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Dr. Amandeep Singh
Assistant Professor, Department of Physical Education (T) Guru Nanak Dev University, Amritsar, Punjab, India

Harmandeep Singh
Assistant Professor, Department of Physical Education Apeejay College of Fine Arts, Jalandhar, Punjab, India

Dr. Tarsem Singh
Associate Professor, Department of Physical Education, Lyallpur Khalsa College, Jalandhar, Punjab, India

Association between behavioural factors and physical activity level among university students: A cross-sectional study

Dr. Amandeep Singh, Harmandeep Singh and Dr. Tarsem Singh

Abstract
The study was conducted to assess the association between physical activity level and behavioral factors viz. fruit intake, vegetable intake and daily screen time among the University students. A total of 109 students including males and females were recruited form Guru Nanak Dev University, Amritsar, Punjab, India. They were subjected to the WHO's STEP survey questionnaire. The data regarding physical activity, fruit intake, vegetable intake was extracted for analysis. Some extra questions regarding daily screen time on smartphone, TV and computer were also asked to the participants. To examine the associations, the Pearson's Chi-square test was applied on categorical data. Results revealed significant association between fruit intake and physical activity whereas no significant associations were between physical activity and vegetable intake and daily screen time. The study concluded that those who were physically inactive were more likely to have less fruit intake.

Keywords: Physical activity, fruit, vegetable, behavioural, screen time

Introduction
Non-communicable diseases (NCDs) are the rime cause of mortality globally. In Southeast Asia, non-communicable diseases are the leading assassins and are accountable for 7.9 million deaths per year. Poverty and non-communicable diseases can make up a vicious cycle. Lack of amenities exposes populace to the behavioral risk factors for NCDs such malnutrition, lack of hygiene, low access to primary healthcare, sanitation and other health hazards. As far as economy is concerned, it has been reported that each 10% increase in NCDs can result in 0.5% lower annual growth rates (WHO's Global status report on noncommunicable diseases, 2010). Physical inactivity along with the less fruit and vegetable intake are such risk factor for NCD that need a continuous monitoring. physical activity (6%) is fourth leading risk factor of global mortality after diabetes (6%), tobacco use (9%) and hypertension (13%) (WHO, 2009). overweight and obesity accounts for 5% of the global mortality. Physical inactivity and sedentary behavior among Indian adolescents are on rise, resulting in lower level of physical fitness and obesity problems (Singh *et al.*, 2017) [10]. Intaking of fruits and vegetables consistently fulfils the nutritional demands of the body especially the micronutrients. Increasing daily screen time on smartphone, computer and TV is one such factor that is thought to the detrimental to health and also culprit in declining the physical activity levels particularly in youth. previous studies have found strong relationship between smartphone usage and physical inactivity (Singh and Singh, 2018).

In general, all these behavioral factors are associated with each other and changes in one variable can make changes in others. taking into account the need of physical activity epidemiology research, this study aims to find out the association between physical activity and other behavioural factors such as fruit intake, vegetable intake and daily screen time.

Methods
Selection of Subjects
For this purpose, a total of 109 students participated in the study. Out of the total sample, 57 were male and 52 were females.

Correspondence
Dr. Amandeep Singh
Assistant Professor, Department of Physical Education (T) Guru Nanak Dev University, Amritsar, Punjab, India

The participants were recruited from various departments of Guru Nanak Dev University, Amritsar by using the convenience sampling method. The age group of participants was 17 to 30 years. All the subjects were explained the objective and protocol of the study was verbal consent was taken for participation.

Behavioural Variables
- **Fruit intake**

Sufficient: > 5 per
Insufficient: <5

- **Vegetable intake**

Sufficient: > 5
Insufficient: <5

- **Daily Screen time**

Low: 0 - 1.5 hours
High: > 1.5 to < 4 hours
Very high: > 4 hours

Study Instrument
WHO's STEPS survey was modified according to local conditions and used to gather data for selected variables. Data were processed and cleaned according to the guidelines of WHO STEPS Surveillance Manual (WHO, 2017).

Statistical Analyses
Demographic data was expressed in percentages. Since the data was transformed into categorical variables, associations among different variables were examined by applying Pearson's Chi Square test. The level of significance was set 0.05 level.

Results

Table 1: Demographic break-up of the participants

Variable	N	%
Male	57	52.29
Female	52	47.41
BMI (overall)		
Underweight	31	28.44
Normal	63	57.80
Overweight	14	12.85
Obese	1	0.92
BMI (Males)		
Underweight	5	8.77
Normal	41	71.93
Overweight	11	19.30
Obese	0	0
BMI (Females)		
Underweight	26	50
Normal	22	42.31
Overweight	3	5.77
Obese	1	1.92
Income status		
< 1 lakh	34	31.19
> 1 lakh, < 2 lakhs	33	30.28
> 2 lakhs, < 3 lakhs	16	14.68
> 3 lakhs, < 4 lakhs	8	7.33
> 4 lakhs	3	2.75
Physical Activity (Overall)	109	
Active	74	67.89
Inactive	35	32.11
Physical activity (Males)	57	
Active	43	75.44
Inactive	14	24.56
Physical activity (Females)	52	
Active	31	59.62
Inactive	21	40.38

