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Screen time, physical activity, dietary pattern and their interplay among adolescents: A survey from developing country

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Original article

Abstract

Introduction: Adolescence is marked as a critical period of human life because of the rapid physical and sexual growth. Technological advances in recent decades have increased the interaction of adolescents with screen-based technologies. The adolescents have the unhealthiest diets of all age groups, and most adolescents do not meet the national guidelines for physical activity.

Objectives: To assess physical activity, dietary pattern and screen time among urban adolescents and to find out association of Screen Time with different variables.

Methods: A cross sectional study carried out in Udaipur, Rajasthan with prior permission from ethical committee. The study included 250 adolescents (10 to 19 years) selected by multistage sampling method. The Leisure Time Exercise Questionnaire of Godin and Shephard was used to find out weekly Physical Activity score. Eating habits were investigated using self-administered questionnaire in which we asked different questions about the food consumed by adolescents in a week. A Screen Time of ≥2 hours/ day was categorized as high sedentary behaviour, whereas a Screen Time <2 hours/ day was categorized as low sedentary behavior.

Results: In current study prevalence of High Screen Time and unhealthy diet was around 83% and 60% respectively. Around 25% had habit of taking breakfast regularly while less than 30% were taking meal without fail. Screen Time found to be associated significantly with physical activity $p < 0.01$, gender ($p = 0.01$) and diet $p < 0.01$.

Conclusion: Screen Time was found to be associated significantly with physical activity, gender and type of diet, whereas it has no role to play with phases of adolescence.

Approval of ethics committee: Institutional Ethical committee, American International Institute of Medical Sciences, Udaipur, Rajasthan, India

Keywords

- adolescent
- screen time
- physical activity
- dietary pattern

Contribution

A – the preparation of the research project
B – the assembly of data for the research undertaken
C – the conducting of statistical analysis
D – interpretation of results
E – manuscript preparation
F – literature review
G – revising the manuscript

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Introduction

The term adolescent has been defined as any person between the age group of 10 and 19 years.[1] It is marked as a critical period of human life because of the rapid physical and sexual growth.[2] Globally, adolescents comprises about two third of total population. In India, adolescents account for 20% of the country's total population.[3]

Physical activity (PA), described as "any bodily movement produced by skeletal muscles that results in energy expenditure.[4] Familial aggregation of dietary intake, physical activity, and sedentary behavior patterns has been indicated by various literatures. However, the studies and results are heterogeneous and it is not possible to draw a clear conclusion.[5] For a healthy lifestyle, the World Health Organization (WHO) recommend 60 min of moderate-to-vigorous daily PA for children and adolescents and low levels of recreational screen time (ST).[6]

Technological advances in recent decades have increased the interaction of adolescents with screen-based technologies while reducing their relationship with nature and others.[7] Screen Time defined as time spent using or watching televisions, computers, phones and other electronic devices. By the time children reach adolescence, screen time soars to 7.5 hours per day with more than one-fourth spent with media multitasking.[8] Access to electronic devices and their presence in life is inevitable and concerns about the consequences of long-term Screen Time (ST), especially in adolescents, are growing.[9] The widespread use of portable electronic devices and the normalization of screen media devices in the bedroom is accompanied by a high prevalence of insufficient sleep, affecting a majority of adolescents.[10,11]

The adolescents have the unhealthiest diets of all age groups, and most adolescents do not meet the national guidelines for physical activity (PA), spending too much time being sedentary.[12] Besides the influence of screen time on PA levels, there is evidence that adolescents who spend more time using screens tend to have a lower intake of fruits and vegetables and higher consumption of energy-dense snacks.[13,14] These behaviours can lead to obesity and increase the risk of a range of non-communicable diseases (NCDs) such as diabetes, cancer, and heart disease in later life.[15] Moreover, as compared to Western populations, in South Asian countries, higher prevalence and a decade earlier onset of Cardio Vascular Diseases were experienced owing to unique genetic predisposition and earlier exposure to risk factors.[16,17]

To the best of our knowledge there are very few studies taking into account the prevalence and magnitude of ST and its association with lifestyle behaviors such as eating habits, physical activity (PA) levels, and sleep patterns in adolescents. Most of these studies used unrepresentative samples and measured only conventional socioeconomic variables, which led to mixed results. So, it is critical to generate information which can assist in developing programs for adolescent lifestyle behaviours. With this background, current study was carried out to assess Screen Time, Physical Activity and dietary pattern among urban adolescents and to find out association of Screen Time with different variables. The study can help to customize ST recommendations and guide in policy making and interventions aimed at moderating the health risks associated with excess ST in adolescents.

