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The relationship between screen time and overweight/obesity among adolescents in Addis Ababa, Ethiopia

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Abstract

The study aimed to ascertain how screen time and adolescent overweight/obesity relate to one another. A school-based cross-sectional study was conducted among adolescents in Addis Ababa, Ethiopia. The sample size was calculated using the single population proportion formula, and the final sample size was 550. Data was collected using interviewer-administered questionnaires. SPSS software version 20 was used to perform descriptive statistics, bivariate analysis, and multivariate logistic regression analyses. The study found that the mean screen time in the study population was 4.12.2 hrs. per day, and the prevalence of overweight and obesity was 12.3% and 1.85%, respectively. Female sex, high socio-economic status, high screen time, eating habits while watching TV, and physical activity were found to have a significant association with overweight/obesity. This study demonstrated a 53.7% prevalence of screen time above the recommended amount and a positive association between longer periods of screen time and overweight/obesity among adolescents in Addis Ababa. Parents and adolescents should be aware of this association and encouraged to involve their children in other forms of recreational activity.

Keywords: adolescents, obseity, physical activity, screen time

How to Cite:

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Background

The World Health Organization defines adolescents as anyone aged 10 to 19 years. It is a transition period from childhood to adulthood. More than 1.2 billion adolescents are living worldwide, and more than 90% live in developing countries (1). Adolescents make up more than one-third of Ethiopia's population (2). Adolescence is a period of rapid growth and development. And even if it is assumed to be the healthiest period of human life, many health-related problems that affect most of the adult and older population start to appear during childhood and adolescence, and among those problems, obesity is one of the major ones. Obesity is currently a global issue. The 2013 Lancet report shows that currently more than 2.1 billion people in the world are overweight or obese, and more than 600 million of them live in Africa. The report shows that the prevalence of overweight/obesity in developing countries among adolescents is more than 13% (3).

A study conducted in Addis Ababa in 2014 showed that the prevalence of overweight and obesity among high school students was 9.7% and 4.2%, respectively. The prevalence is higher among females (9.4% and 0.8) than males (5.4 and 1.1) (4).

Even though different genetic and environmental factors have been known to cause an increase in obesity, lifestyle factors such as unhealthy food, reduced physical activity, and sedentary behavior, including watching television, are potential risk factors for obesity in adolescents (5). Screen time is currently the most common form of recreational activity among adolescents in urban settings. It is also thought to be linked to overweight or obesity due to its negative impact on total energy expenditure, disruption of physical activity, exposure to unhealthy food advertisements, and increased calorie intake while watching TV (6).

Even if there is an increase in the prevalence of overweight/obesity and screen time among adolescents, which is the possible cause of the increase in the prevalence of overweight/obesity, there is no adequate information on the prevalence of screen time and its association with overweight/obesity in Ethiopia. Because public health programs and intervention designs must be more effective in reducing overweight and obesity, common risk factors that have received little attention in the past, such as screen time, must be better understood and researched.

Method

A school-based cross-sectional study was conducted from March 15 to April 30, 2018, in Addis Ababa, which is the capital and largest city of Ethiopia.

Study population

All adolescents living in Addis Ababa who were learning in governmental and non-governmental secondary schools during the data collection period were targets for the study. Adolescents with visible physical deformities were excluded from the study because the anthropometric measurement is difficult to apply to this group.

Sample size and sampling

The sample size was determined by taking the prevalence of adolescents who spent more than 2 hours on screen (above the daily recommendation) 65.5 (7) with a 5% marginal error, a design effect of 1.5, a 95% CI, and a non-response rate of 5%. Based on this assumption, the final sample size was 550. A multi-stage sampling technique was used to select study participants. 15 secondary schools were selected randomly by lottery. A sample of 550 students was distributed proportionally between governmental

and non-governmental schools by considering the number of students in each school.

