

Level of Physical Activity among University Students in Urban Chidambaram, Tamil Nadu – A Cross Sectional Study

Dr. Praveen Kumar S^{1*}, Dr. D P Lakshmi Priya², Dr. A Viknesh Ambayiram³, Dr. AJW Felix⁴, Dr. P K Govindarajan Kandasamy⁵

¹Post-graduate, Department of Community Medicine, Rajah Muthiah Medical College and Hospital, Chidambaram

²Assistant Professor, Department of Community Medicine, Rajah Muthiah Medical College and Hospital, Chidambaram

³Assistant Professor, Department of Community Medicine, Rajah Muthiah Medical College and Hospital, Chidambaram

⁴Reader cum Statistician, Department of Community Medicine, Rajah Muthiah Medical College and Hospital, Chidambaram

⁵Professor, Department of Community Medicine, Rajah Muthiah Medical College and Hospital, Chidambaram

DOI: [10.36348/sjm.2021.v06i08.002](https://doi.org/10.36348/sjm.2021.v06i08.002)

| Received: 06.07.2021 | Accepted: 11.08.2021 | Published: 13.08.2021

*Corresponding Author: Praveen Kumar S

Abstract

Introduction: Annually physical inactivity attributes to 1.6 million deaths. Physical inactivity in college students is higher in developing countries compared to developed countries. There is a decline in physical activity as the age increases, this increases risk of NCDs like cardiovascular disease, Type 2 Diabetes, stroke. **Aim:** The present student was done with the objective of finding the level of physical activity among the university students in urban Chidambaram. **Study setting and design:** This is a cross-sectional study done among students studying in university. **Materials and Methods:** A total of 454 participants were included in the study, the level of physical activity was assessed using IPAQ-SF. **Statistical Analysis:** Descriptive and Analytical statistics were used. Analytical statistics was done using Chi-square test and binominal logistic regression. **Results:** Out of 454 participants, 108 (23.8 %) were physically active and 346 (76.2 %) were physically inactive. Among physically inactive, 107 (30.9 %) were males and 239 (69.1 %) were females. Females were 3 times physically inactive compared to males [odd's ratio - 3.011 (95% CI 1.931 - 4.695)]. Binary logistic regression between levels of physical activity and significant factors showed females were 2.9 [95% CI (1.84 – 4.58)] physically inactive compared to males and this difference is statistically significant (p value < 0.05). **Conclusion:** The study shows that majority of college students lack physical activity, males are physically active compared to females. Females are less engaged in Vigorous physical activity compared to males.

Keywords: IPAQ-SF, physical activity, physically active, physically inactive, college students.

Copyright © 2021 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Non-communicable disease accounts for 41 million deaths each year globally contributing to 71 % of all deaths. The four major NCDs namely cardiovascular diseases, cancer, diabetes and respiratory diseases were responsible for 80 % of all NCD deaths [1, 2]. The four main risk factors associated with NCDs were tobacco use, harmful use of alcohol, unhealthy diet and lack of physical activity, one notable aspect is that they are all modifiable [1, 3].

It is estimated that 1.6 million deaths annually are attributed due to the lack of physical activity [1, 2]. According to World Health Organisation (WHO) physical activity is defined as “any bodily movements produced by skeletal muscles that requires energy expenditure”[4]. Regular physical activity helps in

maintaining healthy weight [5], promotes reduction of visceral fat[6] and also preventive factor which prevents development of NCDs such as cardiovascular disease, type 2 diabetes and colon cancer [5, 7, 8].

World Health Organisation has estimated that the globally 27.5 % of adults and 81 % of adolescents were physically inactive. This physical inactivity is high among the eastern Mediterranean region, America and lowest among the South-East Asian region [4, 9]. Over the past decade studies had shown rising trend in global in physical inactivity. A decade old World health survey among 51 countries has shown that the overall prevalence of physical inactivity was 17.7 % and the prevalence among Indian men and women were 9.3% and 15.2% respectively. The percentage was more among urban compared to rural population.[10] But

recent studies in India studies have shown that overall physical inactivity among the population ranges between 38 % to 70 % across the country and the difference in the prevalence of physical inactivity between urban and rural population had reduced [11]. The ICMR-INDIAB study done in 2014 estimated that the number physically inactive individual across country would be around 392 million [12]. This rise in physical inactivity had been due to rapid urbanization and globalization over the past decade in the country [11,12].

