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Relationship between Categorical Variables for widespread of Physical inactivity among University Students: A study

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Abstract
Background: Physical inactivity is a health concern that is considered a potential risk factor for adverse health outcomes worldwide. Potential barriers to physical inactivity should be identified and eliminated to promote active living and reduce inactivity among college students.
Objective: To determine the correlation between the categorical variables of the prevalence of physical inactivity among the university students.
Methods: A cross-sectional study was conducted with 675 volunteer participants (353 males and 322 females). Participant's age range was 18-30 years, height range 142-182 (male 165-182, female-142-171) cm, body weight 45-89 (male-55-89, female-142-171) kg. Participants had any medical, musculoskeletal, or orthotic problems that were not included in the study. The Global Physical Activity Questionnaire (version 2) developed by the World Health Organization was used to collect data. Chi-Square test was used to find the association between categorical variables of male and female participants. Descriptive statistics were also used to determine the range and percentage of different variables.
Results: The results revealed that females (57.45%) were more physically inactive than males (51%). This difference was statistically insignificant. In the range from 18 to 22 years, the prevalence of physical inactivity was higher in females (47.58%) than in males (40.81%). Whereas for the 23-30 years age group, physical inactivity was nearly the same between male (52.42%) and female (51.01%) participants. Socio-anthropometric analysis was also performed.
Conclusion: The outcome was conclusive with respect to gender disparities in the prevalence of physical inactivity. The finding may be helpful in promoting physical active culture to maintain and sustain health and fitness throughout life.

Keywords: Physical Inactivity, Gender differences, Marital Status, Smokers, BMI

Introduction

Physical inactivity is a term used to identify people who do not get the recommended level of regular physical activity. World Health Organization (WHO) defines physical activity as 'any bodily movement produced by skeletal muscles that requires energy expenditure'. The term physical activity and exercise are inter-related but not the same, exercise is part of physical activity that is design, organised and is done continuously in such a way that the objective is to achieve physical fitness. Exercise as well as other activities which involve bodily movement and are done as routine activities such as playing, walking, active transportation, house errands and recreational activities are all part of physical activity [1]. The global record on physical inactivity indicates that it causes about 1.9 million preventable deaths per annum [2], increases the risk of all-cause mortality by 20-30% [3], and a major risk factor in increasing the level of obesity. It is documented to account for 22% of ischemic heart disease, 11% of ischemic stroke, 14% of diabetes, 16% of colon cancer and 10% of breast cancer worldwide [3]. According to United States Department of Health and Human Services regular physical activity is associated with increase health benefit and decrease risk of all case mortality, it improves aerobic capacity, muscle strength, body agility, coordination and metabolic functioning [4]. Physically active individual have reduced risk of

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developing cardiovascular disease [5]. [6], colon cancer [7] and osteoporosis. Physical activity is associated with higher level of self-esteem and lower level of anxiety and stress [9]. The surgeon‟s General Reports on physical activity and health stated that increase levels of regular physical activity are associated with lower death rates [8]. The university environment is a setting with much greater advantages and easier opportunities towards improving physical activity among students. However, in university, unlike in primary and secondary schools, the absence of proper structure on physical education, health promotion and awareness activities, making the students most often to neglect the opportunities of utilizing the available facilities effectively. It can also be used to reflect prevalence of age group 18-25 in the general population since a public university is a composition of the public in terms of race and gender. According to WHO (2011), all-cause mortality list, physical inactivity is number four and 1.9 million people die annually due to physical inactivity. Globally 31.1% (95% CI 30.9-31.2) of adults aged 15 and above were considered insufficiently active. The prevalence was higher in women (34%) than in men (28%). In all WHO regions, men were more active than women, Americans (50% women and 40% Men) and the Eastern Mediterranean (50% women and 36% men) regions have the highest prevalence of insufficient physical activity while Southeast Asia have the lowest percentage (19% women and 15% Men) [10]. The habit of regular physical activity starts mostly during transition from childhood to adulthood [11] and research have indicated that physical activities decline consistently during this period of transition to adolescent years [12,13]. During adolescences [14] and in the transition to university, and specifically during the duration of study at university, the disregard to healthy lifestyle is on the increase and the decrease in the practice of moderate to vigorous physical activity is prevalent [15].

