Original Article

Correlation between excessive exposure of screen and obesity in adolescent

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ABSTRACT

Objectives: Obesity has become a worldwide problem in both developed and developing nations. The objective of this study was to investigate the correlation between screen exposure and obesity in adolescents of Karachi aged 10 to 19 years, examining the relationships between screen time, physical activity levels, and body mass index.

Study design: This cross-sectional study was conducted on the generalized population of Karachi including individuals from various socioeconomic backgrounds, ages, and genders aged 10-19 years using a questionnaire. Screen time was categorized as acceptable (≤7 hours/week), borderline excessive (14-21 hours/week), or excessive (>21 hours/week). Physical activity was classified as passive, moderately active, or active.

Results: A cross-sectional study of 350 adolescents (192 males, 158 females) aged 10-19 explored the relationship between screen time, physical activity, and obesity. Most participants had acceptable screen time (64.1% males, and 77.8% females). Regression analysis revealed a significant positive relationship between screen exposure and BMI ($p<0.066$), indicating that increased screen time is associated with higher BMI. Physical activity was not a significant predictor. The model explained 16% of BMI variance. These findings suggest that reducing screen time may help mitigate obesity in adolescents.

Conclusion: The study reflects a weak positive correlation between excessive exposure to screens and obesity in children and adolescents and may affect one's physical health. However, In the year 2021 confounding variables like the recent lockdown during COVID-19, small sample size, and limited population may cloud the result.

KEY WORDS: Obesity, adolescents, screen time, body mass index.

INTRODUCTION

Obesity has emerged as a critical public health issue worldwide, affecting both developed and developing nations. It is characterized by excessive fat accumulation that poses health risks. Body mass index (BMI), defined as weight (kg) divided by height squared (m^2), is the standard measure for obesity classification.[1] Overweight and obesity rank as the fifth leading cause of mortality, contributing to approximately 3.4 million deaths annually. Major contributing factors include genetic predisposition, dietary habits, metabolic rate, and a sedentary lifestyle.

Children in low-income countries are 30% more likely to be obese than those in high-income countries. By 2025, the global number of overweight or obese children is projected to reach 70 million.2,3 Childhood obesity often persists into adulthood, increasing the risk of metabolic disorders. Screen time has drastically increased in recent years, replacing outdoor activities and reducing energy expenditure.4 Prolonged seden-

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tary behavior is linked to weight gain, insulin resistance, cardiovascular disease, and psychological disorders.

Obesity prevalence varies globally, with notable differences across regions. In Saudi Arabia, obesity affects 20% of males aged 5–9 years and 24% aged 10–14, while the rates among females are even higher at 40% and 41%, respectively.[5] In South Asia, including Pakistan, rapid urbanization, dietary transitions, and sedentary lifestyles contribute to rising obesity rates. The dual burden of early-life undernutrition and adult obesity increases the risk of non-communicable diseases (NCDs) such as hypertension and diabetes. Given these risks, a lower BMI threshold (≥23 kg/m² for overweight and ≥25 kg/m² for obesity) may provide a more accurate assessment of health risks in this population as suggested by WHO.[6]

Sedentary behavior, particularly screen time, is strongly linked to obesity in children. In the U.S., children aged 0–8 years spend over two hours daily on screens, while in western India, the average screen time for children aged 2–6 years is 2.7 hours per day.[7] The American Academy of Pediatrics (AAP) recommends limiting screen time to no more than two hours daily, yet studies indicate prolonged screen exposure, particularly TV viewing, increases the likelihood of obesity.[8,9] Globally, obesity prevalence is above average in Central Europe, Denmark, Japan, France, Norway, and Sweden, while rates are lower in Australia, Canada, Ireland, New Zealand, Spain. Additionally, in most countries, obesity is more prevalent among boys than girls, except in the UK and the U.S., where the trend is reversed.[10]

As limited data is available from Pakistan, therefore we conducted this study to investigate the correlation between screen exposure and obesity in children and adolescents of Karachi aged 10 to 19 years, examining the relationships between screen time, physical activity levels, and body mass index.

METHODOLOGY

This cross-sectional study was conducted to assess screen time and its potential association with obesity among a diverse population in Karachi from March to June 2020. Data collection was carried out using a structured online questionnaire, which included demographic information, lifestyle habits, and screen time assessment. A convenience sampling method was employed to ensure broad participation across different socioeconomic backgrounds. The estimated sample size was 350 or more, calculated with a ±5% margin of error and a 95% confidence level, ensuring sufficient statistical power for meaningful analysis.

Table-I: Frequency of screen time among study participants.