The factors that affects the level of physical activity at individual level include age, gender, health status of the individual [13]. along with lack of time, lack of motivation and cultural expectations of body image and physical appearance [14].

Studies among university students had shown that about one-third students who were active at high school became physically inactive during the university life [15,16]. A cohort study done by Kwan *et al.*, in 2012 showed that this transition into early adulthood is crucial because the study found that there is decrease in physical activity, increase in drinking and smoking behaviours among the university students [17]. Study by sparling *et al.* reported that 81.3 % who were physically inactive during college days remained physically inactive after completing the studies [18]. The level of physical activity declines during transition from young adult into early adulthood with a steep decline during the time of entering a university/ college [15, 17].

Furthermore, Haase *et al.* reported that the level of physical activity was low in developing countries compared to developed countries [19]. Very few studies had reported the level of physical activity among university / college going students in India.

The present student was done with the objective of finding the level of physical activity among the university students in urban Chidambaram.

MATERIAL AND METHODS

Place and period of research

This cross-sectional study was done for a period of 3 months from 1st November 2020 to 31st January 2021. The study was conducted at Annamalai university, Chidambaram, Tamil Nadu. Ethical committee approval was obtained from institutional ethics committee. Informed consent was obtained from all the study participants.

Study Population

All the undergraduate and postgraduate students who studied in Annamalai University during the study period

Sample Size

A pilot study was done among 100 study participants and proportion of physical activity was 23%. With the prevalence of 23% found in pilot study, with 95 % confidence interval and relative precision of 18 %, required sample size for the study was estimated using the formula $n = Z_{\alpha}^2 * (1-p) / e^2 * p$, where p = prevalence, e = relative precision, $z_{\alpha} = 1.96$. The sample size obtained was 395, with 10 % nonresponse rate the required sample size was 435.

Sampling Method

Convenient sampling technique was used to select the study participants.

Study Procedure

The study participants were administered with structured questionnaire for evaluation of physical activity. Information on socio-demographic details was collected. Physical activity was assessed using short form of International Physical Activity Questionnaire (SF-IPAQ). SF-IPAQ was designed for population surveillance of physical activity among adults. It is a reliable and valid tool for measuring physical activity in Indian population [19–21]. The questionnaire had 7 questions which measures physical activity as vigorous physical activity, moderate physical activity and walking activity.

Total minutes of time spent in a week for vigorous, moderate physical activity and walking activity were obtained and total physical activity score for participants who were physically active is calculated. Physical activity scores were expressed as time spent in minutes per week (minutes / week) and in MET-minute per week (MET-minutes / week) as per guidelines for interpretation of SF-IPAQ. Individuals were classified into 2 categories as physically activity and physically inactive. The participants was said to be physically active, if he/she was involved in 75 minutes of vigorous physical activity or 150 minutes of moderate intensity physical activity or equivalent combination of vigorous and moderate intensity physical activity achieving at least 600 MET-minutes[4]. Participants who didn't meet the above criteria were classified as physically inactive.

Data was collected from 470 participants out of whom 16 were excluded due to incomplete data (fig.1).