Table 1 presents the demographic data of the total sample. With respect to sex, 52.29 were males and 47.41 were females. A large figure of participants was under weight by 28.44% among total sample. Half of the females were under weight whereas 8.77% males were underweight. In overall sample 57.80% were having normal BMI, which was 71.93% in males and 42.31% in females. It was further found that 12.85% were overweight in in overall sample, 19.30% in males and 5.77% in females. Obesity was comparatively less prevalent having only 0.92% share in the total sample. With regard to income level, it was observed that 31.19% were having annual income less than 1 lakh, 30.28% were having less than 2 lakhs, 14.68% were having less than 3 lakhs, 7.33% were having less than 4 lakhs and 2.75% were having more than 4 lakhs, whereas 13.76% participants refused to reveal their income. In overall sample, 32.11 participants were inactive, 24.56% among males and 40.38% among females were found to be inactive.

Table 2: Association between the variable Physical activity level and fruit intake

Fruit intake	N	Physical activity level			
		Inactive	Active	X^2	p-value
Insufficient	61	25 (41)	36 (59)	5.003	0.025*
Sufficient	48	10 (20.8)	38 (79.2)		

X^2: Chi square

Table 2 presents the results of X^2 test between the variable fruit intake and Physical activity level among university students. It is evident from the table that 41% among those having insufficient fruit intake and 20.8% among those having sufficient fruit intake were inactive. The values of Pearson's Chi square test discovered that significant associations (X^2 = 5.003 p<.05) were found between the variable physical activity level and fruit intake. It can be inferred from the above results that level of physical activity was higher among those consume fruit sufficiently and consistently.

Table 3: Association between the variable Physical activity level and vegetable intake

Vegetable intake	N	Physical activity level			
		Inactive	Active	X^2	p-value
Insufficient	26	7 (26.9)	19 (73.1)	0.421	0.516
Sufficient	83	28 (33.7)	55 (66.3)		

X^2: Chi square

Table 3 presents the results of X^2 test between the variable vegetable intake and Physical activity level among university students. It is evident from the table that 26.9% among those having insufficient vegetable intake and 33.7% among those having sufficient vegetable intake were inactive. The values of Pearson's Chi square test discovered that no significant associations (p>.05) were found between the variable physical activity level and vegetable intake.

Table 4: Association between the variable Physical activity level and daily screen time

Daily Screen time	N	Physical activity level			
		Inactive	Active	X^2	p-value
Low	3	2 (66.7)	1 (33.3)	1.717	0.424
High	17	5 (29.4)	12 (70.6)		
Very high	89	28 (31.5)	61 (68.5)		

X^2: Chi square

Table 4 presents the results of X^2 test between the variable daily screen time and Physical activity level among university students. It is evident from the table that 66.7% among those having low daily screen time, 29.4% among those having high daily screen time and 31.5% among those having very high daily screen time were inactive. The values of Pearson's Chi square test discovered that no significant associations (p>.05) were found between the variable physical activity level and daily screen time.

Discussion

The aim this study was to analyze the association between physical activity and behavioral factors viz. fruit intake, vegetable intake and daily screen time. Of the total sample, 67.89% were physically active and 32.11 were reported as inactive. significant association was found between the physical activity level and fruit intake. Active participants were found to have significantly more fruit intake than the inactive ones. The possible reason for these results could be the more consciousness towards the healthy lifestyle among the participants. However, contrary results were found with regard to the association between physical activity level and vegetable intake. Including vegetable in a meal is normal routine in Punjabi culture hence the data shows the high frequency of vegetable intake whether physically active or inactive. the results regarding fruit intake are comparable to the findings of Thakur *et al*. (2016) [2] who reported less than 5 serving of fruit intake weekly. The results are also in agreement to the other similar studies (Aryal *et al*., 2015; Aroor *et al*., 2013 & Zaman *et al*., 2015) [3-5]. Thakur *et al*. (2016) [2] found significant association between vegetable intake and physical activity, however, our study reported no significant association between the both variables. Pertaining to the daily screen time very high screen time was reported by all the participants whether physical active or inactive ones. Pearson's chi square results showed no significant association between daily screen time and physical activity. However, the results of previous studies were in contrast to these results which found a strong negative relationship between physical activity and smartphone screen time (Singh and Singh, 2019) [6]. Previous studies reported that as the smartphone usage is increased, the level of leisure time physical activity is decreased. A previous study revealed that people with smartphone addiction tend to be less engaged in walking for each day (Kim *et al*., 2015) [7] another study reported that it is very likely that smartphone usage could disturb the physical activity participation (Lepp *et al*., 2013) [9]. The present study has some limitations, the most prominent is the less sample size. The self-report of the behavioral parameters is another limitation as responses given by the participants are always prone to the bias. We suggest a similar study with larger sample size in order to get more insights about these factors.

Conclusions

- Physically active ones were intaking more fruit as compared to inactive ones.
- No association was found between physical activity level and vegetable intake among Punjabi students.
- No association was found between physical activity level and daily screen time among Punjabi students.

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