Brief Communication

Metabolic Costs of Daily Activities in Community-Dwelling Older Adults*

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A R T I C L E   I N F O

Article history:
Received 13 November 2013
Received in revised form 11 January 2014
Accepted 6 March 2014
Available online 14 November 2014

Keywords:
calorimeter,
energy expenditure,
exercise intensity,
gardening,
physical activity

S U M M A R Y

This study was conducted to measure the metabolic costs of daily activities in community-dwelling adults aged over 65 years. Eighteen elderly adults performed five daily activities—walking, cleaning with a vacuum cleaner, washing dishes, and gardening (making a vegetable bed and maintaining a garden)—in a laboratory setting. The participants performed each activity for 5 minutes and then rested in a chair for 5 minutes prior to starting the next activity. They wore a portable telemetric calorimeter and a heart rate monitor during the five activities and resting periods to measure the metabolic cost and heart rate. The five daily activities were observed to be of low to moderate intensity (from 2.3 ± 0.5 metabolic equivalents to 4.6 ± 0.5 metabolic equivalents).

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1. Introduction

Although regular physical activity provides many health benefits1,2, older adults are less likely to participate in physical activity3. The majority of older adults do, however, engage in nonrecreational physical activities such as household activities4–8. Data from the National Human Activity Pattern Survey revealed that > 7000 older adults over the age of 65–74 years reportedly spent 35.2% of total energy expenditure on household activities and only 5.2% on recreational physical activity9. Moreover, there is limited evidence regarding the health benefits of low-intensity activities such as washing dishes, ironing, and other routine domestic tasks, and because such activities are most prevalent among older adults, it is imperative that the potential health effects of these daily activities be examined.

The estimated metabolic cost of an activity could potentially lead to the prescription of appropriate daily activities for health promotion in older adults. Metabolic cost can be partly reflected by the metabolic equivalent (MET). The MET refers to oxygen uptake per unit of body mass (1 MET = 3.5 ml O₂/kg/minute; < 3 METs = low-intensity physical activity; 3–6 METs = moderate-intensity physical activity; > 6 METs = high-intensity physical activity)5. There is a lack of research-based data on the MET values of daily activities in older adults9. Therefore, the objective of this study was to determine the metabolic cost of daily activities such as walking, cleaning with a vacuum cleaner, washing dishes, and gardening (making a vegetable bed and maintaining a garden) in community-dwelling adults over the age of 65 years.

2. Materials and methods

2.1. Study participants

A total of 18 community-dwelling older adults over the age of 65 years (6 males, 12 females) were recruited from the community of Gwangjin-gu in Seoul, South Korea. The average height, weight, and body mass index of the study participants were 173.7 ± 7.0 cm, 66.2 ± 12.7 kg, and 22.9 ± 7.0 kg/m², respectively.

2.2. Procedure

The five most common household and gardening activities (walking, cleaning with a vacuum cleaner, making a vegetable bed, maintaining a garden, and washing dishes) were performed by the participants in previously prepared settings (corridor, indoor garden, and a laboratory) at Konkuk University, Seoul, South Korea. The mean temperature and humidity during the testing were 21.6 ± 1.4°C and 38.8% ± 5.3%, respectively.

* Conflicts of interest: All contributing authors declare no conflicts of interest.
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http://dx.doi.org/10.1016/j.ijge.2014.03.006
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Thermometer; Model Acuba CS-201, Chosun, Guangdong, China). All activities were performed during a single session and conducted in a random order. Each activity was performed for 5 minutes and was followed by a 5-minute resting period in which participants rested in a chair.

2.3. Metabolic cost and heart rate measurements

Metabolic cost was measured using a portable telemetric calorimeter (K4b²; Cosmed, Rome, Italy) while participants performed the activities. Participants’ heart rate was measured using a heart rate monitor (Polar T31; FitMed, Kempele, Finland) that was placed under their breast during the activities.

2.4. Data analysis

The metabolic cost data for the first 10 seconds were omitted from analysis because this period represented the time required for walking to the activity spot. The mean comparison of metabolic costs for the five daily activities was made with repeated-measures analysis of variance test at \( p < 0.05 \) using SAS version 9 for Windows (SAS Institute Inc., Cary, NC, USA).

3. Results and discussion

The five daily activities were conducted by adults over the age of 65 years (average age: \( 70.9 \pm 3.3 \) years) and were of low to moderate intensity (from \( 2.3 \pm 0.5 \text{ METs} \) to \( 4.6 \pm 0.5 \text{ METs} \), Table 1). The results indicated that washing, cleaning with a vacuum cleaner, making a vegetable bed, and maintaining a garden were moderate-intensity physical activities (from \( 3.4 \pm 0.6 \text{ METs} \) to \( 4.6 \pm 0.5 \text{ METs} \) in older adults (Table 1). Washing dishes was observed to be a low-intensity activity (\( 2.3 \pm 0.5 \text{ METs} \)) that resulted in less oxygen consumption (Table 1). Washing was observed to be more intense than cleaning with a vacuum cleaner, making a vegetable bed, maintaining a garden, and washing dishes. Gardening activities were of the same exercise intensity level as washing at a moderate intensity. Thus, moderate-intensity activities such as walking, cleaning with a vacuum cleaner, making a vegetable bed, and maintaining a garden may confer health benefits if the activity is performed frequently and for an adequate duration of time.

Although low-intensity activities, such as walking slowly around the home, store, or office, and performing housework or workplace duties, predominantly account for total daily energy expenditure in older adults, there is only limited evidence on the health benefits of such activities. However, several studies have reported that daily activities are associated with health benefits in adults. Camhi et al. and Healy et al. reported that regularly performing several low-intensity activities was associated with a lower risk of cardiometabolic problems. Thus, regular engagement in multiple low-intensity activities may represent a convenient means of increasing physical activity and lowering the risk of metabolic syndrome. These results may have implications for practitioners to appropriately prescribe daily physical activities for health promotion in community-dwelling older adults.

Acknowledgments

This study was supported by the SMART Research Professor Program of Konkuk University.

References