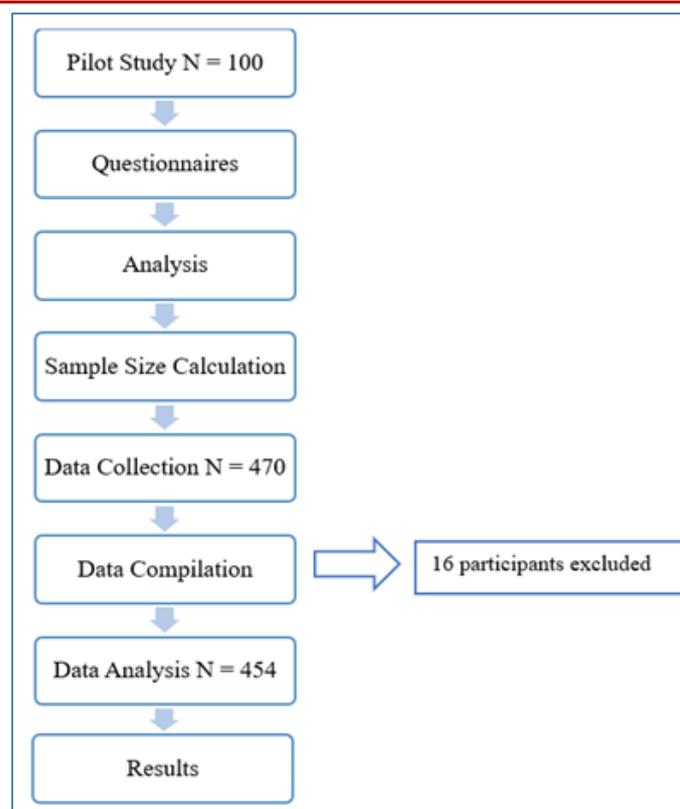


Fig-1: Flow chart of study procedure

Anthropometric measurements including height and weight were recorded using standardised techniques according to WHO STEPS Surveillance Manual for calculation of BMI [22]. Height is measured using a portable height measuring tape. The participants were asked to remove footwear and head gears. The participants were asked to stand straight against the wall facing the investigator, feet together, heels against the wall, knee straight and asked to look straight and not to tilt their head. The highest point was marked with a measuring scale and participants were asked to step away from wall and height was measured using measuring tape in centimetres. Weight was measured using a portable weighing scale. The scale was placed in a flat surface and participants were asked to empty their pockets, remove their footwear and take off belts. They were asked to stand straight, face forward and arms on side, the reading on the weighing scale is noted in kilogram.

Operational Definitions

Physical Activity

Any bodily movements produced by skeletal muscles that requires energy expenditure[4].

Moderate-Intensity physical activity

Moderate-intensity physical activity refers to physical activities performed at between 3.0 to less than 6.0 METs. This includes brisk walking [4].

Vigorous-intensity physical activity

Vigorous-intensity physical activity refers to physical activities performed at or more than 6.0 METs [4].

Walking

This includes walking done at work place and at home, walking to travel from place to place. This doesn't include brisk walking[4].

Metabolic Equivalent of Task (MET)

MET is a physiological measurement expressing the intensity of physical activity. 1 MET is the energy equivalent expended by an individual while seated at rest [4]. For calculation of MET for each activity,

Walking MET-minutes / week = 3.3 * walking time in minutes * walking days
 Moderate intensity activity MET-minutes / week = 4.0 * moderate activity minutes * moderate activity days.

Vigorous intensity activity MET-minutes / week = 8.0 * vigorous activity minutes * vigorous activity days.

Body Mass Index (BMI)

BMI for study participants was calculated using the formula, BMI = (weight in kilogram) / (height in meter)².

STATISTICAL ANALYSIS

Data were entered in Microsoft excel (version 2019) and imported into IBM SPSS (Version 22). Descriptive and analytical statistics were applied. Categorical variables were expressed as proportion and percentage while continuous variables are expressed as median and interquartile range. Chi-square test and binominal logistic regression was used for analytical statistics. All P values were two-tailed and considered significant if < 0.05 .

RESULTS

Out of 454 study participants, 169 (37.2 %) were male and 285 (62.8 %) were females. The mean age was 22.82 ± 3.43 years with minimum age of 17 and maximum age of 47 years. 245 (54 %) belonged to age group between 21 and 25. Most 333 (73.3 %) were undergraduates and 257 (56.6 %) resided in hostel (Table 1). The mean BMI of the study participants was 23.36 ± 4.16 kg/m².

Table-1: Socio-Demographic characteristics of the study population

Demographic characteristics		Frequency (n)	Percent (%)
Gender	Male	169	37.2
	Female	285	62.8
	Total	454	100.0
Age	17 to 20 years	107	23.6
	21 to 25 years	245	54.0
	26 to 30 years	89	19.6
	More than 30 years	13	2.9
	Total	454	100.0
Education	Undergraduate	333	73.3
	Post-graduate	121	26.7
	Total	454	100.0
Mode of Stay	Hosteller	257	56.6
	Day-scholar	197	43.4
	Total	454	100.0

Total physical activity scores were expressed in minutes / week and MET-min / week for moderate intensity, vigorous, moderate physical activity and walking. Out of participants performing vigorous physical activity (28.4 %) only 12.3 % performed

vigorous activity meeting WHO guidelines^[4] and among moderate intensity physical activity (45.6 %) only 9.3 % met WHO guidelines. (Table 2) (Fig. 2) 108 (23.8 %) were physically active and 346 (76.2 %) were physically inactive. (Table 3) (Fig. 3).