Material and methods

A cross sectional study was carried out by Community Medicine Department, American International Institute of Medical Sciences (AIIMS), Udaipur, Rajasthan. After obtaining permission from Ethical committee to conduct the study, data collection was started. Adolescents participating in this study were approached for informed consent.

Study period: June–October 2019.

Study Subjects: The study population included adolescents aged 10 to 19 years who were permanent residents of the area and ready to give informed consent to be part of our study. Those not willing to participate in the study, mentally retarded, not able to respond to interview due to illness were excluded from the study.

Pilot study: Carried out by personal interview of 25 subjects sharing same socio-demographic and geographic conditions

Sampling technique: Multistage sampling method

Data collection: There are total five zones of Udaipur city. One ward was selected randomly by open Epi info software from each zone. Now, from each ward two societies were selected. From each society 25 participants were drawn randomly and final sample size of 250 was attained. Personal interviews were done with all the subjects defined under study protocol. Whenever necessary, family persons were communicated for further clarification and getting right information.

Study tool:

Screen time: The daily duration of screen exposure was assessed with the question: 'How long does you spend in using digital devices for ... on average,' followed by 3 items of purposes, including 'Study (attending online courses and finishing digital homework),'

'Amusement (playing computer/ mobile games)', and 'Leisure (chatting, reading, watching video).' According to the current recommendations based on self-reports and direct measurements,[23] a screen time of ≥2 hours/ day was categorized as high sedentary behaviour, whereas a screen time <2 hours/ day was categorized as low sedentary behavior.

Physical activity: The Leisure Time Exercise Questionnaire of Godin and Shephard was used to find out weekly Physical Activity score of study participants.

During a typical 7-day period (a week), how many times on the average do you do following kinds of exercise for more than 15 minutes during your free time. Strenuous (Heart beats rapidly), moderate (not exhausting) and mild (minimal effort)

Weekly leisure time Activity Score = (9 × Strenuous) + (5 × Moderate) + (3 × Light).

24 or more score was considered as active while 14–23 score interpreted as moderately active and less than 14 scores as sedentary .

Eating habits: Eating habits were investigated using self-administered questionnaire in which we asked about the food consumed by adolescents (healthy/ unhealthy) in last week, how many days in a week they have their breakfast and how many times in a week they miss their meals. was attained. Personal interviews were done with all the subjects defined under study protocol. Whenever necessary, family persons (parent/ guardian) were communicated for further clarification and getting right information.

Healthy diet: A diet which contains each of the following food groups: Carbohydrate, protein, fats and oils, green leafy vegetables, other vegetables, and fruits.

Statistical analysis: Data entry and analysis were done using MS Excel. Chi-square and Mann Whitney *U*-test was used to find out association.

Results

In current study 56.4% participants were male adolescents. Majority (42.8%) of study subjects were belonged to mid adolescence followed by early (39.6%) and late (17.6%) adolescent phases. Almost 32% adolescents had education up to primary followed by secondary (30.4%), higher secondary (21.6%) and college (15.6%) education. Distribution of study subjects according to their Socio-economical class was 14%, 19.2%, 25.2%, 22% and 19.6% from class I to IV respectively (Table 1).

Table 1. Socio-demographic profile of adolescents (N = 250)

Variables	Number	Percentage
Gender		
Male	141	56.4
Female	109	43.6
Age-group (years)		
Early adolescents (10–13)	99	39.6
Middle adolescents (14–17)	107	42.8
Late adolescents (18–19)	44	17.6
Education		
Illiterate	02	0.8
Primary	79	31.6
Secondary	76	30.4
Higher secondary	54	21.6
College	39	15.6
Socio-economic classification		
Class-I	35	14.0
Class-II	48	19.2
Class-III	63	25.2
Class-IV	55	22.0
Class-V	49	19.6

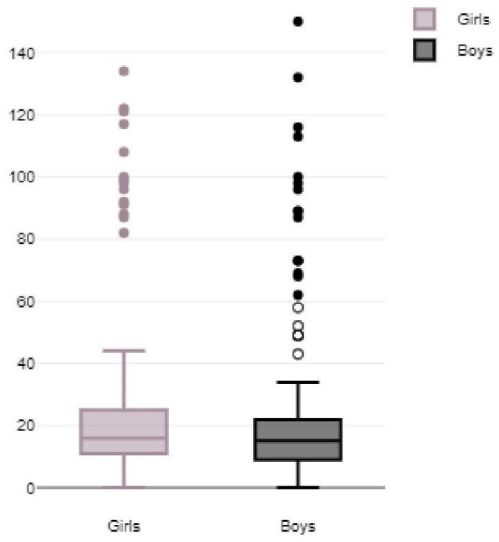

Figure 1. Gender dispersion of physical activity score

Figure 1 shows positive skewness and normal distribution of scores among girls and boys respectively. There was no difference found between physical activity score of these two groups.