Data collection tools and procedures

Interviewer-administered questionnaires were used to collect data using face-to-face interviews. The questionnaire consists of information on demographic and socioeconomic characteristics, which was adopted from the Ethiopian Demographic and Health Survey (EDHS) (8), Dietary intake was assessed by using food frequency questionnaires (FFQ), which were adopted from the Helen Keller International FFQ and used previously in Ethiopia to assess the dietary practices of adolescents; screen time among adolescents was assessed by questionnaires adopted from validated adolescent sedentary activity questionnaires, and physical activity questionnaires were adopted from the global physical activity questionnaires (GPAQ). The questionnaire was first developed in English and translated into the local language (Amharic). To check for consistency, the questionnaire was translated back into English.

Anthropometric measurements

Height was carried out using a wooden height measuring board with a sliding head bar, and the reading was noted to the nearest 0.1 cm.

The adolescent's weight was measured with an electronic personal weighing system and recorded to the nearest 0.1 kg.

The WHO growth reference was used as a standard reference for classifying adolescents based on BMI for age using WHO Anthro Plus software.

Three data collectors with a minimum qualification of a diploma in health-related fields were supervised by one health officer.

Data management and analysis

Data were coded, manually checked by the principal investigator, then entered and cleaned by Epi Data software version 3.1, exported to SPSS version 20, and statistical tests were performed. The WHO growth reference was used as a standard reference for classifying adolescents based on BMI for age using WHO Anthro Plus software version 1.0.4.

Principal component analysis (PCA) was conducted to convert the asset information into latent factors, and the first PCA explaining most of the variation was taken as a wealth score. The wealth score was divided into 5 wealth quintiles (least, second-least, middle, fourth, and highest).

The Global Physical Activity Questionnaire (GPAQ) analysis guide was used to assess the physical activity level of study participants. Total physical activity was classified into three categories based on WHO recommendations for adolescents: high (TPA 60 minutes per day), moderate (TPA 30 minutes per day), and low (TPA 30 minutes per day). Low (30 minutes per day) and Medium (30-59 minutes).

Descriptive statistical analysis was conducted using frequency, percentage, mean, median, and p-value to describe the study population by explanatory variables and BMI for age (BAZ) status.

Binary logistic regression was done to investigate the association between explanatory variables and outcome variables. Variables with a p-value < 0.2 on the bivariate regression analysis and important variables for the objective of the study based on the literature review were entered into the multivariate model.

Finally, multivariate logistic regression was used to statistically adjust the estimated effects of each variable in the model. The multicollinearity of the independent variables was also checked by a

variable of influence factor (VIF), and no variables had a VIF greater than two. Finally, an adjusted odds ratio with a 95% CI and a p-value less than 0.05 was used to declare a statistically significant association.

Results

Socio-economic characteristics.

Out of the sampled 550 adolescent students, a total of 540 participated in this study with a response rate of 98.2%. The mean age of the respondents was 16.8 ± 1.27 yrs. of which 40.2% were between the age of 14-16 yrs. and 59.8% of them are from 17-19 years. There were 263 (48.7%) male and 277 (51.3%) female respondents, and all are from grades 9-12. Out of the total respondent, 75.1% of the respondent's fathers and 58.6% of respondents' mothers attended more than secondary school. (Table1)

Table 1: Socio-demographic characteristics of adolescents in Addis Ababa, 2018

Variable	Frequency	Percent (%)
Sex		
Male	263	48.7
Female	277	51.3
Age (year)		
14-16	217	40.2
17-19	323	59.8
School type		
Governmental	274	50.7
Non-governmental	266	49.3
Father educational status		
No formal education	52	9.6
Primary school (1-8)	67	12.4
Secondary(9-12)	188	34.8
Above secondary (some college and above)	233	43.1
Mother educational status		
No formal education	93	17.2
Primary school (1-8)	118	21.9
Secondary(9-12)	178	33.0
Above secondary (some college and above)	151	28.0
Socioeconomics index.		
Lowest	120	22.2
Second lowest	98	18.1
Middle	105	19.4
High	109	20.2
Highest	108	20.0

Screen time The study shows that the mean screen time in the study population was 4.1±2.2 hrs. per day. A total of 290 (53.7%) of the students reported spending two or more hours on screen time activities per day, whereas a total of 23.1% reported spending five or more hours on screen time activities per day. Boys reported 4.0± 2.2 hours of screen time activities per day, whereas the girl's reported spending 4.3 ± 2.2 hours per day (Table 2).