Table-2: Distribution of study participants according to various levels of physical activity

Physical Activity Performed		Frequency (%)	Median		Interquartile Range	
			Min / Week	MET-min / Week	Min / Week	MET-min / Week
Vigorous Physical Activity*	Present	129 (28.4)	60	480	45	360
	Absent	325 (71.6)				
Moderate Physical Activity*	Present	207 (45.6)	90	360	65	260
	Absent	247 (54.4)				
Walking*	Present	403 (88.8)	140	462	120	396
	Absent	51 (11.2)				

* Activities done at least once, in last 7 days.

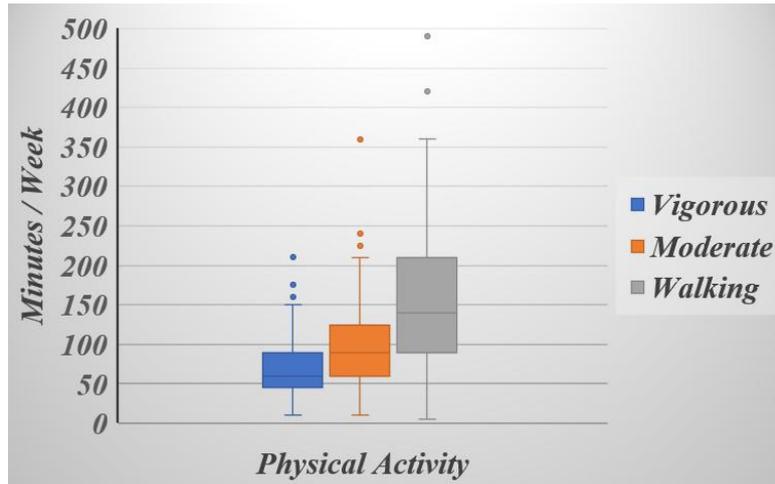


Fig-2: Box and Whisker plot of study participants according to various levels of physical activity

Table-3: Distribution of study participants according to whether the participants were physically active or not

Variables		Frequency	Percentage %
Physically Active	Vigorous and Moderate physical activity achieving ≥ 600 MET-min / week	26	5.7
	Vigorous Physical Activity ≥ 75 minutes / week + Vigorous and Moderate physical activity achieving ≥ 600 MET-min / week	40	8.9
	Moderate Physical Activity ≥ 150 minutes / week + Vigorous and Moderate physical activity achieving ≥ 600 MET-min / week	26	5.7
	Vigorous Physical Activity ≥ 75 minutes / week + Moderate Physical Activity ≥ 150 minutes / week + Vigorous and Moderate physical activity achieving ≥ 600 MET-min / week	16	3.5
	Total	108	23.8
Physically Inactive		346	76.2

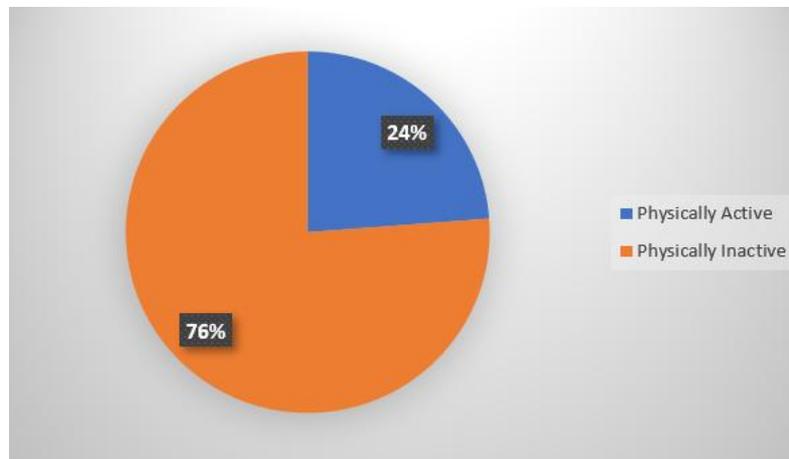


Fig-3: Pie chart showing total participants physically active / Inactive

Table 4 shows association between physical activity and selected socio-demographic characteristics. Among study participants who were physically active, 57.4 % were males and among participants who are physically inactive 69.1 % were females. The above difference in physical activity between males and female was statistically significant (p value < 0.05). Females were 3 times physically inactive when compared to males in this study [odd's ratio - 3.011 (95% CI 1.931 - 4.695)]. Among study participants who were physically active 44.4 % belonged to age group

between 20 and 25 years followed by 29 % in age group < 20 years, age group 20 to 30 years and more than 30 years contributed 20.4 % and 5.6 %, respectively. While among those who were physically inactive, 56.9 % belonged to age group 20 to 25 years followed by < 20 years (21.7 %), 26 to 30 years (19.4 %) and > 30 years (2 %). When compared between the pattern of both the groups, proportion of study participants doing physical activity was lesser in age group 20 to 25 years than the rest. The above difference was found to be statistically significant (p value < 0.05).