Table 2 shows dietary pattern of adolescents. Consumption of unhealthy food during last week was found in almost 60% study participants. The prevalence of unhealthy diet was more in boys as compared to girls. Among all the study subjects, 41% boys and 45% girls had never taken their breakfast. Very few (29% boys and 20%girls) were having their breakfast regularly. Whereas only 26.24% boys and 33.94% girls were taking their meals without miss. All differences in this table were not statistically significant

Table 2. Association between gender and dietary pattern of adolescents (N = 250)

Dietary pattern	Male (n = 141) N (%)	Female (n = 109) N (%)	*P* value
Foods consumed by adolescents in last week			
Unhealthy food	84 (59.57)	61 (55.96)	0.56
Healthy food	57 (40.43)	48 (44.04)	
Consumption pattern of breakfast among adolescents			
Daily	41 (29.08)	22 (20.18)	0.32
3–4 days/ week	22 (15.60)	16 (14.68)	
1–2 days/ week	20 (14.18)	22 (20.18)	
Never	58 (41.14)	49 (44.96)	
Pattern of missing meals among adolescents			
Never	37 (26.24)	37 (33.94)	0.17
1–2 times/ week	56 (39.72)	46 (42.20)	
3–4 times/ week	48 (34.04)	26 (23.86)	

According to the current recommendations based on self-reports and direct measurements, in current study 83% adolescents found with Higher Screen Time (>2hours/ day) whereas only 17% had low screen time (<2 hours/ day) (Figure 2).

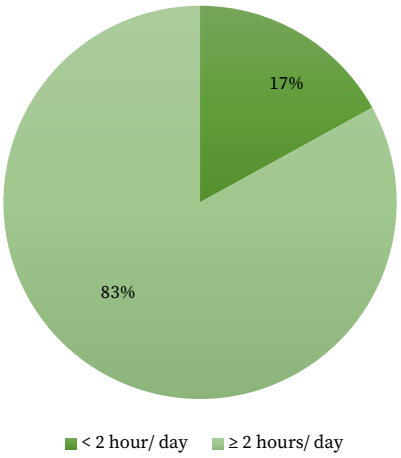

Figure 2. Distribution of adolescents according to screen time exposure per day (N = 250)

Table 3 shows Mean Physical Activity Score in two different groups of adolescents, one is with Screen Time <2 hours/ day and other with ≥2 hours/ day. Here we have tried to find out association between physical activity score of adolescents and their screen time. The result shows statistically significant difference between physical activity score of adolescents and their screen time. Those having high screen time (≥2 hours/ day) has lower physical activity score as comparatively.

Table 4 explains almost 88% male and 76% female had >2 hours of screen time exposure per day. This association was found to be statistically significant ($p = 0.01$). Screen time was constantly higher (>2 hours/ day) in early (76.77), middle (85.98) and late (88.64) adolescence. But this difference was not observed significant ($p = 0.11$). More than 84% adolescents with screen time of more than two hours per day were not active physically. Most of the adolescents with screen time of less than two hours per day were found active (67.44%). These differences were found statistically significant ($p < 0.01$). Most of the adolescents with screen time of two or more hours per day had followed unhealthy

Table 3. Association of screen time with physical activity score

Physical activity score	Screen Time <2 hours/ day Mean (SD)	Screen Time >2 hours/ day Mean (SD)	Mean of ranks	*U*	*Z*	*P* value
Total	68.07 (44.38)	16.56 (12.45)	125.5	1488	−6.86	<0.00001
Active (≥24)	93.52 (29.16)	38.57 (15.87)	31.5	91.5	−5.45	<0.00001
Moderately active (14–23)	20.67 (3.14)	16.33 (2.30)	52.5	97.5	−2.73	<0.006
Sedentary (<14)	11.37 (1.49)	7.29 (2.66)	42.5	59	−3.72	<0.0002

dietary pattern and this association was found to be statistically significant ($p < 0.01$). At the same time, adolescents with less screen time had adopted healthy pattern of food consumption (60.47%) comparatively.

Table 4. Association of screen time with different variables (N = 250)

Variables	Screen Time (hours/ day)		*P* value
	< 2 hours/ day (n = 43) N (%)	>2 hours/ day (n = 207) N (%)	
Gender			
Male	17 (12.06)	124 (87.94)	0.01
Female	26 (23.85)	83 (76.15)	
Adolescence			
Early	23 (23.23)	76 (76.77)	0.11
Middle	15 (14.02)	92 (85.98)	
Late	05 (11.36)	39 (88.64)	
Physical activity			
Active	29 (67.44)	33 (15.94)	0.00
Moderately active	06 (13.95)	98 (47.34)	
Sedentary	08 (18.61)	76 (36.72)	
Diet			
Unhealthy diet	17 (39.53)	128 (61.84)	0.00
Healthy diet	26 (60.47)	79 (38.16)	

Discussion

In this study, we investigated ST and its impact on diet and physical activity. To our best knowledge, there are only few studies examining this kind of association. A healthy diet is not only determined by its quality but also by its quantity. So in current study we also considered number of days per week in which adolescents have their meals and breakfast.

