2 = 0.5565863, df = 1, p = 0.45564 \); hypertension vs. MET: \( x^2 = 0.0805855, df = 1, p = 0.77644 \)). The results found are purely exploratory, but they may suggest that part of the population studied would present a risk of cardiovascular diseases, if this were associated with the BMI values. Despite being within the desirable classifications for physical activity, the latter is not the only condition to influence the presence or absence of risk factors, in that food intake, stress and genetics, for example, are also strong factors influencing the prevalence of chronic-degenerative diseases. What is seen is that physical activity is a potent protective factor for avoiding the progression of a disease, even in the presence of diagnosed risk factors, because of the regularization of the individual's metabolism, especially in the catabolic phase, which has the function of releasing energy from substrates while the organism's vital functions are being performed, in any situation of physical demands.

CONCLUSION

The majority of the elderly women in this study could be classified as having moderate or high energy expenditure. This result may be associated with domestic work, moving around and other day-to-day activities. Although these activities are of low intensity, they take place in large volume, and this may have been one of the factors that contributed towards the high energy expenditure values found. It is emphasized that, particularly when dealing with groups of elderly people, these individuals' lives should not be viewed in a purely biological manner, since the performance attained in daily activities not only is influenced by individual personality but also may be associated with age, gender, incapacities, presence of chronic diseases, socioeconomic level, marital status, living conditions and infrastructure. All these characteristics together contribute towards giving day-to-day life its tone of diversity and may, to varying degrees, have influenced the choice and accomplishment of activities and consequently the energy expenditure of the elderly women in this study.

REFERENCES


BARETTA, E. Nível de Atividade Física e Fatores Associados em indivíduos adultos de um município de pequeno porte do sul do Brasil: um estudo de base populacional. (Thesis) Universidade do Oeste de Santa Catarina, Biological Sciences and Health Division, Joaçaba, 2003.

BARETTA, M. Padrão de gasto energético e fatores associados em adultos: um estudo de base populacional no sul do Brasil. Thesis - Universidad do Oeste de Santa Catarina, Biological Sciences and Health Division, Joaçaba, 2005.


LEONICE APARECIDA DOIMO
Universidade Federal de Viçosa - UFF
Campus Universitário
Departamento de Educação Física
Viçosa - MG
CEP 36570-000
ladoimo@ufv.br
(31)3899-2249

PHYSICAL ACTIVITY LEVELS AND THEIR RELATIONSHIP WITH ENERGY EXPENDITURE IN THE DAILY ACTIVITIES OF ADULT AND ELDERLY WOMEN IN THE CITY OF VIÇOSA (MINAS GERAIS/BRAZIL)

Introduction: Modifications resulting from aging reduce elderly people's physical capacity and influence their daily energy expenditure. Objective: To describe daily physical activity levels among women, classifying them as "high", "medium" or "low" levels. Method: Seventy-five adult and elderly women (mean age: 66.04  6.55 years) enrolled in the Municipal Program for the Third Age, in Viçosa, Minas Gerais, agreed to participate. The International Physical Activity Questionnaire (IPAQ), short version, and a personal data questionnaire were applied, and weights (kg) and heights (cm) were measured to calculate the body mass index (BMI). Descriptive statistics were utilized; relationships between metabolic equivalent (MET), BMI and age group were verified using the
simple linear regression test; and associations between categorical variables were analyzed using the chi-squared test, with \( p < 0.05 \). Results: The means and standard deviations of weight and height were 46.98 ± 31.19 kg and 153.9 ± 5.63 cm; 62.6% of the women received up to two minimum salaries and 70.6% had not completed elementary education. Most of them presented moderate (34.7%) or high (58.7%) energy expenditure, and 98.6% performed large quantities of domestic tasks. No significant relationship was found between BMI and MET, although the elderly women classified as having "low" physical activity levels presented high BMI. Ages were inversely related to MET values. There was no relationship between IPAQ and reported diseases, but most of the women with "high" and "moderate" IPAQ classifications presented at least one risk factor for coronary diseases. Conclusion: These women's incomes and schooling were equivalent to those found among the oldest segment of the general population, particularly among women. Although of low intensity, the large volume of domestic activities constitutes an important stimulus towards high energy expenditure, and this may be a protective factor against cardiovascular diseases and for maintaining the independence of this group.

Key words: elderly people, physical activity, energy expenditure

**MÉTODO**


- **Intervenção**: as mulheres que se inscreveram foram submetidas a atividade física de acordo com as orientações recebidas.

- **Análise dos dados**: os dados foram analisados utilizando o programa EPIINFO. O nível de atividade física foi categorizado de acordo com as orientações do IPAQ.

**RESULTADOS**

- A idade variou de 56 a 89 anos, com uma média de 72 anos (± 6,55).
- A maior parte das participantes (98,6%) realizou um grande número de atividades domésticas.
- A maioria das mulheres apresentou um gasto energético diário de alta intensidade (58,7%), seguido de moderada (34,7%) e baixa (6,6%).
- A maioria das mulheres (70,6%) não completou o ensino fundamental e 62,6% receberam até dois salários mínimos.

**CONCLUSÃO**

- As mulheres participantes apresentaram um gasto energético diário de alta intensidade, o que pode ser considerado como um fator protecionista para doenças coronarianas.

**Palavras-chave**: atividade física, energia, consumo energético.