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Association of pedometer determined physical activity with various obesity parameters in young adults

Medicine

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ABSTRACT

Background : Physical inactivity is a critically important issue in today's society. Strategies are continually sought in an effort to produce changes from unhealthy behaviors. Obesity & Physical inactivity is a major public health concern in modern society with adverse health outcomes including cardiovascular diseases like hypertension, diabetes mellitus etc. Walking can be measured using simple counting popular device called a pedometer. Therefore, purpose of the study was to find out association of pedometer determined physical activity with various obesity parameters. **Material and method:** This was a cross sectional study. 209 young adults in the age group of 18 – 22 years were included in the study. Their physical activity was measured with the help of pedometer. Participants were instructed to wear a pedometer for 7 days to establish baseline step-counts. Average activity was calculated in form of number of steps per day. Obesity parameters BMI, WC and WHR were estimated using standardized technique. Statistical analysis was done using correlation coefficient. **Results:** Obesity parameters like BMI, WC and WHR were negatively correlated with pedometer count though the correlation was statistically not significant. **Conclusion:** In the study obesity parameters like BMI, WC and WHR were negatively correlated with pedometer count though the correlation was not statistically significant. This indicates that increase in step count will be responsible for prevention of obesity.

KEYWORDS:

Introduction:

Physical inactivity is a critically important issue in today's society. Strategies are continually sought in an effort to produce changes from unhealthy behaviors. Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure.1 A physically active lifestyle is associated with a decreased risk for a variety of chronic diseases. 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, diabetes mellitus etc.2

The dramatic increase in overweight and obesity over the last few decades is considered to be of epidemic proportions in many countries around the world.3 The most recent statistics reported from NHANES III indicate that close to 55% of US adults are either overweight or obese.4 Paradoxically, participation in leisure-time physical activity has remained relatively stable.5

Walking has been increasingly promoted as a viable tool for increasing ones' physical activity given its' numerous and varying benefits. Walking has many associated health benefits, with the possibility of being used as a weight management technique. It can be employed all year round, carries little risk and is perhaps the one activity that is available to almost all individuals.6 Walking also overcomes many of the barriers associated with more structured forms of exercise such as time and expense. It is accessible to both genders, young and old, and is capable of overcoming many barriers such as time or expense.

Walking can be measured objectively using simple counting popular device called a pedometer. By counting the number of steps accumulated in a day, both sedentary behaviors and indicators of insufficient activity can be identified.

Pedometer is matchbook-sized, battery-operated movement monitors which is cheap and easy to use can be effectively utilized as a valid determinant of physical activity levels to measure the number of steps that a person takes during ambulatory activity such as walking or running.

Patterns of activity among young adults reflect those of the population as a whole. By collecting objective activity data and comparing them to obesity, experts can work toward establishing benchmarks of physical activity vis-a`-vis health risks. Such data are necessary as health professionals and policy makers struggle to advise the public how best to improve their health. Therefore, purpose of the study was to find out association of pedometer determined physical activity with various obesity parameters.

Material and method:

This was a cross sectional study. 209 young adults in the age group of 18 – 22 years were included in the study.

After obtaining institutional ethics committee approval, written informed consent was obtained from all the participants.

Their 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, showering or engaging in any form of structured physical activity or sport. At 7 days baseline step-counts was obtained. The average activity was calculated in form of number of steps per day. Depending on step count participant's physical activity was determined as follows7:

Number of Steps	Activity Level
0-5,000	Sedentary
5,000-7,499	Low Active
7,500-9,999	Somewhat Active
10,000-12,500	Active
12,500 or more	Highly Active

*Developed by C Tudor-Locke and DR Bassett Jr. (2004)
Basal step count was correlated with obesity parameters.

Parameters recorded were:
Pedometer count
Obesity parameters: BMI, WC, WHR.

Procedure for parameters:
Body Mass Index (BMI)[8]: Height was measured using to the nearest 0.1 cm with a standardized technique. Body weight was measured with minimal clothing to the nearest 0.1 kg using a digital electronic scale. BMI was measured by weight in kilograms divided by square of height in meters (kg/m^2).

Waist Circumference (WC) and Waist to Hip ratio (WHR)9: Waist circumference (in cms) was measured at a point mid-way between the lower rib and iliac crest with the measuring tape centrally positioned 1cm below the umbilicus. Hip circumference was measured (cms) over light clothing at the widest girth of the hip. For waist and hip circumference two consecutive readings were made at each site on a horizontal plane without compression of the skin. The mean was taken as the final reading. WHR was calculated by dividing waist circumference by hip circumference.

Statistical analysis: Data was expressed as mean ± SD. Comparison of pedometer count in steps/day with obesity parameters was done by using correlation coefficient. p value was calculated from r value. p value of <0.05 was considered as statistically significant.

Results:
Table 1: correlation of pedometer count with obesity parameters

Pedometer count (Mean ± SD)	Obesity parameter (Mean ± SD) (n=209)	r value	p value
5662.49 ±1332.69	BMI(kg/m2) 22.53±3.59	-0.088	> 0.05
5662.49 ±1332.69	WC (cm) 82.67 ± 15.2	-0.033	> 0.05
5662.49 ±1332.69	WHR 1.06 ±0.31	-0.087	> 0.05

Discussion:
As observed in table 1 obesity parameters like BMI, WC and WHR were negatively correlated with pedometer count though the correlation was statistically not significant.

C Tudor-Locke et al, examined the relationship between pedometer and body composition variables body mass index (BMI) and percentage body fat. They observed similar inverse relationship between pedometer-assessed physical activity day and BMI in an adult sample.[10]

Also, Catherine B. Chan et al, found that pedometer-determined steps/day were inversely correlated with BMI, waist circumference.11 Waist circumference is gaining support as a primary measure of the health risks of overweight and obesity because of its association with abdominal fat.12 Hence, WC is considered as more important central obesity parameter. As we found in our study many studies have observed negative correlation between WC and pedometer count. Also, K. Backholer et al, greater daily step count was associated with a greater reduction in WC. [11,13]

The study shows consistent findings with WHR and step count/ day. Dixie L. Thompson et al observed that participants who walked more had smaller waist circumference and waist-to-hip ratio.[14]

Japanese health promotion efforts recommend a goal of 10 000 steps/day. 15,16 A review of the published literature17 indicates that this value seems a reasonable estimate for younger and/or otherwise healthy individuals, but there is currently little empirical evidence to support such a threshold. According to Hatano, 15 walking 10 000 steps is approximately equivalent to energy expenditures of between 300 and 400 kcal/day (depending on walking speed and body size).

Hence it is recommended to fulfill the goal of 10000 steps / day for health benefits.

The limitations of this study include its cross-sectional design of a convenience sample of young adults. More number of participants and systematic sampling may yield better result.

Conclusion:
In the study obesity parameters like BMI, WC and WHR were negatively correlated with pedometer count though the correlation was not statistically significant. This indicates that increase in step count will be responsible for prevention of obesity.

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