



Assessment of stages of behavior change related to physical activity and the associated barriers among college-going adolescents in Greater Noida

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Abstract

Introduction: Global burden of disease in India top most conditions are non-communicable diseases this is mainly caused due to physical inactivity. One in every ten deaths globally is reported by physical inactivity related risks. Also, it is evidenced that 6-10% of global death due to non-communicable diseases was in direct relation to physical inactivity. The prevalence of physical inactivity is at its peak, at around 85% worldwide 18% of the total population, due to physical inactivity they are more at risk of NCDs. This study aims to find the level, stages of behavior changes, associated barriers related to physical activity among adolescents.

Methodology: A quantitative research approach with a cross-sectional research design was used. The samples included were 920 adolescents in the age group of 18-19 years who are enrolled in the selected college. Standardized self-administered questionnaires such as the Global Physical Activity Questionnaire and Trans Theoretical model Questionnaire were used to assess the level of physical activity and stages of behavior change related to physical activity. Besides, barriers to participating in physical activity were also elicited.

Results: This study found that about one-fifth of the subjects (20.4%) are physically inactive. We found that they are in pre-contemplation and contemplation stages of behavior change related to physical activity. Compared to females, males are a high chance to do physical activity. The major barriers to physical activity founded as Personal barriers like lack of time and have many tasks. There is a significant increase in physical activity among males than females and it is statistically significant. Healthy practices in a family also found to have a significant association with increased physical activity.

Conclusion: This study concludes that one-fifth of the adolescents are physically inactive almost 90% of males were in the action & maintenance stage compared to 60% in females. The one-third female was reported pre-contemplation & contemplation stage. Two third of adolescents reported having personal barriers they are including lack of time and have many tasks. Many barriers were also reported that prevent adolescents from taking up sufficient physical activity.

Keywords: Behavior change, physical Inactivity, physical Inactivity, Greater Noida

Introduction

Physiological movement and exercise produced by the involvement of skeletal muscles that need energy expenditure are called physical activity [1]. "Exercise" and "Physical activity" are two terms that are often confusing and mistaken for their identity. Subsequently comes under the category of "physical activity," and it is a way of maintaining and improving one or more components of physical fitness and it is planned, structured, and repetitive. [2]

In 2016 globally, thirty-two percent of women and twenty-three percent of men aged more than 18 years are reported insufficient physical activity, straight above the past 15 years insufficient physical activity level did not improve (2001 reported 28.5%, 27.5% in 2016) [3].

12 million individuals in the Western Pacific region lost their lives to NCDs in 2019. According to a 2015 WHO report, almost 5.8 million Indians die from NCDs. However, India displays a prevalence of one-fourth of physical inactivity. Adolescents constitute 18% of the total population, due to physical inactivity they are more at risk of NCDs [4].

Physical inactivity is one of the primary risk factors for non-communicable diseases (NCD) and physical activity prevents NCD related death worldwide. The failure to achieve the minimum level of activity increases the risk factors of NCD by twenty to thirty percent and reduces the 3 to 5 years of individual lifespan [1].

1. Objectives of the present study

1. To assess the level of physical activity among adolescents.
2. To assess the prevalence of stages of behavior change regarding regular physical activity.
3. To assess the barriers to physical activity participation among adolescents
4. To study the association between the level of physical activity and socio-demographic variables.

2. Delimitations

- The study included only the age of adolescents who were 18 to 19 years.
- The six weeks of study data collection period.
- Lack of qualitative study methods to explain the reasons behind the findings.

Methodology

1. Research approach

For the current study, a quantitative approach has been adopted.

2. Research design

The community-based cross-sectional study design was used for the present study.

3. Setting

The study was conducted in colleges in knowledge park III. The total number of students enrolled in colleges is around 1900. Students were approached in their classrooms at free hours.

4. Sample

The sample of the present study comprises of adolescents in the age group of between 18 to 19 years available during data collection in the selected colleges of Greater Noida.

5. Sampling technique

A list of all colleges (Arts, Science, Polytechnic, and Engineering) was obtained from the Directorate of Higher and Technical education Greater Noida. The college for the study was chosen based on the Multi-stage cluster sampling technique from the available list. All eligible students in the college were included in the study.

6. Sample size calculation.

The sample size was estimated as 450 based on the prevalence of low physical activity to be 31% from literature [16]. The sample size was calculated to be 836 with 95% confidence and 5% absolute precision, design effect as 2.5 using Openepi software. Assuming 10% non-response or incomplete questionnaires, the final 920 sample size was calculated. All available students in the college who met the inclusion criteria those students were included in this study.

