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Prevalence and factors associated with internet addiction among adolescents in urban public schools – A cross-sectional study from an internet de-addiction center in South India

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ABSTRACT

Background: The Internet has become an integral and indispensable part of the life of every human being. **Aims and Objectives:** The aim of this study was to estimate the prevalence and the factors associated with internet addiction (IA) in adolescents in urban public schools in South India. **Materials and Methods:** This is a cross-sectional study done in one boy's and one girl's school, in an urban area and included all the children from 8th to 12th standards from January 2023 to March 2023. The study tool used was Chen's IA scale (CIAS). Internet usage was broadly classified into three categories: 1: Social networking and gaming, such as Facebook, 2: Chat/messenger services such as WhatsApp, and 3: Streaming applications such as YouTube. Data were analyzed statistically using Statistical Package for the Social Studies Version 26.0. **Results:** On analysis of CIAS scores, the prevalence of IA was 7.95% (n = 692). A significantly higher number of boys had IA than girls (P = 0.008). On analysis of the body mass index, a significantly larger number of overweight participants were observed in adolescents with IA. There was no significant difference between the two groups regarding age (P = 0.13) or socioeconomic class (P = 0.66). Usage of social networking sites/gaming was associated with significantly higher CIAS scores (P = 0.003). Although the usage of the internet for streaming and chatting purposes was common, they were not associated with higher scores. **Conclusion:** IA is taking on new dimensions and is seen across all socioeconomic classes. Periodic screening, adequate treatment, and follow-up are important in nurturing physical and mental health of adolescents.

Key words: Adolescents; Problematic internet usage; Chen's internet addiction scale; Social media

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INTRODUCTION

The internet has become an integral and indispensable part of the life of every human being. It has wide applications in our daily life, from learning online to shopping, entertainment, and communication.[1] Recent technological advances such as 4G/5G networks and the introduction of affordable plans have made the Internet accessible to everyone. With the wider accessibility of the internet, the problems associated with it also started increasing. Unlimited and unrestricted access to the internet has led to problematic internet usage (PIU)/internet addiction (IA), especially among adolescents and young adults.[2] However, both the terms PIU and IA were not included in the international classification of diseases, 11th Revision, and the Diagnostic and Statistical Manual, 15th Revision, as there was no consensus in labeling them as a disorder.[3] The term IA was first proposed by Ivan Goldberg in

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1995, for pathological and compulsive internet usage.[4] The manifestations of IA are such as manifestations of substance abuse – salience, mood modification, tolerance, withdrawal, conflict, and relapse.[5] IA is often associated with severe impairment of physical and mental health and results in psychological disorders like depression.[6]

In India, the prevalence of IA varied from 0.7% to 8.7%.[7,8] A review from South-east Asia estimated the prevalence from 0% to 47.4%.[9] The wide variations in the estimations were due to the usage of different scales, study populations, and sampling techniques.[10] A study from China reported an increase in the incidence of IA after the COVID-19 outbreak.[11] There are many tools used to estimate IA, but the most used ones are Young's IA Test (YIAT), the young diagnostic questionnaire, Chen's IA scale (CIAS), and the IA Scale.[12]

Adolescence is a period of stress, due to numerous changes that happen in them – physical maturation, moving toward independence, increasing social and peer group interactions, and brain maturation.[13] Adolescence is also a vulnerable period for developing IA. Adolescents are easily fascinated by the internet and are mainly attracted to various social networking sites.[2] Although the internet offers numerous advantages, it is also associated with problems like IA in adolescents who have unlimited and unrestricted access to it. Understanding the magnitude of the problem, the Tamil Nadu government started Internet De-addiction Centers in all Government Medical College Hospitals in the state to provide rehabilitation to these children under the supervision of mental health experts in the year 2021.[14] These centers are attached to the district early intervention centers and function in close liaison with Rashtriya Bal Swasthya Karyakram team at the field level for case finding. A psychiatrist, pediatrician, and child psychologist are deputed to take care of the children with IA in these centers.