Among study participants who were physically active and inactive there were no statistical significance between undergraduate, postgraduate students and Day-

scholar, hostellers. Also, BMI was not associated between level of physical activity in the study (Table 4).

Table-4: Association between physical activity and selected socio-demographic characteristics

Variables		Physically Active	Physically Inactive	P Value
Gender	Male	62 (57.4%)	107 (30.9%)	< 0.001
	Female	46 (42.6%)	239 (69.1%)	
Age Category	Less than 20 years	32 (29.6%)	75 (21.7%)	0.042
	20 to 25 years	48 (44.4%)	197 (56.9%)	
	26 to 30 years	22 (20.4%)	67 (19.4%)	
	More than 30 years	6 (5.6%)	7 (2.0%)	
Education	Undergraduate	81 (75.0%)	252 (72.8%)	0.656
	Post-graduate	27 (25.0%)	94 (27.2%)	
Mode of Stay	Hosteller	57 (52.8%)	200 (57.8%)	0.358
	Day-scholar	51 (47.2%)	146 (42.2%)	
Anthropometry	BMI	23.37 ± 3.79*	23.35 ± 4.27*	0.961**

* Mean ± SD. **P value based on t test.

Binary logistic regression between levels of physical activity and significant factors showed females were 2.9 [95% CI (1.84 – 4.58)] physically inactive compared to males and this difference is statistically

significant (p value < 0.05). There was no statistical significance between the age categories and level of physical activity in binary logistic regression (Table 5).

Table-5: Logistic regression for physical activity with significant variables

Demographic characteristics		Frequency (n)	Percent (%)	Adjusted ODDS Ratio	95 % CI for ODDS	
					Lower	Upper
Gender	Male	169	37.2	1*		
	Female	285	62.8	2.906	1.843	4.583
Age Category	17 to 20 years	107	23.6	1*		
	21 to 25 years	245	54.0	1.232	0.370	4.106
	26 to 30 years	89	19.6	2.141	0.665	6.892
	More than 30 years	13	2.9	1.833	0.541	6.208

* Reference

DISCUSSION

This cross-sectional study was done with an objective of finding out the level of physical activity among the university students in Annamalai University, Chidambaram. Prevalence of physical activity in this study was 23.8 %. A Lebanese study done by Musharrafieh *et al.* for assessing physical activity among university students showed only 26.4 % were physically active[23] which is similar to this study. Dinger *et al.* in his study showed that students in many college campuses don't meet physical activity recommendation [24]. Similarly many studies done among college students in different countries reported that only about two-third of the Brazilian and Chinese students and less than half of the students in Canada were physically active [25]. This shows that physical activity is low among college students. A cross-sectional study done among university students in 23 countries by Haase *et al.* showed physical activity varies among different population based on economic and cultural factors [19].

A study done by Muttappallymyalil *et al.*[26] among university students in UAE reported that among

32.7 % students performing vigorous physical activity, only 9.1 % met recommended guidelines, similar result was found in present study where only 12.3 % of students performing vigorous physical activity that met the recommended guidelines. A Saudi Arabian study by Awadalla *et al.* showed 12 % of university students were highly active,[25] similar result was found in this study where only 12.3 % were highly active. College students engage less in vigorous physical activity was observed in a study done by Nelson *et al.*[27] who also reported that Asians were less engaged in vigorous physical activity [27].

Present study showed that males were physically active than females. This study showed that males were 3 times more active than females and also females were less engaged in vigorous physical activities. Similar results were obtained by various other studies [23, 25, 28–30]. A study by El Gilany *et al.* among university students in Egypt also showed females were less engaged in vigorous physical activity [29]. This finding was also reported in many studies among different countries [19, 31, 32]. The main factors which are barrier for females in performing vigorous

physical activities are cultural factors, lack of awareness about benefits of physical activity lifestyle changes [19, 23, 25].