University environment or college is a period of great change for young adults. Coming with new independence makes a high school student to take decisions and choices which previously was not made by him or her, among other decisions is how the student can incorporate physical activity [16]. A study in America among college students 18-24 years of age shows that only 35% of the females and 39% of the male students made the CDC-ACSM guidelines for moderate physical activity (Arriaza et al., 1998), the guideline states that every US adult should accumulate 30 minutes or more of moderate intensity activity on most, preferably all days of the week [17]. [18]. In a cross-sectional study among 174 undergraduates students (male= 40.2% and females = 59.8%) of UPM age 18-24 using pedometer to assess level of physical activity, the study showed that less than 15% of the student were categorised as sedentary with females twice as sedentary than the males [19]. University students are subjected to different factors and obstacles during the academic year, which may dispirit participation in physical activity such as: use of social site, academic pressure, high density traffic, low air quality pollution, lack of sports/recreational facilities, self-motivation, also peers' pressure, social habits, and lack of awareness. [29].

The aim of the present study was to evaluate the relationship between categorical variables for prevalence of physical inactivity among the university students and its association with sociodemographic variables.

Methodology:

Study design: A cross-sectional design was adopted to conduct this study.

Sampling technique: The probability convenience-sampling technique was used in this study.

Sample size: Six Hundred seventy-five (males=353 and females=322) voluntary university students participated in this study. Any students with any musculoskeletal disorder and pregnant women were excluded from the study.

Characteristics of participants: The anthropometric and demographic characteristics of university students are presented in the below mentioned table.

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Table 1. Anthropometrics and demographics characteristics of university students

Gender	**Male:**	**353**
	Female:	**322**
18-22 Age 23-30	Male:	147
	Female:	124
Height	Male:	165-182cm
	Female:	142-171cm
Weight	Male:	55-89kg
	Female:	45-59kg
Marital Status	Male:	479
	Male:	196
BMI	Underweight	89
	Healthy	235
	Overweight	197
	Obese	154
Year of students in university	First year	139
	Second year	155
	Third year	216
	Fourth year	77
	Fifth year	88
Smoking Habits	Smokers	479
	Non-Smokers	196

Tool

The Global Physical Activity Questionnaire (GPAQ) was developed under the auspices of the World Health Organization (WHO) in 2002 as part of the WHO STEP wise Approach to Chronic Disease Risk Factor Surveillance (STEPS). GPAQ comprises 16 questions grouped to capture physical activity undertaken in different behavioral domains, namely work, transport and discretionary activity (also known as leisure or recreation). Within the work and discretionary domains, questions assess the frequency and duration of 2 different categories of activity defined by the energy requirement or intensity (vigorous- or moderate-intensity). In the transport domain, the frequency and duration of all walking and cycling for transport is captured, but no attempt is made to differentiate between these activities. One additional item is collected, i.e., time spent in sedentary activities.

Metabolic Equivalents (MET) are commonly used to express the intensity of physical activities and are also used for the analysis of GPAQ data. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly and is equivalent to a caloric consumption of 1 kcal/kg/hour. For the analysis of GPAQ data, existing guidelines have been adopted: it is estimated that, compared to sitting quietly, a person's caloric consumption is four times higher when being moderately active, and eight times higher when being vigorously active. Therefore, when calculating a person's overall energy expenditure using GPAQ data, 4 METs get assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities.

To assess physical activity MET scores were calculated separately for individual domains and sub domains. For the calculation of a categorical indicator, the total time spent on physical activity during a typical week, the numbers of days as well as the intensity of physical activity are

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considered. The three levels of physical activity suggested for classifying students are low, moderate, and high. The criteria for these levels are:

- High: 7 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes per week.
- Moderate: 5 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week.
- Low: A person not meeting any of the above-mentioned criteria falls in this category.

Informed consent and university clearance were taken for the study. The questionnaire was pre-tested on a random sample of dental health care professionals to ensure practicability, validity and interpretation of responses.