7. Criteria for sample selection Inclusion criteria

Late Adolescents between 18 to 19 years of age group registered in the selected college in Greater Noida.

8. Development data collection instrument

GPAQ [31] is a standardized questionnaire formulated by WHO to assess physical activity.

TTM [4] is a standardized model developed by Clemente C and Prochaska O in Rhode Island University done a study on the stages of behavioral change in PA.

The instruments are freely available online for use, and it has been used in several other studies.

9. Description of the data collection instrument

It consists of three sections

Section A: Socio-demographic proforma

Section B: GPAQ [30]

Section C: TTM [4]

Section D: Barriers related to physical activity [27]

Section A: Socio-demographic proforma

This section deals with socio-demographic characteristics. It includes variables such as age, gender, income, occupation, healthy lifestyle practices, residence, and use of media and history of chronic diseases in the family.

Section B: Global Physical Activity Questionnaire (GPAQ)

It consists of sixteen questions in four domains:

- Activity at work
- Travel from one places to other
- Recreational activities of sports
- Sedentary behavior

For questions, P1, P4, P7, P10, P14 are presented with two alternatives, and those who respond 'NO' to these questions can skip the corresponding items.

Section C: Transtheoretical model (TTM)

TTM -2 the five stages in the trans-theoretical model are Pre-contemplation is the next six month adolescents does not plan to change behavior related to PA. Adolescents strongly motivated to change behavior in the next six months called the Contemplation behavior stage. Preparation stage adolescents plan to act in general next month. Adolescents already have been incorporated physical activity for at least 6 months in the Action stage of behavior related to PA. Activity that already occurs for over 6 months is the maintenance stage of behavior related to PA.

Section D: Barriers related to physical activity

This deals with barriers underlying people's to not participate in physical exercise. It includes three major domain every two questions with two alternatives mentioning their level of agreement.

10. Score interpretation of the instrument

Collected data from samples, physical activity level was calculated using GPAQ. First, for work-related physical activity, moderate work-related activity accounts for MET value 4.0, and for vigorous work activity, it is 8.0. For recreation activities also, it follows a similar pattern, and for travel to from places, MET value is 4.0. MET-minutes for total physical activity is calculated by adding the MET-minutes for each domain. In that, a cut off of 600 MET-minutes is considered as the basis for sufficient physical activity.

11. Validity

The tool used in this study to assess the level, behavior stages, and barriers to participating in physical activity was standardized tools, GPAQ by WHO, and TTM standardized model developed by Clemente C and Prochaska O in Rhode Island University respectively [4].

12. Ethical consideration

Permission was obtained from the Institute ethics committee Sharda University Human studies. Informed consent was obtained from every adolescent after a brief explanation about the study by the researcher. Confidentiality and anonymity were maintained throughout the period of data collection.

13. Data collection procedure

The questionnaire was piloted and modified accordingly. Permission was obtained from all colleges from the Dean, of respective colleges Greater Noida. Eligible study participants were approached at their college during their free hours. Background and importance of the study were explained to the participants and written informed consent

was obtained. The confidentiality of the details collected was assured to study participants. Self-administered questionnaire in both Hindi and English was used to collect the data. Clarifications were given to the participants in case of doubts. The data were scored, and the datasheet was prepared for data analysis.

14. Plan for data analysis

Micro-soft Excel used for data entry and fined the percentages, means, standard deviation, and confidence interval of various quantitative variables measured by SPSS package version 20 was used.

- The physical activity level was stated as proportions.
- Comparison between dissimilar groups like gender, socio-economic status, measured by the Chi-square test.
- The univariate analysis has shown the Association of demographic variables and physical activity levels. It is stated as confidence intervals of 95% and Odds ratio.

- The multivariate analysis showed an association of physical activity with sufficient and insufficient characteristics is expressed as an adjusted OR ratio.
- Stages of behavior change and barriers related to physical inactivity were expressed in percentage.

Analysis and findings

Section I: Distribution of socio-demographic characteristics among the study participants in Greater Noida.

Section II: Levels of physical activity among the study participants.

Section III: Stages of behavior changes related to physical activity among adolescents.

Section IV: Barriers to physical activity among the study participants.

Section V: Distribution of Association between physical activity and selected socio- demographic and behavioral variables among the study participants.