Screen Time	*Male*	*Female*
< 7 HOURS	64.60%	77.85%
> 7 < 14 HOURS	31.77%	18.35%
> 14 <21 HOURS	4.17%	0.63%
> 21 HOURS	0%	3.16%

Screen time was classified into three distinct categories: acceptable (≤7–14 hours per week, equivalent to 1–2 hours per day), borderline excessive (14–21 hours per week, ~2.5 hours per day), and excessive (>21 hours per week, ≥3 hours per day). The classification was based on established guidelines and prior studies linking prolonged screen exposure to adverse health outcomes. Data analysis was performed using SPSS software version 23.0, employing both descriptive and inferential statistical methods to examine correlations between screen time and obesity-related factors. Key statistical tests included chi-square tests for categorical variables and logistic regression models to adjust for potential confounders such as age, gender, and physical activity levels.

RESULTS

This cross-sectional study included 350 children and adolescents aged 10 to 19 years from diverse regions of the city. The sample consisted of 192 males and 158 females. Among male respondents, 64.1% reported a screen time of ≤7 hours/week, while 31.8% fell within the 7–14 hours/week range, considered acceptable. Additionally, 4.2% of males had borderline excessive screen time. Among female participants, 77.8% reported ≤7 hours/week, while 18.4% had 7–14 hours/week of screen time. Only 0.6% of females were classified as borderline excessive, and 3.2% had excessive screen time (>21 hours/week). (Table-I)

Physical Activity and Screen Time Analysis: Based on screen time and activity levels, 74.7% of adolescents were categorized as moderately active, reporting screen time of ≤7 hours/week with <4 hours of physical activity. In

Table-II: Frequency of Physical activity among study participants.

Physical Activity	*Passive*	*Moderately Active*	*Active*
SCREEN TIME < 7 HOURS	79.67%	16.67%	3.66%
SCREEN TIME >7<14 HOURS	61.11%	28.89%	10.00%
SCREEN TIME >14<21 HOURS	11.11%	33.33%	55.56%
SCREEN TIME >21 HOURS	40%	40%	20%

Table-III: Correlation between Screen time and obesity Regression.

Hypothesis	*Regression Weights*	*Beta coefficient*	*R2*	*F*	*T value*	*P-value*	*Hypothesis Supported*
H1	SE Obesity	0.491	0.016	2.743	2.319	0.021	Yes
H	PA Obesity	-0.512	0.016	2.743	-1.040	0.299	No

contrast, 25.25% were very active, engaging in moderate-to-vigorous physical activity for >7 hours/week while maintaining screen time of ≤7 hours/week. Additionally, 21.4% of adolescents were classified as very passive, with screen time exceeding 21 hours/week and <4 hours of moderate-to-vigorous activity. The remaining 78.5% were slightly active, reporting >21 hours/week of screen time but engaging in >7 hours/week of physical activity. (Table-II)

The study hypothesized a relationship between screen exposure (SE) and obesity, with BMI as the dependent variable regressed on SE and physical activity (PA). Results indicated that SE predicted BMI, $F(349) = 2.743$, $p = 0.066$, suggesting a marginally significant relationship ($b = 1.138$, $p = 0.066$). However, PA did not show statistical significance in predicting BMI. The model accounted for 16% of BMI variance ($R^2 = 0.16$), emphasizing the potential role of screen exposure in obesity risk. (Table -III)

DISCUSSION

Obesity and overweight are complex, multifactorial, and potentially reversible conditions that affect over one-third of the global population today.[1-3] Various lifestyle factors contribute to the rising prevalence of obesity, including dietary habits, physical activity levels, and sedentary behaviors such as prolonged screen time. In this study, data were collected on different forms of screen exposure, including video gaming, computer use, mobile phone usage, and television viewing, as well as physical activity patterns, to evaluate their impact on childhood weight gain.

Extensive research has been conducted to assess the association between screen time and obesity, with previous studies demonstrating that excessive screen exposure contributes to weight gain and that reducing screen time is associated with weight loss. Our findings reinforce existing evidence that screen time, particularly television viewing, is associated with increased body weight indices, independent of physical activity levels and access to screen-based technologies.

The implications of this study highlight the importance of parental intervention in managing children's screen time. Rather than passive consumption, engaging children in structured and interactive screen-based activities may serve as a preventive strategy against obesity. Furthermore, this study enhances our understanding of how screen media usage patterns can be effectively regulated to mitigate obesity risk.