Physical activity level was lesser in this study, this highlights important public health issue where physical inactivity increases risk of non-communicable diseases like type 2 diabetes, hypertension etc.

The main reasons for lack of physical activity among students are the lack of knowledge about health benefits of physical activity, lack of time, tight schedule, cost factors, lifestyle changes and cultural factors. Future studies are needed to investigate these barriers.

Strengths

Participants were sensitized to questionnaire before the start of the study and were shown show cards for each of the activity types for easy understanding of various levels of physical activity.

This study included students who studied different courses rather than students from single speciality. Hence estimated level of physical activity was not affected due to speciality students studying.

Limitations

This study is done in Chidambaram, Tamil Nadu among university students and convenient sampling technique was followed. Therefore, generalisability of the study result is to be carried out with care.

Since this study is done amidst COVID 19 pandemic in the country, low level of physical activity observed in this study could be attributed by the pandemic situation where many avoided outdoor activities.

This present study didn't investigate the barriers in performing physical activity and hence further investigations are needed in investigating barriers that prevent students performing physical activity.

Participants had to recall physical activities performed for the past 7 days, this could lead to recall bias and overestimation of physical activity can occur due to over reporting.

CONCLUSION

This study concluded that majority of college students lack physical activity, males are physically active compared to females. Females are less engaged in Vigorous physical activity compared to males. This highlights an important health issue among college students and forms a basis for health promotion and IEC campaigns. Awareness should be created among

college students regarding the importance of physical activity.

REFERENCES

1. Non communicable diseases [Internet]. [cited 2021 Apr 8]; Available from: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
2. World Health Organization. (2020). World health statistics 2020. Geneva: World Health Organization; 2020.: World Health Organisation;
3. Forouzanfar, M. H., Afshin, A., Alexander, L. T., Anderson, H. R., Bhutta, Z. A., Biryukov, S., & Carrero, J. J. (2016). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The lancet*, 388(10053), 1659-1724.
4. World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour: web annex: evidence profiles.
5. World Health Organization, T. (2010). *Global recommendations on physical activity for health*. World Health Organization.
6. Reaven, P. D., Barrett-Connor, E., & Edelstein, S. (1991). Relation between leisure-time physical activity and blood pressure in older women. *Circulation*, 83(2), 559-565.
7. Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., & Lancet Physical Activity Series Working Group. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The lancet*, 380(9838), 219-229.
8. McTiernan, A., Friedenreich, C. M., Katzmarzyk, P. T., Powell, K. E., Macko, R., Buchner, D., ... & Piercy, K. L. (2019). Physical activity in cancer prevention and survival: a systematic review. *Medicine and science in sports and exercise*, 51(6), 1252.
9. World Health Organization. (2018). *More active people for a healthier world: Global Action Plan on Physical Activity 2018-2030*. World Health Organization.
10. Guthold, R., Ono, T., Strong, K. L., Chatterji, S., & Morabia, A. (2008). Worldwide variability in physical inactivity: a 51-country survey. *American journal of preventive medicine*, 34(6), 486-494.
11. Tripathy, J. P., Thakur, J. S., Jeet, G., Chawla, S., Jain, S., & Prasad, R. (2016). Urban rural differences in diet, physical activity and obesity in India: are we witnessing the great Indian equalisation? Results from a cross-sectional STEPS survey. *BMC public health*, 16(1), 1-10.
12. Anjana, R. M., Pradeepa, R., Das, A. K., Deepa, M., Bhansali, A., Joshi, S. R., ... & Shukla, D. K. (2014). Physical activity and inactivity patterns in India—results from the ICMR-INDIAB study (Phase-1)[ICMR-INDIAB-5]. *International*