Adolescents attending non-governmental schools and Female adolescents spent more time on screen (Table 3)

The study found that 30.6 % of participants spent 2-5 hrs. on screen & 23.1% spent more than 5 hrs. Among adolescents who participate in the study 204 (37.8%) have a habit of eating foods while watching TV and 271 (51.2%) watched food advertisements at least once a day. (Table4)

Table 2 *prevalence of screen time among male and female adolescents in Addis Ababa, 2018*

Screen time (hour)					
sex of adolescent	N	Minimum	Maximum	Mean	Std. Deviation
Male	263	0.15	10.00	4	2.2
Female	277	0.15	10.00	4.3	2.2

Table 3 *Screen time activity based on age and sex and school type among secondary school adolescents in Addis Ababa, 2018*

Variables		Screen time			
		>2 hrs.			
≤ 2 hrs.		Number	Percent		
Number					
Percent					
Sex of respondent	Male	133	50.6	106	49.4
	Female	117	44.9	160	55.1
school type	Governmental	149	54.4	125	45.6
	Non-governmental	101	38.0	165	62

Table 4 *Prevalence of screen-related activity, number of Televisions, TV in the sleeping room, watching fast food advertisements, and eating habits while watching among adolescents in Addis Ababa, 2018*

Variable		Frequency	Percent
Screen time	≤ 2 hrs.	250	46.3
	2-5 hrs.	165	30.6
	>5 hrs.	125	23.1
Habit of eating while watching TV	Usually	197	36.5
	Sometimes	178	33.0
	Never	165	30.6
TV in the sleeping room	Yes	95	17.6
	No	445	82.4
Food advertisement	Daily	271	50.2
	Not daily	269	49.8

1.1.1 Physical activity and screen time

The median physical activity per day among the respondents was 51.2 minutes. Among participants with high screen time (>2hrs.), the median total physical activity was 42.9 minutes which was lower than adolescents with low screen time (63.0 minutes per day). Among total adolescents, 46.1% of the study participants met the WHO recommendation of daily physical activity (60 minutes of physical activity per day) and were classified as having high levels of TPA while the rest were insufficiently active and classified as moderate (30-59 minutes) and low (<30 minutes) TPA per day which accounts for 32.6% and 21.3% respectively. Adolescents with high screen time spent less time on physical activity than those adolescents with low screen time. (Table 5)

Table 5 Physical activity level and sedentary behavior of adolescents with screen time in 2018

Variable		Physical activity					p-value
	Low		Moderate		High		
	Number	Percent	Number	Percent	Number	Percent	
Screen time	≤ 2hrs.	130	56.3	73	45.1	47	
	>2 hrs.	101	43.7	89	54.9	100	p <0.0001
							32
							68

Screen time and overweight/obesity

The overall magnitude of overweight and obesity was 14.2% (12.3% and 1.85% for overweight and obese adolescent respectively) and it was higher in adolescents who spent >2 hrs. on screen than those who spent <2 hrs. (6% versus 21.4%) (fig.1). The total prevalence of adolescents who spent greater than 2hrs. (above the recommended) on-screen is 53.7% and it is 44.4%, 51.4%, and 80.3% for underweight, normal, and overweight/obese adolescents respectively (fig.2). The prevalence of overweight/obesity is higher among adolescents who spent higher time on screen than those adolescents with low screen time (23.4%, 33.8%, and 42.9% for low, moderate, and high screen time respectively). Showing that as the time spent on screen increases, the magnitude of overweight and obesity also increase (fig. 3).

