34 - 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)

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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 (McARDLE, 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 (AADAHL & 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 disconsidered. 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 6.0. 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

from health services or with population-based samples, and the low level of schooling plus the 62.6% of these elderly women who had a monthly income of one to two minimum salaries imprinted on this group the general characteristics of the public health service users who seek services like MPTA (TAVARES, ANJOS, 1999; MARQUES et al, 2005).

Table 1: Sample characteristics distributed according to IPAQ levels

IPAQ	n (%)	Age (years)	Weight (kg)	Height (cm)	MET *	BMI (kg/m^2)
		Mean/SD	Mean/SD	Mean/SD	Mean/SD	Mean/SD
High	44 (58.7)	64.7/6.4	45.8/31.3	154.9/5.9	5427.6/2092	27.41/3.9
Moderate	26 (34.7)	68/5.9	46.5/30.7	152.6/5.2	2455.6/892.4	27.58/5.5
Low	5 (6.6)	67/9.1	60.2/36.7	152.1/4.2	1334/937.9	32.74/5.6

* MET (energy expenditure) = activity level (in MET) x duration of the activity x events per week

The results revealed that 93.4% of the sample could be considered "active" and that only 6.6% had a "low" level of physical activity. These results are equivalent to those from a study among women aged 20 to 65 years who participated in a project named "Cardiological Assessment" that was conducted at a general outpatient clinic in the city of São Paulo, in which only 6.5% of the women were considered to be sedentary and 93.5% of the women performed activities 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 expenditure on physical activity. It is also important to highlight the high proportion of those 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 high level; 2455.6 ml/min/kg ± 892.4 for the moderate level and 1334 ml/min/kg ± 937.9 for the low 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 calorie 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 (r^2=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 elderly women who performed a single activity per week (n=26; walking), most 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 degree of schooling was negatively associated with the level of energy expenditure. Considering the most elderly individuals, this could be indicative that, despite not engaging in regular physical activities, the necessity to perform basic activities (relating to survival and self-care) and activities that are instrumental in daily life (more complex activities, also called social activities, since many are essential for developing a wide range of external activities) constitutes sufficient physiological stimulus for maintaining a healthy organism over the course of aging. That is, most of the effective day of these elderly women is spent on carrying out behavioral actions needed for adequate maintenance of life, both from a physiological point of view and with regard to organizing the environment.

Concerning BMI, the population in this study presented a high degree of overweight, and more specifically, pre-obesity (25-29.9 kg/m^2), in conformity with the figures recommended by WHO (1997), since the mean for the whole group was 27.82 kg/m^2. Among the three activity levels, the mean BMI was greater among elderly women classified as having a "low" level of physical activity (32.74 5.6), although no significant relationship was found between this index and the energy expenditure expressed in MET (r^2 = 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/m^2), 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. These results confirm that the 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"

women, 17.33%, 53.33% and 69.33% reported that they had diabetes, high cholesterol and hypertension, respectively. Thus, despite being active, a large majority of the elderly women in the latter two groups presented at least one risk factor for coronary diseases, even though there was no significant relationship between IPAQ and these reported diseases, 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: $x^2 = 0.0805585$, df = 1, p = 0.77654). 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.

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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

LE NIVEAU D'ACTIVITÉ PHYSIQUE ET SON RAPPORT AVEC LA DÉPENSE ÉNERGÉTIQUE QUOTIDIENNE CHEZ LES FEMMES ADULTES ET FEMMES ÂGÉES À VIÇOSA (MINAS GERAIS/ BRÉSIL)

Introduction - Le procès de veillessement réduit la capacité physique de personnes âgées et joue un rôle important sur la dépense énergétique quotidienne. **But de l'étude** - analyser le niveau d'activité physique chez les femmes en trois catégories " lourde", "modérée" et "légère". **Méthode** - L'échantillon a été composé de soixante-quinze femmes volontaires (adultes et âgées), participantes du Programme Municipal à la Troisième Âge développé par la Mairie de Viçosa/MG. L'âge moyenne du groupe était 66,04 ans (± 6,55). La récolte de données a utilisé a) le Questionnaire International d'Activité Physique (IPAQ) version courte, b) questionnaire sur les données personnels, c) le poids corporel et la taille pour le calcul de l'indice de masse corporelle (IMC). On a utilisé la statistique descriptive, le modèle de régression linéaire simple pour vérifier le rapport entre le MET, l'IMC et le groupe d'âge et d) le test du chi carré pour analyser les rapports entre les variables nominales, au seuil de 5%, de probabilité. **Résultats** - La moyenne du poids corporel a été 46,98 kg et l'écart-type 31,19 kg. La moyenne de la taille 153,9 cm et l'écart-type 5,63 cm. Les revenus de 62,6% des femmes est moins que 200 euro et 70,6% n'a pas réussi l'enseignement fondamental. La plupart des femmes âgées a présenté une dépense énergétique modérée (34,7%) et lourde (58,7%). 98,6% font des travaux ménagères. On a pas trouvé de rapport signifiant entre l'IMC et le MET malgré les femmes âgées catégorisées comme de « faible » niveau d'activité physique présentent un grand IMC. On a observé le rapport inversement proportionnel entre l'âge et la valeur du MET. Il n'y a pas eu de rapport entre l'IPAQ et les maladies décrites, mais la plupart catégorisée comme « grande » et « modérée » à l'IPAQ a présenté au moins un facteur de risque aux maladies coronariennes. **Conclusion** - les revenus et le niveau d'études de l'échantillon sont caractéristiques de la population âgée au Brésil, surtout chez les femmes. La faible intensité de l'activité physique est compensée par le grand volume d'activités ménagères quotidiennes qu'augmente la dépense énergétique. Peut-être il s'agit d'un facteur de protection des maladies cardiovasculaires et le sur le maintien de l'indépendance du groupe.