Section 1: Distribution of socio-demographic characteristics among the study participants in Greater Noida.

Table 1: Distribution of socio-demographic characteristics of study participants (N=920).

S.NO	Socio-demographic characteristics	Frequency (n=920)	Percentage (%)
1.	Age		
	18	305	33.2
	19	615	66.8
2.	Sex		
	Male	574	62.4
	Female	346	37.6
3.	Religion		
	Hindu	816	88.7
	Muslim	22	2.4
	Christian	82	8.9
4	Department in college #		
	Science departments	368	40
	Arts departments	552	60
5	Year of study		
	Second-year	508	55.2
	Third-year	412	44.8
6	Socio-Economic Classification \$		
	Upper class(INR 7008and above)	76	8.3
	Upper middle Class(INR 3504-7007)	143	15.5
	Middle Class(INR 2102-3503)	231	25.1
	Lower middle Class(INR 1051-2101)	316	34.3
	Lower Class(INR 1050 and below)	154	16.7
7	Type of Family		
	Joint family	222	24.1
	Nuclear family	698	75.9
8	Transport @		
	Public transport	569	61.8
	Personal-bicycle	41	4.5
	Personal-motorbike & car Pooling	220	23.9
	transport	90	9.8

Section 2

Table 2: Level of physical activity among the study participants. (N = 920)

Level of physical activity	MALE (n = 574) n (%)	Female (n = 346) n (%)	Overall n (%)	Average time spent per week in minutes, Median (IQR)
Sufficient Physical activity (GPAQ>600MET-minutes)	523(91.1)	209(60.4)	732(79.6)	8760(393-14160)
Insufficient physical activity (GPAQ<600MET-minutes)	51(8.9)	137(39.6)	188(20.4)	

Measurement of physical activity

Out of the 920 samples, 732 participants (79.6%) reported as having sufficient physical activity when compared to 188 participants (32.4%) with insufficient activity. One-third of Female participants (n-137) has reported insufficient physical activity compared to male (n-51). i.e. (8.9%) among the study participants.

A sufficient level of activity should meet more than 150 minutes is or 75minutes of vigorous activity throughout the week or should meet MET minutes of 600 in a particular week. The median value of physical activity level in this late adolescents is stated in 8760 MET- minutes. (IQR 3963-14160).

Section 3

Table 3: Distribution of Barriers to physical activity among the study participant’s adolescents in insufficient physical activity. (N-188)

Barriers	Insufficient pa male N- 51 N (%)	Insufficient pa female N-137 N (%)	Overall n- 188 n (%)
Personal barriers	27(52.9)	73(53.3)	100(53.2)
Psychological barriers	19(37.3)	43(31.4)	62(33)
Environmental barriers	5(7.8)	21(15.3)	26(13.8)

Table 3 depicts Barriers of physical activity among the study participants to insufficient physical activity. Two third of participants had personal barriers 53.2%. One-fifth of

participants reported environmental barriers 13.8% they're including adverse weather condition.

Section 4: Association between physical activity and selected demographic variables among the study participants

Table 4: Univariate analysis showing the association between physical activity and selected demographic variables among the study participants. (N=920)

Variables	Sufficient PA-n=732	Insufficient PA-n=188	Unadjusted OR	95% CI	p-value
Age					
18	224(73.4)	81(26.6)	Ref 1.71	1.23-2.38	0.01*
19	508(82.6)	107(17.4)			
Sex					
Male	523(91.1)	51(8.9)	Ref 0.14	4.69-9.62	0.001**
Female	209(60.4)	137(39.6)			

P significant for age and sex <0.005

Table 5: Distribution of Univariate analysis showing the association between physical activity and socio lifestyle characteristics of the participants. (N-920)

Variables	Sufficient PA(n=732)	Insufficient PA(n=188)	Unadjusted OR	95% CI	p-value
Recreation activities					
Yes	554(75.6)	8(4.2)	Ref	0.007-0.03	0.001**
No	178(24.3)	180(95.7)	0.14		
Practice of yoga					
Sometimes	460(62.8)	114(76.5)	Ref	0.4-2.8	0.7
Most days	242(33.6)	67(35.6)	1.1		
Never	30(4.09)	7(3.7)	1.0		
Screening time					
>5hours per day	245(33.4)	70(37.2)	Ref	0.4-0.9	0.05*
<3hours per day	263(35.9)	50(26.5)	0.9		
3 to 5hours per day	224(30.6)	68(36.17)	0.6		
Healthy lifestyle					
Yoga & meditation	194(26.5)	19(12.1)	Ref	1.4-5.3	0.001**
Dietary restriction	94(12.8)	26(13.8)	2.3		
None	444(60.6)	143(76)	3.2		
Chronic disease in a family					
None	456(62.2)	132(70.2)	Ref	0.5-1.0	0.8
DM/HT/HD	225(30.7)	49(26)	0.7		
Others	51(6.9)	7(3.7)	0.4		