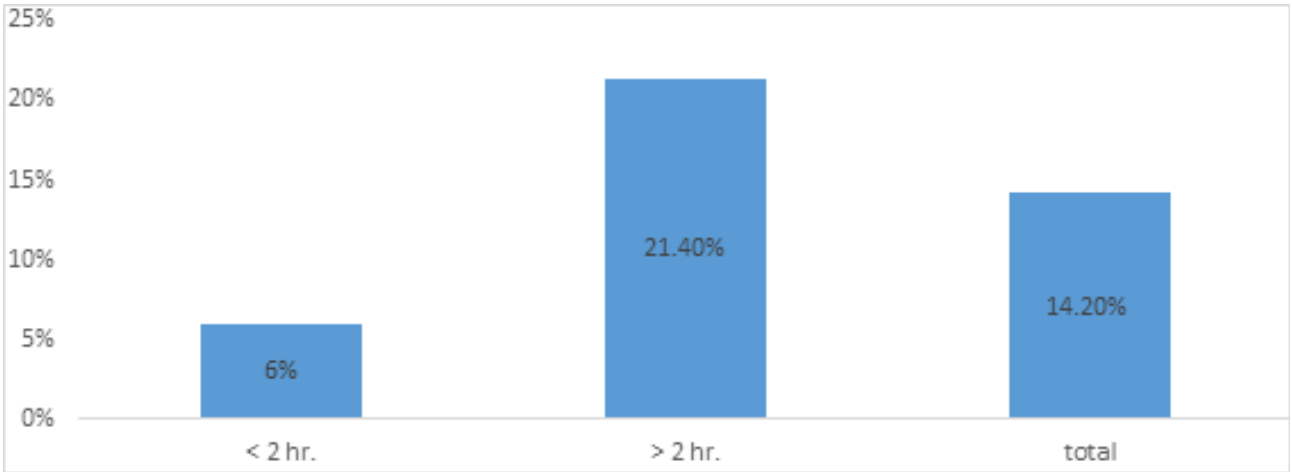


Figure 1 Prevalence of overweight/obesity among adolescents with high and low screen time in Addis Ababa, Ethiopia 2018

Figure 2 percentage of screen time based on BMI among adolescents in Addis Ababa, 2018