A study conducted in Saudi Arabia reported a significant association between screen media use and increased BMI, with a stronger correlation observed in young girls.[2] However, our findings indicate that only 3.2% of females in our study population exhibited a notable increase in screen time. Additionally, while our study identified a marginal association between screen exposure and obesity, the correlation with physical activity levels was borderline and not statistically significant. In contrast, other studies have demonstrated a robust positive association between television viewing and weight gain. Regarding physical activity, the majority of students in previous studies engaged in outdoor activities for 30 minutes to 2 hours daily. In comparison, our study found that only 25.25% of adolescents participated in physical activity at an active level. These findings underscore the need for targeted interventions to promote healthier screen habits and increase physical activity among children and adolescents to reduce the burden of obesity.

Limitations of the study: There may be some possible limitations to this research. The population of Karachi is the only one studied in this study. The data was obtained from adolescents who self-reported their height and weight, many of the participants may not have known their exact weight and height because the survey was done online, skewing the results. There may be a chance that adolescents may overestimate their physical activity time. The weight status (underweight, healthy, overweight, or at risk of becoming overweight) was only computed using BMI which does not distinguish between fat and muscle weight/muscle mass. There was no information on critical confounders such as food or parental characteristics, or sleep time, and wrist, waist and hip circumference. As the study was done during lockdown period, people are more likely to spend more time in front of the television and participate in less physical activity than on normal days because they spend more time at home.

CONCLUSION

The study reflects a weak positive correlation between excessive exposure of screen and obesity in children and adolescents. However, the confounding variables like recent lockdown due to COVID-19, small sample size and limited population may cloud the result. However, it is evident with the study that spending a lot of time in front of screen can affect one's physical health.

Obesity is now considered a chronic disease requiring early intervention and management. Lifestyle modifications, including dietary regulation and increased physical activity, are crucial in mitigating associated health risks.

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REFERENCES

1. Rosiek A, Frąckowiak Maciejewska N, Leksowski K, Rosiek-Kryszewska A, Leksowski Ł. Effect of television on obesity and excess of weight and consequences of health. International journal of environmental research and public health. 2015 Aug;12(8):9408-26.
2. Al-Ghamdi SH. The association between watching television and obesity in children of school-age in Saudi Arabia. Journal of Family and Community Medicine. 2013 May 1;20(2):83-9.
3. Nwankwo F, Shin HD, Al-Habaibeh A, Massoud H. Evaluation of children's screen viewing time and parental role in household context. Global pediatric health. 2019 Sep;6:2333794X19878062.
4. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: causes and consequences. Journal of family medicine and primary care. 2015 Apr 1;4(2):187-92.
5. Aljassim H, Jradi H. Childhood overweight and obesity among the Saudi population: a case-control study among school children. Journal of Health, Population and Nutrition. 2021 Dec;40:1-9.
6. Nanan DJ. The obesity pandemic--implications for Pakistan. Journal of Pakistan Medical Association. 2002;52(8):342.
7. Varadarajan S, Govindarajan Venguidesvarane A, Ramaswamy KN, Rajamohan M, Krupa M, Winfred Christadoss SB. Prevalence of excessive screen time and its association with developmental delay in children aged< 5 years: A population-based cross-sectional study in India. Plos one. 2021 Jul 6;16(7):e0254102.
8. Ruangdaraganon N, Chuthapisith J, Mo-suwan L, Kriweradechachai S, Udomsubpayakul U, Choprapawon C. Television viewing in Thai infants and toddlers: impacts to language development and parental perceptions. BMC pediatrics. 2009 Dec;9:1-6.
9. Serrano-Sanchez JA, Martí-Trujillo S, Lera-Navarro A, Dorado-García C, González-Henríquez JJ, Sanchís-Moysi J. Associations between screen time and physical activity among Spanish adolescents. PloS one. 2011 Sep 1;6(9):e24453.
10. Sigmund E, Sigmundová D, Badura P, Kalman M, Hamrik Z, Pavelka J. Temporal trends in overweight and obesity, physical activity and screen time among Czech adolescents from 2002 to 2014: A national health behaviour in school-aged children study. International journal of environmental research and public health. 2015 Sep;12(9):11848-68.

Authors Contribution:

The authors confirm contribution to the paper as follows: conceived of the presented idea: Sualeha Rashid[1], Dr Humaira Aman Ali[3]; performed the computations: Sualeha Rashid[1]; Analysis and interpretation of results: Sualeha Rashid[1], Dr Humaira Aman Ali[3]; draft manuscript preparation Arshia Jamal[2], Aisha Hanif Sahar[4], Sualeha Rashid[1] and Sundus Sheikh[5] ; study conception and design: Aisha Hanif Sahar[4], Sundus Sheikh[5] ; data collection: Aisha Hanif Sahar[4], Sualeha Rashid[1], Sundus Sheikh[5], Arshia Jamal[2]; supervision: Dr Humaira Aman Ali[3]; All authors reviewed the results and approved the final version of the manuscript.

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