Many studies are available in India that describe IA in adolescents in private schools who have unlimited access to the internet and internet devices.[1,2,4,7] There are only a few studies that have estimated the prevalence of IA in public schools where the access to internet and internet devices will be limited. Understanding the prevalence of IA in them and the factors associated with them will help in formulating policies for the prevention of IA in them.

Aims and objectives

The aim of this study is to estimate the prevalence and the factors associated with IA in adolescents in urban public schools in South India.

MATERIALS AND METHODS

As part of active case finding by the Internet De-addiction Center of the study hospital, weekly campaigns were conducted in the schools. During the campaign, children were assessed for IA, and one-to-one counseling was given by a psychiatrist and child psychologist for those children with IA. Furthermore, all children were briefed about the ill effects of the internet. Those children having IA were followed up by the RBSK team regularly. During such weekly campaigns, we included two schools – one girl's and one boy's school in the urban area, for this study.

Study design, setting, and participants

This is a cross-sectional study done in two public schools, one boy's and one girl's, in the urban municipal corporation area and included all the children from 8th to 12th standards from January 2023 to March 2023. The children who self-reported or referred to the de-addiction center directly were excluded from the study. Assent from the children and informed consent from the parents was obtained. Parents and children who were not willing were excluded from the study. Institutional Human Ethics Committee approval (113/IEC/2023 dated January 05, 2023) was obtained. Permission from District Educational Officer was obtained. The caregivers were explained about the nature of the study in the local language.

Variables, case definitions, data management, and bias

The study tool used in this study was CIAS, which consists of a 4-point, 26-item, and self-reported questionnaire which measures the respondent's experience in the past 3 months.[15] It measures all five dimensions of IA, including compulsive use, tolerance, withdrawal, time management, and interpersonal relationship problems. CIAS has been validated and widely used in many studies since 2003.[16] A team of pediatricians, a psychiatrist, a child psychologist, a social worker, and a staff nurse visited the school and briefed the children about the questionnaire with the help of the teachers. The students were encouraged to fill in the responses by themselves and the students who had difficulties in understanding the questions were helped by the first author. Besides the CIAS questionnaire, sociodemographic details such as gender, age, income of parents, domicile, educational level of the parents, and occupation of parents were collected and tabulated. The data regarding the purpose of access to the internet, source of internet data, and gadgets used for the access were also collected. Internet usage was broadly classified into three categories: 1: Social networking and gaming, such as Facebook, 2: Chat/messenger services such as WhatsApp, and 3: Streaming applications such as YouTube. The socioeconomic class was categorized using

the Modified Kuppuswamy scale.[17] The height, weight, and body mass index (BMI) data of the participants were collected. BMI was classified as per revised IAP growth charts, 2015.[18] The children with a CIAS score of 64 and above were considered internet addicts and were referred to the Internet De-addiction Center. To avoid bias, the first author alone briefed the children about the CIAS and guided them in filling out the form.

Sample size calculation

The sample size was calculated using the formula $n=Z^2_{(1-\alpha/2)}X\sigma^2/d^2$, where σ denotes standard deviation, d denotes precision, and $Z_{(1-\alpha/2)}$ is the two-sided Z value for corresponding α. In the study of Ko et al., the reported prevalence of IA in adolescents assessed using CIAS is 19% (16%). Hence, to estimate the prevalence of IA, expecting a similar prevalence with an absolute precision of 3% and 95% of confidence interval, the required minimum sample size is 657 adolescent children. However, we included all the children who fulfilled the inclusion criteria during the campaigns in the selected two urban schools.

Statistical analysis

Data were analyzed statistically using Statistical Package for the Social Studies Version 26.0. All categorical data were presented using frequency and percentage and all continuous measurements were summarized using Mean±SD after assessing normality assumption. The association of demographic and other clinical characteristics was compared between children with and without IA using the Chi-square test. P-value will be considered significant at a 5% level of significance for all analyses.

RESULTS

The results are tabulated in Table 1.