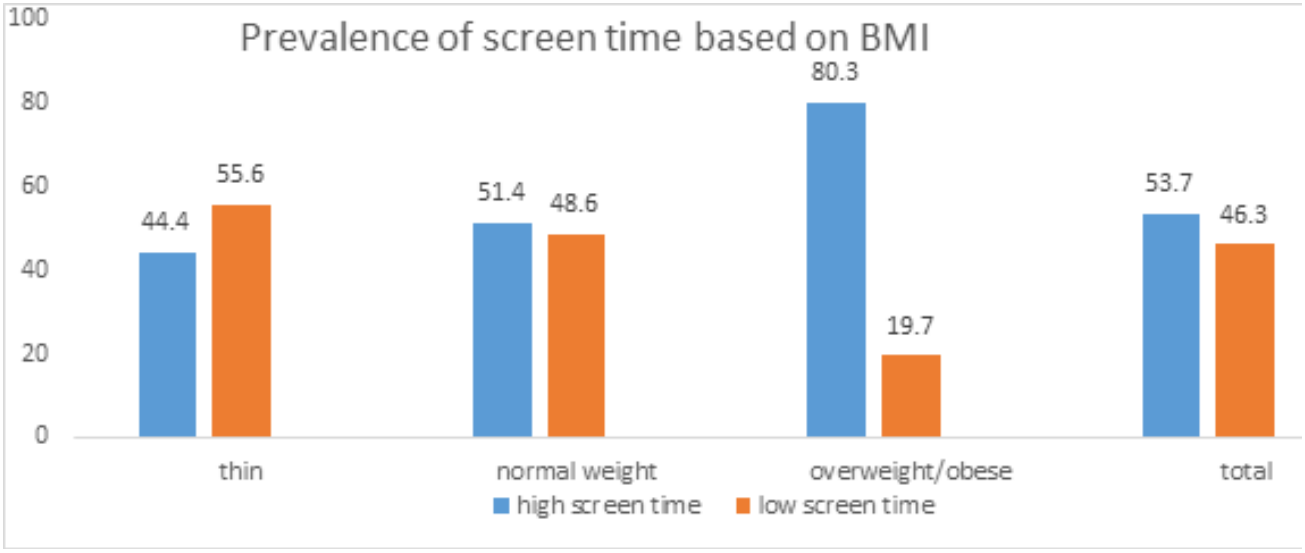
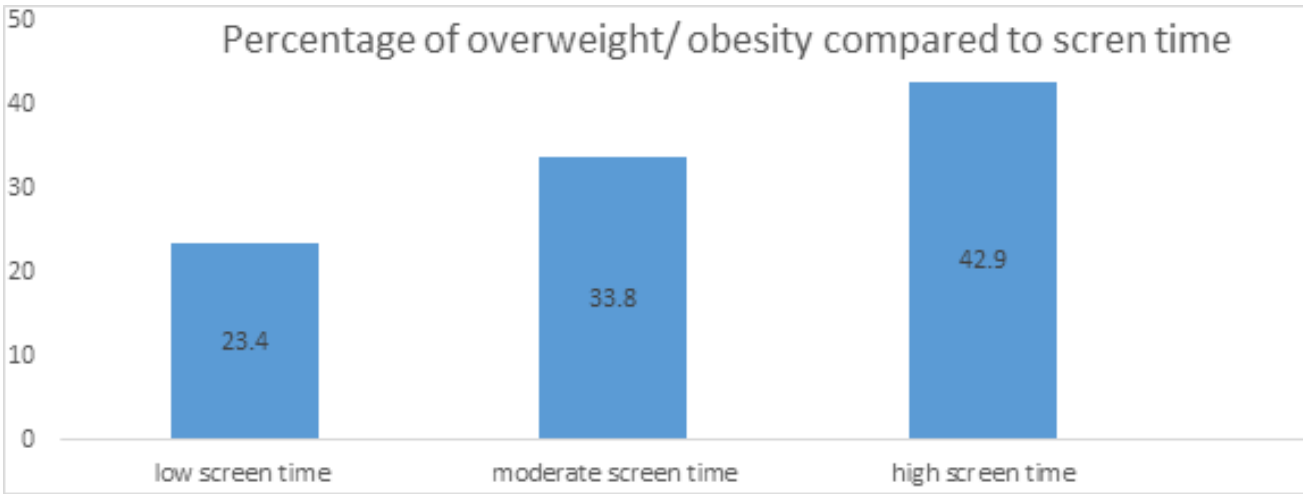


Figure 3 Comparison of overweight/obesity with screen time among adolescents in Addis Ababa,



Adolescents with high screen time had 3 times higher odds of being overweight/obese than those with low screen time, AOR (95% CI) = 3.01 (1.53-5.90).

The odds of being overweight/obese in those adolescents who have a habit of eating while watching TV were significantly higher than those who do not have a habit. AOR (95% CI) = 4.05 (1.83-9.03). Similarly, adolescents who watch food advertisements at least once a day had 2.69 times higher odds of being overweight/obese with AOR (95% CI)=2.69(1.45-4.967) (Table 6).