Mots clés: personnes âgées, activité physique, dépense d'énergétique

NIVEL DE ACTIVIDAD FÍSICA Y LA RELACIÓN CON EL GASTO ENERGÉTICO EN LAS ACTIVIDADES DIARIAS DE LAS MUJERES ADULTAS E ANCIANAS DE LA CIUDAD DE VIÇOSA (MINAS GERAIS/BRASIL)

Introducción - Modificaciones originadas por la vejez reducen la capacidad física de los ancianos influyendo en el gasto energético diario. **Objetivo** - Describir el nivel de actividad física diaria de mujeres, clasificándolas en categorías de "alto", "medio" e "bajo" nivel de actividad física. **Método** - Participaron de la investigación 75 mujeres, adultas y ancianas, con media de edad entre 66,04 +/- 6,55 años, que integran el Programa Municipal de la Tercera Edad (PMTE) de Viçosa, Minas Gerais. Usamos el Cuestionario Internacional de Actividad Física - IPAQ, versión reducida; un cuestionario de datos personales, y se han tomado medidas de peso (Kg.) y estatura (cm.), para el cálculo del Índice de Masa Corporal (IMC). Trabajamos con la estadística descriptiva: teste de regresión linear simple para verificar la relación entre MET, IMC y edad, y el teste qui-cuadrado para análisis de asociación entre variables categóricas, con p< 0,05. **Resultados** - Media y desvío patrón de peso y estatura fueron 46,98 =/- 31,19kg e 153,9 =/- 5,63cm, respectivamente; 62,6% tienen renta de dos sueldos mínimos y 70,6% no ha terminado los 4 primeros años de la enseñanza fundamental. La mayoría de las ancianas posee un gasto energético moderado (34,7%) y alto (58,7%), siendo que 98,6% realizan gran cantidad de trabajos domésticos. No ha sido encontrada relación significativa entre IMC y MET, a pesar de las ancianas clasificadas como "bajo" nivel de actividad física presentar valores elevados de IMC. Las edades se relacionaron inversamente al valor del MET. No hubo relación entre IPAQ y enfermedades referidas, sin embargo, la gran mayoría clasificada como "alto" y "moderado" no IPAQ presentó, al menos, un factor de riesgo para enfermedades coronarias. **Conclusión** - La renta y el nivel de escolaridad equivalen al encontrado en el mismo segmento más envejecido de la población, especialmente para el género femenino. Aunque con baja intensidad, el gran número de actividades domésticas diarias se constituye en importante estímulo que contribuye para el alto gasto energético, pudiendo ser factor de protección para las enfermedades cardiovasculares y manutención de la independencia de este grupo.

Palabras claves: ancianos, actividad física, gasto energético.

NÍVEL DE ATIVIDADE FÍSICA E A RELAÇÃO COM O GASTO ENERGÉTICO NAS ATIVIDADES DIÁRIAS DE MULHERES ADULTAS E IDOSAS DA CIDADE DE VIÇOSA (MINAS GERAIS/BRASIL)

Introdução - Modificações decorrentes do envelhecimento reduzem a capacidade física dos idosos, influenciando no gasto energético diário. Objetivo - Descrever o nível de atividade física diária de mulheres, classificando-as em categorias de "alto", "médio" e "baixo" nível de atividade física. Método - Consentiram em participar 75 mulheres, adultas e idosas, média de 66,04 6,55 anos, integrantes do Programa Municipal de Terceira Idade (PMTI) de Viçosa/MG. Foi aplicado o Questionário Internacional de Atividade Física- IPAQ, versão curta, um questionário de dados pessoais e coletado medidas de peso (Kg) e estatura (cm) para cálculo do IMC. Utilizou-se a estatística descritiva; teste de regressão linear simples para verificar a relação entre MET, IMC e faixa etária e teste qui-quadrado para análise de associação entre variáveis categóricas, com p< 0,05. Resultados - Média e desvio padrão de peso e estatura foram 46,98 31,19 Kg e 153,9 5,63 cm respectivamente; 62,6% recebem até dois salários mínimos e 70,6% não completou o primário. A maioria das idosas possui um gasto energético moderado (34,7%) e alto (58,7%), sendo que 98,6% realizam grande quantidade de trabalhos domésticos. Não foi encontrada relação significativa entre IMC e MET, apesar das idosas classificadas como "baixo" nível de atividade física apresentar valores elevados de IMC. As idades relacionaram-se inversamente ao valor do MET. Não houve relação entre IPAQ e doenças referidas, porém, a grande maioria classificada como "alto" e "moderado" no IPAQ apresentou, pelo menos, um fator de risco para doenças coronarianas. Conclusão - A renda e escolaridade equivalem ao encontrado para o segmento mais envelhecido da população, especialmente para sexo feminino. Embora de baixa intensidade, o grande volume de atividades domésticas diárias se constitui em importante estímulo que contribui para o alto gasto energético, podendo ser fator de proteção para doenças cardiovasculares e manutenção da independência deste grupo.

Palavras chave: idosos, atividade física, gasto energético.