- Journal of Behavioral Nutrition and Physical Activity*, 11(1), 1-11.
13. Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., Martin, B. W., & Lancet Physical Activity Series Working Group. (2012). Correlates of physical activity: why are some people physically active and others not?. *The lancet*, 380(9838), 258-271.
 14. Joseph, N. M., Ramaswamy, P., & Wang, J. (2018). Cultural factors associated with physical activity among US adults: An integrative review. *Applied Nursing Research*, 42, 98-110.
 15. Sigmundová, D., Chmelík, F., Sigmund, E., Feltlová, D., & Frömel, K. (2013). Physical activity in the lifestyle of Czech university students: Meeting health recommendations. *European Journal of Sport Science*, 13(6), 744-750.
 16. Bray, S. R., & Born, H. A. (2004). Transition to university and vigorous physical activity: Implications for health and psychological well-being. *Journal of American College Health*, 52(4), 181-188.
 17. Kwan, M. Y., Cairney, J., Faulkner, G. E., & Pullenayegum, E. E. (2012). Physical activity and other health-risk behaviors during the transition into early adulthood: a longitudinal cohort study. *American journal of preventive medicine*, 42(1), 14-20.
 18. Sparling, P. B., & Snow, T. K. (2002). Physical activity patterns in recent college alumni. *Research quarterly for exercise and sport*, 73(2), 200-205.
 19. Haase, A., Steptoe, A., Sallis, J. F., & Wardle, J. (2004). Leisure-time physical activity in university students from 23 countries: associations with health beliefs, risk awareness, and national economic development. *Preventive medicine*, 39(1), 182-190.
 20. Shenoy, S., Chawla, J. K., & Sandhu, J. S. (2014). Validation of short international physical activity questionnaire Punjabi version in India. *Saudi Journal of Sports Medicine*, 14(2), 77.
 21. Rai, R. H., Asif, M., & Malhotra, N. (2018). Reliability of International Physical Activity Questionnaire–Short Form IPAQ-SF for Young Adults in India. *European Journal of Physical Education and Sport Science*.
 22. Riley, L., Guthold, R., Cowan, M., Savin, S., Bhatti, L., Armstrong, T., & Bonita, R. (2016). The World Health Organization STEPwise approach to noncommunicable disease risk-factor surveillance: methods, challenges, and opportunities. *American journal of public health*, 106(1), 74-78.
 23. Musharrafieh, U., Tamim, H. M., Rahi, A. C., El-Hajj, M. A., Al-Sahab, B., El-Asmar, K., & Tamim, H. M. (2008). Determinants of university students physical exercise: a study from Lebanon. *International Journal of Public Health*, 53(4), 208-213.
 24. Dinger, M. K., & Waigandt, A. (1997). Dietary intake and physical activity behaviors of male and female college students. *American Journal of Health Promotion*, 11(5), 360-362.
 25. Awadalla, N. J., Aboelyazed, A. E., Hassanein, M. A., Khalil, S. N., Aftab, R., Gaballa, I. I., & Mahfouz, A. A. (2014). Assessment of physical inactivity and perceived barriers to physical activity among health college students, southwestern Saudi Arabia. *East Mediterr Health J*, 20(10), 596-604.
 26. Muttappallymyalil, J., Mathew, E., Sreedharan, J., Al Sharbatii, S., Shaikh, R. B., & Basha, S. A. (2010). Self reported physical activity among University Students in Ajman, UAE. *Pak J Med Sci*, 26(4), 782-786.
 27. Nelson, T. F., Gortmaker, S. L., Subramanian, S. V., & Wechsler, H. (2007). Vigorous physical activity among college students in the United States. *Journal of Physical Activity and Health*, 4(4), 496-509.
 28. Abolfotouh, M. A., Bassiouni, F. A., Mounir, G. M., & Fayyad, R. C. (2007). Health-related lifestyles and risk behaviours among students living in Alexandria University Hostels. *EMHJ-Eastern Mediterranean Health Journal*, 13 (2), 376-391, 2007.
 29. El Gilany, A. H., Badawi, K., El Khawaga, G., & Awadalla, N. (2011). Physical activity profile of students in Mansoura University, Egypt. *EMHJ-Eastern Mediterranean Health Journal*, 17 (8), 694-702, 2011.
 30. Fagaras, S. P., Radu, L. E., & Vanvu, G. (2015). The level of physical activity of university students. *Procedia-Social and Behavioral Sciences*, 197, 1454-1457.
 31. Aty, M. A. A. (1999). Health related behaviors among adolescents and youth in Assiut Governorate, Upper Egypt. *Bull. High Inst. Public Health*, 29(3), 447-473.
 32. Mahfouz, A. A., Abdelmoneim, I., Khan, M. Y., Daffalla, A. A., Diab, M. M., Al-Gelban, K. S., & Moussa, H. (2008). Obesity and related behaviors among adolescent school boys in Abha City, Southwestern Saudi Arabia. *Journal of tropical pediatrics*, 54(2), 120-124.