Procedure Of Data Collection

Direct contact was made with every participant to collect data. Prior filling the questionnaires, all subjects informed about the purpose, benefits, confidentiality of data, and informed consent. As they agree to participate in the study, students provide their information regarding socio-anthropometric details (gender, age, height, weight, BMI, marital status, smoking habit, and year of study). Data was collected with help of Global Physical Activity Questionnaire (version 2). The GPAQ was formed as the multiply of variables that describe the work, travel, and leisure.

Work includes activities such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment etc. Transport activities includes mode of travel around getting from place-to-place. Recreational activities include sports and exercises. This also called as leisure time activities.

METs (Metabolic Equivalents) were used to calculate the intensity of physical activities. For calculation, four METS were multiplied with the number of minutes spend by a person on moderate intensity physical activity and eight METS for vigorous intensity physical activity in a typical week respectively because a person's caloric consumption is four times higher when doing moderate activity, and eight times higher when doing vigorously active, when compared to a person sitting quietly.

As per WHO recommendation to consider a person as physically inactive, an adults should not do at least 75 minutes of vigorous or 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity achieving at least 600 MET-minutes throughout a week.

Statistical Analysis:

Statistical analysis was performed using IBM SPSS for Windows, version 23 (IBM Crop. United States of America). The data were distributed normally. Descriptive analyses of sociodemographic characteristics were performed. Data was analyzed using Chi-Square test to determine the relationship Categorical Variables for Prevalence of Physical Inactivity among university Students. A significant level is set at 0.01 levels.

Results

Table 2. The prevalence of physical inactivity for the university students as per their categorical variables.

Gender		**Physically Active (%)**	**Physically Inactive (%)**	**p-value**
Male		173 (49%)	180 (51.00)	
Female		171 (42.55)	185 (57.45)	**0.94**
Age				
18-22 years	Male	87 (59.18%)	60(40.81)	**<0.001**
	Female	59 (53.22)	66 (47.58)	

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23-25 years	Male	98 (47.57%)	108(52.42)	
	Female	97 (48.99)	101 (51.01)	
Smoking Habits				**<0.001**
Smokers		297 (62.00)	181 (37.78)	
Non-smokers		131 (66.84)	65 (33.16)	
Marital Status				
Single		325 (67.85)	154 (32.15)	**0.096**
Married		87 (44.39)	109 (55.61)	
BMI				
Underweight		48 (53.93)	41 (46.07)	**0.674**
Healthy		167 (71.07)	68 (28.94)	
Overweight		79 (40.10)	118 (59.90)	
Obese		56 (36.36)	98 (63.64)	
Year of study				
First Year		68 (48.92)	71 (51.08)	**0.212**
Second Year		97 (62.58)	58 (37.42)	
Third Year		127 (58.79)	89 (41.21)	
Fourth Year		39 (50.65)	38 (49.35)	
Fifth Year		39 (44.32)	49 (55.68)	

TABLE 2 shows the association between socio-demographic factors and level of physical activities, the result indicates that the prevalence of physical inactivity is significantly higher in females (57.45%) than in males (51%), p- value 0.94). There is no significant association between the age groups and smoking habits of the respondents and levels of physical activity.

Table 3. METs score among study participants in different domains.

Domain	**Male**		**Female**		**Both Gender**	
	Mean	**Median (25^{th}-75^{th})***	**Mean**	**Median (25^{th}-75^{th})***	**Mean**	**Median (25^{th}-75^{th})***
Work	967	253	675	458 (0-1184)	845	452 (0-1342)
Travel	154	0 (0-124)	54	0 (0-54)	104	0 (0-128)
Leisure	195	0 (0-0)	78	0 (0-90)	146	0 (0-0)
Total	1316	724 (0-1942)	807	648 (0-1254)	1187	687 (0-1548)

*Inter quartile range.

Table 3 showed METs score among university students between genders in the three domains. The METs scores showed that male have higher scores than female for work, travel, and leisure domains.