There were 692 participants who formed the study group. The mean age of the study group was 15.7009±0.0831 years. The mean height and weight were 150.3309±0.761 cm and 47.1503±0.743 kg, respectively. About 70.85% of the study participants had normal BMI. The boys: girls ratio of the study group was 1:2.72. About 83% of the adolescents in the study group belonged to the upper lower socioeconomic class as per the Modified Kuppuswamy Scale and none were in the upper class. On analysis of the gadget usage, it was found that multiple gadget usage was common among the participants and 97.83% of the participants used mobile phones for access to the internet in the public schools and <10% of the participants used laptops or personal computers for internet access. On analysis of the purpose of internet access, it was found that multiple purposes were commonly cited by the participants, and about two-thirds of the participants were using the internet for video streaming and gaming purposes. On analysis of the route of internet access, about 98.98% of the participants used mobile data for internet access and only 1.44% used public facilities like internet centers. On analysis of CIAS scores, about 55 adolescents had scores of 64 and above, resulting in a prevalence of 7.95% for IA in the study group.

For the analysis of the factors associated with IA, the study population was divided into two groups, based on CIAS scores (Table 2). It was found that a significantly higher number of boys had IA than the girls in the study population (P=0.008). On the analysis of the BMI correlation between the two groups, a significantly larger number of overweight adolescents were observed in the adolescents with IA. There was no significant difference between the two groups regarding age (P=0.13) or socioeconomic class (P=0.66). Usage of social networking sites such as Facebook and gaming was associated with significantly higher CIAS scores (P=0.003). Although the usage of the internet for streaming purposes was common, they were not associated with higher CIAS scores. There

Table 1: Baseline characteristics of the study group (n=692)

Parameters	No	Percentage
Gender		
Girls	497	71.82
Boys	195	28.18
Age (years)		
14	158	22.83
15	91	13.15
16	243	35.11
17	200	28.90
Body mass index		
Underweight	18	2.60
Normal	491	70.95
Overweight	143	20.66
Obesity	40	5.78
Socioeconomic class		
Lower	45	6.50
Upper lower	577	1.89%
Upper middle	13	1.82
Lower middle	57	8.23
Gadget usage		
Mobile phone	677	97.83
Tablet	13	1.89
Laptop/personal computer	64	9.25
Purpose of internet access		
Social networking/gaming	271	39.16
Chat/messenger	491	70.95
Streaming	450	65.03
Source of internet		
Mobile 4G/5G	685	98.99
Landline	21	3.03
Internet center	10	1.44
Chen Internet addiction scale score		
< 63	637	92.05
≥ 64	55	7.95

Table 2: Factors associated with internet addiction

Parameter	CIAS<63 (n=637) (%)	CIAS>64 (n=55) (%)	P-value*
Gender			
Boys	171 (87.69)	24 (12.31)	0.008
Girls	466 (93.76)	31 (6.24)	
Body mass index			
Underweight	17 (94.44)	1 (5.56)	0.001
Normal	464 (94.50)	27 (5.50)	
Overweight	119 (83.21)	24 (16.79)	
Obese	37 (92.50)	3 (7.50)	
Age (years)			
14	139 (89.10)	17 (10.90)	0.13
15	85 (88.54)	11 (11.46)	
16	229 (94.23)	14 (5.77)	
17	184 (93.40)	13 (6.60)	
Socioeconomic status			
Lower	41 (91.11)	4 (8.89)	0.66
Upper lower	531 (92.02)	46 (7.98)	
Upper middle	11 (84.61)	2 (15.39)	
Lower middle	54 (94.73)	3 (5.27)	
Purpose of internet access			
Social networking/gaming	231 (85.23)	40 (14.77)	0.003
Chat/messenger	449 (91.44)	42 (8.56)	
Streaming	416 (92.44)	34 (7.56)	
Gadget use			
Mobile phone	618 (91.96)	54 (8.04)	0.99
Tablet	12 (92.30)	1 (7.70)	
Laptop/Personal Computer	59 (92.18)	5 (7.82)	
Source of internet			
Mobile 4G/5G	626 (84.37)	54 (15.63)	0.37
Landline broadband/Fibernet	8 (80.00)	2 (20.00)	
Internet center	19 (90.47)	2 (9.53)	

