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ORIGINAL ARTICLE

Development, reliability and validity of a physical activity questionnaire for estimating energy expenditure in Greek adults



Fiabilité et validité d'un questionnaire sur l'activité physique en vue d'estimer la dépense énergétique chez des adultes grecs

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KEYWORDS

Exercise;
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Summary

Objectives. – The purpose of this study was to develop and assess the reliability and validity of a single page, physical activity questionnaire, for estimation of energy expenditure in Greek adults.

Equipment and methods. – The Athens Physical Activity Questionnaire (APAQ) was designed to assess energy expenditure of the previous 7 days, in Greek language. Sixty subjects (40 women, age: 20.9 ± 1.7 years, BMI: 21.4 ± 2.7 kg/m²; 20 men, age: 22.4 ± 3.1 years, BMI: 23.5 ± 3.1 kg/m²) completed the APAQ on two separate occasions, 7 to 14 days apart, to assess internal consistency and test-retest reliability, using Cronbach alpha and intraclass correlation coefficients (ICC), respectively. Additionally, 79 more subjects (42 women, age: 26.6 ± 6.1 years, BMI: 20.6 ± 1.8 kg/m²; 37 men, age: 30.0 ± 6.1 years, BMI: 25.1 ± 2.2 kg/m²) wore a triaxial accelerometer for 7 consecutive days, and then completed the APAQ to assess validity, using correlation and Bland-Altman analysis.

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MOTS CLÉS

Exercice ;
Accéléromètre ;
Coût énergétique ;
Questionnaire
d'auto-évaluation

Results. – ICC were 0.95, 0.78, 0.58 and 0.85 ($P < 0.001$) for total, occupational, home and recreational EE, respectively. Total energy expenditure derived from APAQ was significantly correlated ($r = 0.839$, $P < 0.001$) to accelerometer measures. Bland-Altman analysis showed a good agreement between the two methods with most of the differences within the 95% limits of agreement. It was concluded that APAQ is a reliable and valid tool for estimation of individual energy expenditure in Greek adults, suitable for clinical and epidemiological studies.

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Résumé

Objectif. – Cette étude vise à établir la fiabilité et la validité d'un questionnaire d'activité physique pour estimer la dépense énergétique chez des adultes Grecs.

Instruments et méthodes. – Le Athens Physical Activity Questionnaire (APAQ) écrit en grec est destiné à évaluer la dépense d'énergie lors d'une semaine d'activité physique. Dans un premier temps, 60 sujets (40 femmes : moyenne d'âge $20,9 \pm 1,7$ ans, IMC : $21,4 \pm 2,7$ kg/m² et 20 hommes : moyenne d'âge : $22,4 \pm 3,1$ ans, IMC : $23,5 \pm 3,1$ kg/m²) ont rempli le questionnaire lors de deux sessions séparées par un intervalle de 7 à 14 jours. Pour évaluer la cohérence interne et la fiabilité test-retest de cet instrument, nous avons utilisé les coefficients alpha de Cronbach et le corrélation intra-classe (ICC). Ensuite, 79 sujets (42 femmes : moyenne d'âge $26,6 \pm 6,1$ ans, IMC : $20,6 \pm 1,8$ kg/m², et 37 hommes : moyenne d'âge : $30,0 \pm 6,1$ ans, IMC : $25,1 \pm 2,2$ kg/m²) ont été équipés d'un accéléromètre triaxial pendant 7 jours consécutifs et évalués avec l'APAQ. La validité de l'APAQ a été établie par analyse de corrélation et selon la méthode Bland-Altman.

Résultats. – Les coefficients ICC, pour la dépense énergétique totale, était de $r = 0,95$; $p < 0,001$). L'estimation de la dépense énergétique totale mesurée au moyen de l'APAQ était significativement corrélée ($r = 0,839$; $p < 0,001$) aux valeurs indiquées par l'accéléromètre. L'analyse Bland-Altman a confirmé une concordance satisfaisante entre les deux méthodes. En conclusion, l'APAQ semble constituer un outil fiable et valide pour l'évaluation individuelle chez l'adulte grec de la dépense énergétique et peut être utilisée pour études cliniques et épidémiologiques.

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1. Introduction

Physical inactivity has been linked to one of the greatest risk factors for the premature death and chronic disease like coronary heart disease, hypertension, obesity and diabetes [1]. Based on the world health organization physical activity is defined as bodily movement, produced by the contraction of skeletal muscles, that increases energy expenditure above a basal level. Information on physical activity and energy expenditure may be used in large epidemiological studies investigating the relationship between lifestyle and chronic diseases and the dose-response characteristics between physical activity/energy expenditure and specific health outcomes [2]. Moreover, data on energy expenditure may be used in dietary planning for individuals or groups, as well as in nutritional studies in order to adjust energy intake estimated by dietary questionnaires.

Physical activity and energy expenditure can be assessed via indirect calorimetry, however, this technique is limited primarily to laboratory studies. This is due to overall expensiveness of the equipment while the unit itself presents with limitations on transportability, overall dimensions and weight, as well as overall applicability: requiring constant wear of a respiratory mask in order to collect respiratory gasses. The method of double labeled water ingestion offers a precise assessment of physical activity by estimating energy expenditure, however, the high cost of the tracer

(²H₂¹⁸O) and the consecutive laboratory analysis makes the method impractical for larger scale studies (i.e. epidemiological studies). Even though wearable technology that assesses movement (i.e. pedometers, accelerometers) could offer a good alternative, most of the investigators rely on physical activity questionnaires mainly due to their ease of use and low cost application.

Over the years, a plethora of physical activity questionnaires have been developed with the majority of them being written in the English language. In addition to accommodate for language barriers, the questionnaires should include activities that are relevant to the target population [2]. The majority of the existing physical activity questionnaires are tailored towards activities that are culturally irrelevant to Greek adults and a translated version in Greek language does not guarantee transfer of validity from the original language. To the best of our knowledge, the only available reliable physical activity questionnaire in Greek is the Greek-translated version of IPAQ-short physical activity questionnaire [3]. However, its validity to estimate energy expenditure has not been investigated yet, and its criterion-related validity against exercise capacity in young adults may be considered low to moderate [4]. Moreover, IPAQ-short physical activity questionnaire divides physical activity to sections related to intensity, while recalling activities separated as occupational, home and recreational may be easier. In addition, since

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