The prevalence of healthy diet was around 40% in this study which is very low. This might indicate inadequate information about the constituents of a healthy diet among the guardians of the children. In our study, only one fourth adolescents had breakfast regularly. A point of concern, however, was that around one fourth boys and one third girls were taking their meals regularly. They missed their meals due time constrains, ill health, lack of appetite, or disliking the food served. On asking, most of the adolescents didn't mentioned good and common sources of energy (such as milk, ghee, wheat, bajri, rice, and pulses) and vitamins (such as green leafy vegetables, fruits, and carrots) as healthful foods. Girls could correctly point out certain cooking/ food preparation practices which led to the reduction in nutritive value of the food items, for instance, excessive washing of rice grains. Some admitted getting more attracted towards fast foods than homemade foods, especially when they were out with friends. We noticed a big gap between their knowledge and practice. Despite knowing the harmful effects of unhealthy food habits, they continued to eat junk foods and the reasons being their taste preferences and strong desire to do so. Another barrier to proper healthy food habit was lack of time due to their busy schedule. Another study relating to dietary patterns of adolescents found that the food habits during adolescence were affected by the opportunities they had of eating with peers away from their families.[18]

Most guardians felt that adolescents paid more attention to their looks; among girls to remain slim and attractive whereas among boys to appear well-built. Due to such incorrect beliefs, they did not adopt healthy eating habits. [18]

The proportion of students who had Screen Time (ST) >2 hours/ day in this study was found to be 83%. The higher ST was found in late adolescence as compared to early and mid adolescence. This might be because parents are likely to have given them a smart phone of their own at later age. Given that young people at college have higher educational levels and are likely to possess more electronic products, they may be more susceptible to ST exposure. A study of physical activity and obesity trends reported by Sigmundova et al. showed that, over a period of ten years, the time spent with sedentary activities increased and the level of physical activity decreased in childhood and adolescence.[19]

Consumption of unhealthy diet was found in almost two third adolescents with more Screen Time in our study. A study from Japan recorded almost all smart phone users spent about 2 hours/ day with their smart phones. More hours per day of mobile phone use was associated with occasionally skipping breakfast.[20] In current study, higher ST was found in males. This result was contradictory to the findings of study by Xiaoyan Wu et al.[21]

Only One fourth adolescents in current study were found physical active. This is in contrast to a study conducted at China where the prevalence of PA was higher as compared to our study.[22] In our study we found association between ST and PA which is supported by a study by Greca et al.[23] This might be owing to spending hours in front of the screen keeps students seated and limits them from getting the physical activity that they need. In present study less PA was found in late adolescents as compared to early and middle adolescents, which is in line with the study by Gonc et al. and Decelis et al.[24,25] This might be explained by the fact that parents can associate lower academic achievement at school with the time that they spend outside the home, which might be a barrier for older boys and girls to engage in more physical activity.

As such, the findings suggest that Indian adolescents are physically inactive. This could be due to the fact that they are so overburdened with academic work and higher ST that they do not find the time to engage in any form of physical activity. Moreover, in our country, there is the culture of private tuitions where the parents want to provide their children with an extra boost in their academic performance. The Centre for Disease Control and Prevention states that adolescents who are physically active tends to have better grades, school attendance, cognitive performance, and classroom behaviors. Therefore, being physically inactive is counter-productive. Another reason may be ascribed to some schools not having adequate resources and facilities for the students to play and engage more in activities related to physical fitness. Family plays an important role in physical activity practice in childhood and adolescence.[26] There is still a need to promote physical activity and discourage usage of screen in childhood and adolescence and for that the data from our study can help to develop interventions for this population.

Conclusion

In our study unhealthy dietary pattern was more prevalent. More than half subjects have had unhealthy food during last week. Only one fourth have habit of taking their breakfast regularly and less than one third were taking their meals without fail. More than three fourth adolescents have high Screen Time (ST) (>2 hours/ day). Screen Time was found to be associated with gender, physical activity and type of diet, whereas it has no role to play with phases of adolescence. So, increasing awareness among adolescents regarding healthy eating is of prime importance. Educating them about the ill-effects of sedentary lifestyle will be beneficial in helping them to be more active and reducing their Screen Time especially in male.

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