*Chi-square test

was no significant correlation between the CIAS scores and gadget usage (P=0.96) or route of data access (P=0.44). Similarly, there was no significant correlation between the CIAS scores and the parent's educational level (P value – father's: 0.838, mother's: 0.31) or occupation (P-value – father's: 0.702, mother's: 0.545).

DISCUSSION

Many studies have estimated the prevalence of IA among urban adolescents in private schools.[2] However, there were no studies estimating the prevalence of IA in public schools. A study by Reddick et al., in 2020 has demonstrated that a digital divide exists between higher and lower-income groups.[19] However, since then, there has been an increase in internet adoption among lower-income groups also due to lower internet tariffs offered by the service providers and the increased usage of the internet for educational activities during the COVID-19 pandemic. Hence, it is imperative to understand the prevalence and factors associated with IA in adolescents from lower-income groups also.

In the present study, the prevalence of IA was estimated to be 7.95%. There has been considerable heterogeneity in the prevalence due to the diverse study population. In a meta-analysis by Joseph et al., a pooled prevalence of 21.5% for moderate IA and 2.6% for severe IA was found.[2] The meta-analysis was done among the studies that have used YIAT and most of the studies analyzed included a greater number of students from private schools. The prevalence of IA was more common in boys than in girls in the present study. A similar higher prevalence was observed in a few other studies from India.[8,20] In the present study, we did not observe a significant difference in the prevalence between various age groups. However, a systematic review done on adult college students in India has shown a higher prevalence of 19.9%.[21]

In the present study, we observed a significant association between BMI and IA. The association between BMI and IA was demonstrated in many studies. In a systematic review of nine studies by Aghasi et al., a positive correlation was found between internet usage and overweight and obesity.[22] The mechanisms associated with overweight and obesity among internet addicts are complex and multifactorial. The possible mechanisms include a sedentary lifestyle, high snack consumption, and psychological problems such as anxiety or depression.[22]

In this study, we did not observe variations in the prevalence of IA among various socioeconomic classes. However, in a study by Mane et al., a higher prevalence of IA was observed among adolescents from higher socioeconomic classes.[23] However, in post-COVID-19 pandemic, internet usage has increased among students from all socioeconomic classes, and the digital divide is seen to be narrowing.[24] Hence, IA is a problem across all socioeconomic classes and needs to be addressed.

In the present study, though the usage of streaming and chat/messenger applications is high, they are associated with a significantly lesser frequency of IA than social networking/gaming applications. Similar observations were made in a study by Masthi et al., who reported a higher frequency of IA among Facebook users than WhatsApp users.[25] Social media addiction was observed in one-third of the study participants. Many other studies have also demonstrated the addiction potential of social networking sites and their health hazards.[26,27]

Limitations of the study

The limitation of this study is that it did not differentiate internet usage for educational and entertainment purposes.

CONCLUSION

IA is taking on new dimensions and is seen across all socioeconomic classes. The prevalence of IA observed in the present study done in a public school is comparable to other studies in private schools in India and developed countries. Furthermore, the significant association of overweight with IA in the present study is a warning sign of health hazards associated with IA. Periodic screening in the schools for IA with scales such as CIAS, adequate treatment, and follow-up of the adolescents with IA is important in nurturing the physical and mental health of adolescents.

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TP and SK- Definition of intellectual content, literature survey, prepared the first draft of manuscript, implementation of the study protocol, data collection, data analysis, manuscript preparation, and submission of an article; **AV-** Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; **MV-** Design of study, statistical analysis, and interpretation; **KiP-** Review manuscript; RC- Review manuscript; **KP-** Literature survey and preparation of figures; and **KKS-** Coordination and manuscript revision.

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