Table 6.Multivariate analysis showing an association between screen time and overweight/obesity among adolescents in Addis Ababa, 2018

Variables	Overweight/obesity				COR (95% CI)	AOR (95% CI)
	Yes		no			
	count	%	count	%		
Sex						
Male	27	10.3	236	89.7	1	**1**
Female	50	18.1	227	81.9	1.93 (1.17-3.18)	**1.90 (1.05-3.43)***
Socio-economic status						
Lowest	10	13	110	23.8	1	1
Second lowest	12	15.6	86	18.6	1.535 (0.633-3.720)	1.84 (0.68-4.95)
Middle	17	22.1	88	19		
Middle high	19	24.7	90	19.4	2.125 (0.927-4.873)	2.35 (0.90-6.16)
Highest	19	24.7	89	19.2	2.322 (1.028-5.245)* 2.348 (1.039-5.306)*	2.43 (0.94-7.62) **2.86 (1.06-7.73)***
Screen tim e						
≤2 hrs.	15	6	235	94	1	**1**
>2hrs.	62	78.6	228	21.4	4.26 (2.36-7.70)	**3.01 (1.53-5.90)***
Eating while watching TV						
Rarely	16	9.7	160	90.3	1	1
Sometimes	24	13.5	154	86.5	1.45 (0.74-2.84)	1.14 (0.34-3.77)
Usually	37	18.8	149	81.2	2.15 (1.15-4.03)	**4.05 (1.83-9.03)***
TV in the sleeping room						
No	67	15.1	378	84.9	1	1
Yes	10	10.5	85	89.5	0.66 (0.33-1.34)	093 (0.41-2.10)
Watching food advertisement						
Not daily	22	28.6	247	53.3	1	**1**
Daily	55	71.4	216	46.7	2.86 (1.69-4.84)	**2.69 (1.45-4.967)***
Total physical activity						
Low	33	22.4	114	77.6	1	1
Moderate	23	14.2	139	85.8	0.57 (0.32-1.03)	0.83 (0.28-2.46)
High	21	9.1	210	90.9	0.35 (0.19-0.63)	**0.27 (0.13-0.59)***

* = statistically significant

Discussion

The study revealed a high prevalence of screen time above the recommended amount among adolescents in Addis Ababa. In the present study, 53.7% of adolescents spent more than 2 hours on screen.

It was found that female adolescents were found to have higher odds of being overweight and obese than male adolescents which is consistence with other research done in the study area (4, 7, 9, 10). This could be because female adolescents had higher odds of participation in sedentary activity than male adolescents including screen time. It also can be explained by behavioral differences between the two sexes in which males are more physically active than females and also those who watch a lot of televised sports may also participate in sports, which mitigates the effect of sedentary behavior on BMI (11). It can also be explained by physiological differences and timing of puberty between the two sexes in which female adolescents are particularly vulnerable to an increase in body weight than males (11).

Adolescents in the highest wealth quintile also had higher odds of being overweight/obese than those in the lowest wealth quintiles. Which was consistent with the findings of other studies done in the country (7, 12). But this result contradicts the study done in developed countries (13-15) this could be because different unhealthy foods which are rich in calories but poor in their nutrient are affordable at a low price than those healthy foods which makes it easy to access for adolescents with low economic status and prone them to overweight/obese (14, 16).

The study also reveals that there is a high prevalence (53.7%) of screen time activity among adolescents above the recommended amount. This finding is higher than other findings done in the same area (10, 17, 18). This difference could be due to the difference in measurement in which the previous studies measure only one component of screen time (TV) and fail to assess and measure other forms of screen activity whereas the present study assesses and measure a different form of screen-related activity. And also, the present study used validated ASAQ while the previous literature measured by using a single component (one questioner) to measure TV time.

The present study found that screen time was significantly associated with overweight/ obesity. There was also a dose-response effect relationship between time spent on screen and overweight/obesity among adolescents in which there is a 43% increase in the prevalence of overweight for the additional 2 hrs. increase in screen activity and a two-fold increase in the prevalence of overweight/obesity for the adolescents who watch a screen for more than 5 hrs. per day. This result is consistence with the finding of other literature (13, 19-21)

Adolescents who participate in high physical activity daily had 0.27 odds of decreased in being overweight/obese than adolescents with low physical activity. This evidence is supported by other two researches (15, 21) but contradicted by research done in other areas in which the study state that independent of physical activity level adolescents who have high screen time had higher odds of being overweight and obese (13). This difference could be due to the difference in measurement of physical activity in which the current research and the above two research uses the WHO recommended measurement of physical activity (at least 60 minute daily moderate to vigorous physical activity) obtained from GPAQ but the last literature uses question adapted from other sources.