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Discussion

The findings of this study showed that gender differences exist in prevalence of physical inactivity among university students, which is generally higher among female as compared to male university students. The finding of this study is inconsistence with other several studies that showed that physical activity levels between male and female have shown difference between males and females, with males being more active than females [20,21]. The prevalence of physical inactivity in this study was higher among females (48%) when compared with their male counterparts (18.8%) this finding is in line with several studies (20-27) The odds in gender in this study can also be compared to findings by Dan et al. which reveals that female adolescents were twice (45.1%) in low physical activity category when compared to males (22.1%) [22]. A review by Van der Horst on 51 cross-sectional studies also showed that males were positively associated with physical activity [23]. Arab Gulf countries also showed a high prevalence of physical inactivity. For instance, two studies conducted in the United Arab Emirates, Kuwait, and Iraq reported a prevalence of physical inactivity among female student colleges of 62%, 64% and 47%, respectively [24, 25, 26]. The 2013 Survey of Health Information in KSA estimated that 60% of the entire Saudi population was physically inactive. [27] Furthermore, 58% of 1257 healthy college students at King Khalid University (426 males and 831 females) were found to be physically inactive [28]. Similar studies have been conducted in other countries: in Romania, 34.745% of female university students were sedentary and 34.474% did not perform enough PA [29]; in China and Brazil, one-third of students were found to be inactive [30].

In 2008 Frank et al. assessed physical activity levels of 2,316 U.S. medical students. More than half (61%) of the students had the level of physical activity higher than those age-matched peers in the general population, thus showing that promotion of adequate physical activity habits during medical education may be an important step to improve the physical activity in future clinicians [31]. In a survey on physical activity conducted by Hensrud et al (1992) on physicians of the Minnesota Medical Association, the prevalence of physical activity was higher compared with the general population. Overall, 65.6% of the 393 respondents reported performing regular exercise, while 38.2% participated in exercise vigorous enough to be of cardiovascular benefit. Men reported significantly higher prevalence of regular exercise and cardiovascular exercise than women did [32]. Lobelo et al. (2009) conducted a study to assess how physical activity habits of doctors and medical students influence their counselling practices. They concluded that medical schools need to increase the proportion of students adopting and maintaining regular physical activity habits to increase the rates and quality of future physical activity counselling delivered by doctors [33].

In comparing physical activity pattern amongst American college students of age group 18-25 years, Asian (n=874), Africans (n=332), white (n=1101) and Hispanic (n=529), the study showed that about 46.7% of them didn't engage in vigorous physical activity and 16.7% were physically inactive [34]. In a study comparing factors associated with physical inactivity among East Asia college students, using stratified random sampling with sample size of 12,137, the result showed 7.2% physically inactive student for Singapore, 8.0% for Malaysia, 13.5% for Taiwan, 16.8% for Hong Kong and 28.5% for South Korea [35]. In a cross-sectional study among 174 undergraduates' students (male= 40.2% and females = 59.8%) of UPM age 18-24 using pedometer to assess level of physical activity, the study showed that less than 15% of the student were categorised as sedentary with females twice as sedentary than the males [36].

A very less population (14.9%) was occupied in high levels of physical activity when weighted against a similar study conducted on Egyptian students which reported a comparatively better percentage of highly active students (36.7%) [37]. Median MET value was 1560 which indicates that more than half of the participants achieved the minimum value of recommended physical activity of at least 600 MET-min/weeks [38]. In males, 8.53% were inactive, 69.76% moderately active and 21.71% were highly active. The median value of 1850 METs provides evidence that majority of males achieved the minimum recommended PA levels. In the female category, 14.29% were inactive, 77.77% moderately active and 7.94% participants were highly active in their daily life and median MET value was 1364. These findings are inconsistent with the

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findings from a systematic review done on South Asians which reported inactivity prevalence ranged from 12.7%-66.2% in males and 17.0%-79.6% in females [39]. Findings are also dissimilar to a study that reported most Polish males and females as highly active [40].

Conclusion

In conclusion, results from the present study suggest that gender differences exist for physical inactivity; females are dominating in physical inactivity than males. Multidimensional collaborations are needed including university administration, ministries of health, sports, youth and education to prevent prevalence of physical inactivity. Better understanding of the detrimental effects of physical inactivity can also assist in promoting positive health outcomes. The prevalence of physical inactivity found in this study is consistent with previous studies carried out in similar population, it therefore showed that there is no much reduction in the prevalence and this indicates that physical inactivity among this population has not been controlled, hence should not be overlooked in designing public health interventions.

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