Table 4 and 5 Female gender has lesser odds of sufficient PA than males (OR=0.14, 95% CI=0.10- 0.21) and this was statistically significant. The presence of healthy practices in the family members had a stronger association with physical activity in the study population (OR=0.49, 95% CI 1.41-2.93) and that was statistically significant. Recreation Activities screening time, healthy lifestyle practices, and chronic illness in the Family.

Discussion

The conversion from adolescence to adulthood is the period in which they undergo many behavioral and physical changes. This transition period also plays a significant role in the development of lifestyle behaviors.

The first objective is to assess the physical activity level among college-going late adolescents.

This study used the Global Physical Activity Questionnaire for measuring the physical activity level among adolescents.

This study revealed that one-fifth of the late adolescents are physically inactive. Out of the 920 subjects, 188 participants (20.4%) were having insufficient activity when compared to 732 participants (79.6%) who reported having sufficient physical activity. The mean score of the physical activity was found to be 8760 MET- minutes. On comparing the median (interquartile range) score of time spent on various domains, a majority of the participants spend around 324 (0-175) minutes per week for recreational activities. Present study participants of late adolescents have sufficient physical activity, similar to study by Corol)^[35].

This study second objective was to assess the prevalence of stages of behavior change regarding regular physical activity participation among adolescents

This study finds that two-thirds of adolescents have reported in action and maintenance. Male (91.1) has a high PA when compared to females (60.4%) where the action stage had already happened for over 6 months. 14.7% were found in the pre- contemplation and contemplation stage of behavior. 5.8% of participants reported preparation stages of behavior change related to PA, similar study with (Bourdeaudhuij R)^[23].

The third objective of the present study was to assess the barriers to physical activity participation among adolescents

The present study found that barriers and physical activity are interrelated. This study found that one-fifth of adolescents having physical inactivity. They were two-third of participants perceived personal barriers (53.2%). Comparatively one-third of participants perceived psychological barriers (33%) and one-fifth of participants reported environmental barriers (13.8%).

The fourth objective was to study the association between the level of physical activity and socio-demographic variables.

Multivariate analysis shows that variables are gender and recreation activity were independent determinants related to physical activity. Females reported lower odds of enough physical activity compared to males the same as family healthy lifestyle practices also have more chances of enough physical activity these variables are statistically significant ($p < 0.001$) after adjusting for confounding variables. Age of the 19 years old Adolescents had higher odds of enough physical activity. High chance of adequate physical activity, compared to 18 years old adolescents, after adjusting the other confounding variables ($p < 0.05$).

Conclusion

This study found that among the study participants one-fifth of the adolescents are not achieve enough physical activity almost 90% of males were in the action & maintenance stage compared to 60% in females. The one-third female was reported pre- contemplation & contemplation stage. Two third of adolescents reported having personal barriers they are including lack of time and have many tasks. Several barriers are preventing adolescents from taking up regular physical activity and exercise. Stages of behavior, females were in pre- contemplation and contemplation stages comparatively high than males. On analysis of the Univariate female gender has a lesser odds ratio of sufficient PA than the male gender (OR=0.1, 95% CI 4.6-9.6) and this

was statistically significant. The major obstacles found in a female are like lack of time and engaged in a household activity