The possible mechanism for the above association could be explained by the amount of time spent in a screen-related activity that increases the adolescents' sedentary behavior and could also be the reason for the displacement of physical activity. This decrease in physical activity led to a decrease in energy expenditure and positive energy balance in individuals which result in weight gain and ultimately led to overweight and obesity (15, 21, 22).

Adolescents who watched food advertisements more than once a day had 2.69 times higher odds

of being overweight/obese than adolescents who do not watch food advertisements on a daily base. Which is consistent with other research done in the study area (4, 9). And also with research done in another country (23). The above association could be due to the reason that children and adolescents are an important population group for the food industry through the direct purchase of foods "primary market" or through influencing their families' decision in food purchasing "influence market". And the content of the media mainly food advertisements, have a significant effect on adolescents eating habits and their food preference through the promotion of unhealthy food, commercials, and other programs which encourage them to eat more (14, 16, 22, 23).

The study also found that those adolescents who had a habit of eating while watching TV or other screen had 4.05 times increased odds of being overweight and obese than those adolescents who does not have such a habit. This evidence is supported by other literature done in the study area (9) and also by other literature done in other countries (12).

The above association could be due to the food preference of adolescents in which the commonest food which is preferred by adolescents during screen time is fast foods and soft drinks which are rich in calories but poor in their nutrient content (23, 24). That causes an increase in energy intake through snacking and "mindless eating," that is lack of attention to the consumption of food due to external cues in the environment (screen). Study shows that adolescent consumes significantly more food when watching films, and TV programs or stay longer in other means on screen than when they weren't watching these programs (22).

The other thing is that adolescents who participate in screen time activity during mealtime consume fewer fruits and vegetable and their food preference and consumption for fast food and soft drink is higher than those who did not participate in high screen activity which makes those adolescents who participate in high screen-related activities associated with being overweight more than those adolescents who do not participate in those activities (22).

1.1 Strengths and limitations of the study

This research study tried to address a neglected but important public health issue of adolescents. And as of the researcher's knowledge, the study is the first of its kind in the country due to this reason it can motivate different researchers to do more investigation on the area and can also serve as a reference for future investigators. But due to the nature of the cross-sectional study, we cannot infer causality from the findings, there is also a potential for recall and social desirability bias in the frequency of dietary habits, physical activity, and sedentary behavior. The study also does not provide information on the content of media use.

Conclusion and recommendations

This study demonstrated a high prevalence of screen time above recommended amount and also a positive association with overweight/ obesity among adolescents in Addis Ababa with an apparent dose-response effect. So, there should be the promotion of participation in physical activity to prevent weight gain and separately, to tackle the factors (excess mobile phone usage, non-participation in sports, and excessive weight) that appear to be conducive to participation in sedentary behaviors such as screen time. Furthermore, youth centers and schools should encourage opportunities for low/no-cost physical activities

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References

1984.:85. W. Programming for adolescent health and development. Technical Report Series. WHO. 1984.:85.

CSAo. The 2007 Population and Housing Census of Ethiopia. May 2007.

Lancet. t. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013.

Chere BGaA. Prevalence of Childhood Overweight and Obesity and its Determinant Factors Among Elementary School Children in Addis Ababa, Ethiopia: A Cross Sectional Study. Nutritional Disorders & Therapy. 2015.

Reilly JJ AJ DA, Emmett PM, Ness A, Rogers I, et al. Early life risk factors for obesity in childhood. BMJ 2005.

Maher C OT EJ, Dollman J. Screen time is more strongly associated than physical activity with overweight and obesity in 9- to 16- year-old Australians. Acta Paediatr. 2012;101.

