

Original Research Article

Correlation of subjective and objective measurement of physical activity in young adult and assessment of general awareness of type 2 Diabetes mellitus in Pune urban population

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ABSTRACT

Background: Measurement of physical activity is a challenging and complex procedure. Objective assessment of physical activity can help to overcome errors incurred by subjective methods like PAQs. Hence, this study was planned to compare measurement of physical activity subjectively using IPAQ and objectively using pedometer in young adults.

Methods: Young adults in the age group of 18-22 years were included in the study. Detailed history of physical activity was taken using IPAQ (International Physical Activity Questionnaire) for subjective measurement of physical activity. Participant's physical activity was measured with the help of pedometer for objective assessment of physical activity.

Results: There was no statistically significant difference in measurement of physical activity by subjective and objective methods. IPAQ overestimates physical activity.

Conclusions: In this study, there was no statistically significant difference in subjective and objective methods of physical activity assessment. Study concludes subjective method overestimates physical activity than objective method.

Keywords: IPAQ, Physical activity, Type 2 diabetes mellitus

INTRODUCTION

Physical inactivity is considered to be one of the four leading risk factors for global mortality.¹ Strategies are continually being sought in an effort to produce changes from sedentary behaviour. Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure.

Regular physical activity (PA) is needed to gain physiological and psychological health benefits and to reduce the risk for a number of adverse health outcomes

including cardiovascular diseases like hypertension and metabolic disease like diabetes mellitus.

Measurement of physical activity is a challenging and complex procedure. Valid and reliable measures of physical activity (PA) are required to document the frequency, duration and distribution of PA in defined populations, to evaluate the prevalence of individuals meeting health recommendations, to examine the effect of various intensities of physical activity on specific health parameters, to make cross-cultural comparisons and to evaluate the effects of interventions.²

Physical Activity Questionnaires (PAQs) are often the most feasible methods while assessing PA in large population, because of their low cost and convenience but these questionnaires have limitations. Therefore, it should be selected and used judiciously. PAQs are likely to have errors and bias due to misreporting, either deliberate or because of cognitive limitations related to recall or comprehension.^{3,4} To collect internationally comparable data, a standardized questionnaire, the International Physical Activity Questionnaire (IPAQ), was developed for use across different cultural milieus and geographic locations.^{5,6}

Also, physical activity can be measured objectively. One of the easy method is use of simple device called pedometer. Pedometer is matchbook-sized, battery-operated movement monitor which is cheap, easy to use and can be effectively utilized as a valid determinant of physical activity levels. It measures the number of steps that a person takes during his daily activity such as walking, climbing or running.

Objective assessment of physical activity can help to overcome errors incurred by subjective methods like PAQs. Hence, this study was planned to compare measurement of physical activity subjectively using IPAQ and objectively using pedometer in young adults.

METHODS

This was a cross sectional study. The study was conducted in the private medical college. 209 young adults in the age group of 18-22 years were included in the study. Written informed consent was taken from all the participants. Young adults with chronic diseases were excluded from the study.

Subjective measurement of physical activity

Detailed history of physical activity was taken using IPAQ (International Physical Activity Questionnaire) so as to find out the type and quality of physical activity they are engaged in. In IPAQ (short) questionnaire, information was asked about three specific types of activities such as simple walking, moderate-intensity activities like brisk walk or regular sport and vigorous-intensity activities like jogging or gym. Metabolic Equivalent Task (MET) was calculated by IPAQ evaluation which is one of the easiest methods for recording of the intensity of a physical activity.⁷

MET values and formula for computation of MET-minutes/week

- Walking MET-minutes per week = 3.3x walking minutes x walking days
- Moderate MET-minutes per week = 4.0 x moderate-intensity activity minutes x moderate days
- Vigorous MET-minutes per week = 8.0 x vigorous-intensity activity minutes x vigorous-intensity days
- Total physical activity MET-minutes per week = sum of Walking + Moderate + Vigorous MET minutes per week scores.

Table 1: Categorical score for Metabolic Equivalent Task (MET) physical activity measured subjectively.

Category and Score	MET-minutes/week
Category 1 (Low)	<600 MET-minutes/week
Category 2 (Moderate)	≥ 600 to <3000 MET-minutes/week
Category 3 (High)	≥3000 MET-minutes/week

Objective measurement of physical activity

Also, participant's physical activity was measured with the help of pedometer. Participants were instructed to wear a pedometer for 7 days to establish baseline step-counts. Participants were instructed not to alter normal walking patterns and to wear the pedometer continuously apart from when sleeping and showering. At the end of 7 days, baseline step-counts were obtained. The average activity was calculated in form of number of steps per day.

Table 2: Depending on step count per day, participant's physical activity was determined objectively.⁸

Number of steps/day	Activity level
0-7499	Low active
7500-12500	Moderate active
12500 or more	Highly active

*Developed by C Tudor-Locke and DR Bassett Jr. (2004)

Data handling and Statistical Analysis:

Data was expressed as mean ± SD. Comparison of total MET score with total pedometer score by using correlation coefficient was done.

RESULTS

Table 3 showed that there was no statistically significant difference in measurement of physical activity by subjective and objective methods.

Table 3: Subjective and objective measurement of physical activity in young adults.

	IPAQ (MET score as MET-minutes/week)	Pedometer count steps/day	r value	p value
Mean±SD (n=209)	941.64±598.01	5662.49±1332.69	0.012957	> 0.05

Table 4: Physical activity category wise comparison of IPAQ and pedometer count.

IPAQ derived vs Pedometer derived physical activity	IPAQ number of subjects	Pedometer count number of subjects
Low vs. low active	61	199
Moderate versus moderate active	143	9
High versus high active	5	1
Total	209	209

Table 4 shows that by IPAQ method maximum number of subjects belong to moderate physical activity whereas by pedometer maximum number of subjects are in low active category.

DISCUSSION

Mean age of the volunteers was 22.3 years. It was observed in table 3 that there was no statistically significant difference in measurement of physical activity by subjective and objective methods. This shows that IPAQ is at par with objective measurement of physical activity. Similar findings were observed by Paul Innerd et al. study in which they examined validity of subjective and objective measures of physical activity in adults.⁹ Physical activity mean score by IPAQ method subjects fall in moderate category but with pedometer count they are in low activity category. Also, table 4 shows that by IPAQ method maximum number of subjects belong to moderate physical activity whereas by pedometer maximum number of subjects are in low active category. This shows that, IPAQ overestimates physical activity. Similarly, Maria Hagstromer et al in her study found that the IPAQ likely overestimates actual physical activity.¹⁰ Also, Allana et al observed over-reporting of physical activity by inactive young adults when compared to objective measurement.¹¹ Dr. Kharche et al in their study observed that mean MET score by IPAQ was 3153 MET-minutes/week. Also, they observed that physical activity differs in males and females.¹²

Tudor-Locke et al. recently analysed physical activity data in a national sample of children who participated in the 2005-2006 National Health and Nutrition Examination Survey (19). Males and females in the United States age 6-11 years averaged approximately 13,000 and 12,000 daily steps, respectively, whereas male and female young adults (age 12-19 years) accumulated fewer steps: 11,000 and 9000 respectively.⁸

CONCLUSION

In this study, there was no statistically significant difference in subjective and objective methods of

physical activity assessment. Study concludes subjective method overestimates physical activity than objective method.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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