References

1. World Health Organization. Physical activity, 2018. Available from http://www.who.int/topics/physical_activity/en/. (Accessed on December 16th 2018)
2. World Health Organization. Fact sheet. 2018. Available from <http://www.who.int/mediacentre/factsheets/fs385/en/>. (Accessed on December 16th 2018)
3. World health organization. Prevalence of insufficient physical activity. 2016 Available from <http://www.who.int/gho/ncd/risk-factors/physical-activity-text/en/>. (Accessed December 16th 2018).
4. Saikia B, Singh S, Pal M. Early recognition of risk factors and screening may stave off non-communicable diseases among elderly- a review article. International journal of scientific research,12:(09):1-5.
5. Prochaska O, Clements D. Transtheoretical model beginning in 1977. Available from https://en.wikipedia.org/wiki/Transtheoretical_model. (Accessed November 9, 2018).
6. Teixeira JP, Carraca E, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: A systematic review. Int J Behav Nutr Phys Act,2012;9:78.
7. WHO Regional Office for the Eastern Mediterranean, 2018. Accessed from <http://www.who.int/about/regions/emro/en/>. (Accessed on December 17th 2018)
8. Kansal OP, Ohri P. Adolescents: A key pivotal in India's health strategy. Ind J Youth Adol Health. 2014; 1: 2349-880.
9. Breakfast Adherence And Factors Associated With Missing Breakfast Among Students Of JIPMER, Greater Noida - A Descriptive Study. B Saikia, RS Ramesh, ZJ Borgoary, V Eniyan, B Kamudi, A Rahman international Journal Of Innovative Science And Research Technology 8 (7), 7
10. Welk GJ. The youth physical activity promotion model: A conceptual bridge between theory and practice. Quest,2012;51:5-23.
11. Lawler M, Heary C, Nixon E. Peer support and role modeling predict physical activity change among adolescents over twelve months. J Youth Adolesc, 2020.
12. Biernat E, Piatkowska M. Leisure-time physical activity participation trends 2014-2018: A cross-sectional study in Poland. Int J Environ Res public health, 2019, 17(1).
13. Oyeyemi AL, Ishaku CM, Oyekola J, Wakawa HD, Lawan A. Patterns and associated factors of physical activity among adolescents in Nigeria. PLoS one,2016;11:e0150142.
14. Sevil J, Práxedes A, Abarca-Sos A, Villar DF, García-González. Levels of physical activity, motivation, and barriers to participation in university students. J Sports Med Phys Fitness,2015;56:1239-1248
15. Duan J, Hu H, Wang G, Arao T. Study on current levels of physical activity among middle school students in Beijing, China. PLoS ONE,2015;10:e0133544.

16. Muller AM, Khoo S, Lambert R. Review of physical activity prevalence of Asian school-age children and adolescents. *Asia Pac J public health*,2013;25:227-38
17. Divyasree P, Kumar GD, Subitha L, Ramesh RS. Level, motivation, and barriers to participating in physical activity among late adolescents in Greater Noida. *Int J Adolesc Med health*, 2018.
18. Kumar D, Parashar A, Thakur A. How active is Our Young Generation: An Assessment of Physical Activities among Youth in a City of Northern India. *Ind J Youth Adol Health*,2016;3:5-21.
19. Rajappan R, Selvaganapathy K, Liew L. Physical activity level among university students. A cross-sectional survey. *Int J Physiother Res*,2015;3:1336-43.
20. Anand T, Ingle GK, Meena GS, Kishore J, Yadav S. Dietary Behavior, Body Mass Index, and Level of Physical Activity amongst School Adolescents in Delhi: A Need for Life Skills-Based Education. *Ind J Youth and Adol Health*,2014;1:34-45.
21. Gulati A, Hochdorn A, Paramesh H, Paramesh EC, Cliff D, Kumar M *et al*. Physical activity patterns among school children in India. *Indian J Pediatr*,2014;81:47-54.
22. Silva JA, Silva KS, Lopes a da S, Nahas MV. Behavior change stages related to physical activity in adolescents from Santa Catarina: prevalence and associated factors. *Revista Paulista de Pediatria*, 2016, 476-83.
23. Samuel C, Denise P, Marlos D. Stages of change for physical activity in adults from Southern Brazil: a population-based survey *International Journal of Behavioral Nutrition and Physical Activity*,2007;4:25.
24. Bourdeaudhuij I, Renaat P, Geert C, Lynn M, Katrien W, Anne-Line B, *et al*. Stages of change for physical activity in a community sample of adolescents, *Health Education Research*, 2005, 357–66.
25. Lene H, Nanna V. Stages of Change Model for Participation in Physical Activity during Pregnancy *Journal of Pregnancy*, 2013.
26. Dishman K, Jackson AS, Bray MS. Validity of Processes of Change in Physical Activity Among College Students in the TIGER Study. *Annals of behavioral medicine : A publication of the Society of Behavioral Medicine*,2010;40(2):164- 175.
27. Gustavo.S, Maria D, Fatima D, Siva D, Behaviour change related to physical activity in adolescents. *Rev Bras Med Esporte*,2005;11:(2).