Tesfalem Teshome Psadm. Prevalence and Associated Factors of Overweight and Obesity Among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia. Current Research in Nutrition and Food Science. 2013; 1(1).

Agency ECS. The 2011 Ethiopia Demographic and Health Survey Ethiopian Central Statistical Agency. 2011.

Askal T YT, Bekri M and Getachew TG. Prevalence and Associated Factors of Overweight and/or Obesity among Primary School Children in Bole Sub-City, Addis Ababa, Ethiopia. Journal of Nutrition & Food Sciences.5(5).

Yoseph Gebreyohannes SS, Balem Demtsu, Gessessew Bugssa. Nutritional status of adolescents in selected government and private secondary schools of Addis Ababa, Ethiopia. International Journal of Nutrition and Food Sciences. 2014;3(6).

Irene Braithwaite AWS, Robert J. Hancox, Richard Beasley, Rinki Murphy, Edwin A. Mitchell, the ISAAC Phase Three Study Group". The Worldwide Association between Television Viewing and Obesity in Children and Adolescents: Cross- Sectional Study PLoS ONE.8(9).

Zelalem Alamrew Anteneh MG, Kidist Nigatu Tekletsadek,Meseret Tsegaye,4 and Dagmawi Alemu. Risk Factors of Overweight and Obesity among High School Students in Bahir Dar City, North West Ethiopia: School Based Cross-Sectional Study. Advances in Preventive Medicine. 2015;1.

Aoife Lane MH, and Niamh Murphy. Screen Time Increases Risk of Overweight and Obesity in Active and Inactive 9-Year-Old Irish Children: A Cross Sectional Analysis. Journal of Physical Activity and Health. 214;11.

Barbara A. Dennison TAEaPLJ. Television Viewing and Television in Bedrooms Associated With Overweight Risk among low income preschool children. American acadamy of pediatrics. 2002;109.

French DCRJaS. Television viewing, physical inactivity, and obesity. International Journal of Obesity.23.

Altman JVHaCE. Competitive Food Sales in Schools and Childhood Obesity: A Longitudinal Study. American Sociological Association. 2012;85(23):29.

Yoseph Gebreyohanne SS, Balem Demtsu, Gessessew Bugssa. Nutritional status of adolescents in selected government and private secondary schools of Addis Ababa, Ethiopia. International Journal of Nutrition and Food Sciences. 2014;6(3):11.

Emana Alemu AA, Mezgebu Yitayal and Kedir Yimam. Prevalence of Overweight and/or Obesity and Associated Factors among High School Adolescents in Arada Sub city, Addis Ababa, Ethiopia.

Nutrition & Food Sciences. 2014;4(2).

Diane M Jackson KD, Joanne Stewart, and John R Speakman. Increased television viewing is associated with elevated body fatness but not with lower total energy expenditure in children. the American journal of clinical nutrition. 2009;89.

Hege Kristiansen PeBJu1, Geir E Eide, Mathieu Roelants, Robert Bjerknes. TV viewing and obesity among Norwegian children: the importance of parental education. Acta Paediatrica. 2012;102.

JC Eisenmann RB, DT Smith2, GJ Welk and Q Fu. Combined influence of physical activity and television viewing on the risk of overweight in US youth. International Journal of Obesity 2008;32.

Rebecca Boulos a, Emily Kuross Vikre a, Sophie Oppenheimer a, Hannah Chang b, Robin B. Kanarek. ObesiTV: How television is influencing the obesity epidemic. Physiology & Behavior. 2012;107.

Bargh JLHaJA. The Relationship between Television Viewing and Unhealthy Eating: Implications for Children and Media Interventions. National institute of health. 2009 October; 24(7).

Anna Rosiek NFM, Krzysztof Leksowski Aleksandra Rosiek-Kryszewska 4 and Łukasz Leksowski. Effect of Television on Obesity and Excess of Weight and Consequences of Health. International Journal of Environmental Research and Public Health. 2015;12:9408.