

RESEARCHARTICLE

INFLUENCE OF SCREEN TIME ON QUALITY OF SLEEP AMONG GENERAL **POPULATION – A CROSS SECTIONAL STUDY**

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Abstract

..... Sleep is a physiological state of reversible unconsciousness in which brain is less responsive to external stimuli. Among the various causes of sleep disturbances, increased screen time and exposure to lightemitting devices used during late hours plays a major role. With the pervasive use of digital screens in daily life, understanding their impact on sleep patterns is crucial. As Screen exposure increases, particularly before bedtime, it is hypothesized to disrupt sleep quality and duration, potentially affecting physical and mental health.

Objectives: To assess and evaluate the sleep quality and screen time among general population.

To find out the association between screen time and sleep duration.

Methods : A cross-sectional study was conducted in the community using respondent-driven sampling. A total of 310 participants were assessed using a semi structured questionnaire that included

demographic details and screen time usage. Sleep quality and quantity were measured using the Pittsburgh sleep quality index (PSQI).

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Results:-

Among the 310 participants, 50.3% were female and 49.7% were male, with a mean age of 27 + 9.33 years. 74% had poor sleep quality and 73.2% had screen time usage >2 hours per day. Social media (82%) and communication (71%) were the two areas where screen usage was found to be highly used. There is a significant association (p-0.001) between no of hours slept and screen time usage using chi square test (21.1). Independent t-test revealed a significant difference between screen time usage and sleep quality ((p-0.001).

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Conclusion :-

There is a significant finding for the association observed between duration of screen time and sleep quality, majority of respondents developed poor sleep quality. Individual's well-being and sleep quality can be improved by implementing awareness campaigns and technological improvements into practice.

Introduction:-

In the digital age, screen time has become an integral part of daily life across all age groups, including early adolescents.(1)The rapid growth of digital devices usage has significantly increased screen exposure for various purposes such as entertainment, education, and social interaction. While these technologies offer numerous benefits, there is increasing concern about their potential adverse effects on health.(2) Sleep is a vital, often neglected component of overall health and well-being. Adequate sleep is both a biological and psychological necessity essential for optimal cognitive function, emotional stability, and overall performance. Exposure to luminous light from the electronic devices will disrupt sound sleep by altering communication pattern between sleep—wake cycle and the internal clock.(3) Exposure to screen light during the night time can elevate alertness, suppress melatonin production, and cause a phase lag in the circadian clock leading to delayed sleep onset. (4) Inadequate sleep duration and poor sleep quality have been associated with several adverse cardiometabolicoutcomes including hypertension,(5)obesity, type 2 diabetes mellitus(6,7) and cardiovascular disease.(8) It is recommended adults aged 18 to 60 years obtain at least seven hours of sleep per night to maintain optimal health, although some young a dults may require more than nine hours.(9) Screen time (ST) refers to the duration spent using a device withscreens, such as a smartphones, computers, televisions, or video game console.(10) Sleep and screen time influence one another and it will significantly impact an individual's physical and mental wellbeing.

Screen usage may directly impact sleep by reducing sleep time due to its time-consumingnature. Additionally, it may interfere with sleep through increased psychophysiological arousal caused by the stimulating content, or through exposure to bright light emitted by screens.(11) Bright light may impact sleep in two primary ways: by delaying the circadian rhythm when exposure occurs in the evening and by causing an immediate physiological activation.(12) India has over 820 million active internet users across all age groups, highlighting the widespread of digital engagement.(13,14) However, despite this widespread usage, there is a lack of comprehensive research examining the relationship between screen time and sleep quality in the general population. This study aims to evaluate the association between screen time, sleep quality and sleep duration among the general population.

Methods:-

A cross sectional study was conducted in the community from May-June 2024 using the respondent driven sampling technique. Individuals who had access to google forms were included in the study.

The participants were assessed using a structured questionnaire comprising sections on demographic details, screen time usage details and the Pittsburgh Sleep Quality Index (PSQI). The PSQI includes seven components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction.

Statistical analysis

A total of 310 respondents participated in the study. The data were recorded in excel sheet and analyzed using SPSS 23.0 software. Chi-Square test and Independent t test was used to determine the association between screen time and sleep quality.

Results:-

Responses were obtained from 310 participants. Table 1 presents the demographic characteristics of the participants. Among the 310 respondents, 50.3% were female and 49.7% were male with a mean age of $27 \pm (9.33)$ years. In which 52.3% were employed, (2.6%) unemployed, (33.5%) student and (11.6%) homemaker. Among employed 69.8% worked general shift and 30.2% worked night shifts.

Type of screen majority of study participant used was mobile (95.8%) followed by Tv (55.6%), Laptop (49.2%) and others (Figure 1). As per PSQI score individual having high score of >5 was considered to have poor sleep quality. Majority (74%) had poor sleep quality. About 73.2% had >2 hours and 26.8% had <2 hours screen time usage per day (Table 2)

Purpose of screen used by majority of participant was for social media (82.3%), communication (71.1%), work (39.5%), academic (33.8%) and games (19%). The chi-square analysis ($\chi^2 = 72.927$, p=0.000) resulted a significant association between age and sleep quality (Table 3). Notably, 48.3% of individuals aged 26–35 years reported poor sleep quality representing the highest proportion among the different age groups. Sleep duration and screen time usage were also significantly associated (p-0.001) using chi square test (21.1) (table 4) Independent t-test resulted that there is a significant (p-0.001) mean difference between screen time usage and sleep quality. Error bar plot indicates that individuals who engage in more than 2 hours of screen time per day experience poor sleep quality. (Figure 2)

Discussion:-

Sleep is essential for maintaining a healthy and balanced lifestyle. It serves as acritical period for the body's maintenance and repair, during which accumulated metabolites are cleared, and mental stress and anxiety are relieved.(15) Exposure to light, particularly from screens causes a dose-dependent suppression of melatonin production, which in turn leads to sleep disruption.(16) Studies have documented that odds of an unhealthy lifestyle and subjective health complaints increase with the use of electronic media exceeding 1 hour per day.(17) The associated adverse effects on the health/lifestyle include sedentary behavior obesity, headache, reduced sleep duration, and dry eye(18)(19)

This study sought to assess and evaluate the sleep quality and screen time among general population and its associations with duration of sleep. Participants in the current study ranged in age from 16-51 years, with a mean age of 27 ± 9.33 years. Similarly, a study by Patel reported an age range of , 16-40 years for their participants.(20) In terms of gender distribution, male and female in the current study were nearly equal, comprising of 49.7% and 50.3% respectively. A similar distribution was also observed in Patel's study with 49.6% males and 50.3% females.(20)

Type of screen majority of the subjects was mobile (95.8%) followed by Tv (55.6%), Laptop (49.2%) and others. Cumulative percentage were calculated because majority of the participants reported using multiple gadgets. Koushik Yeluri found in their study that the most used gadget was the smart phone (100%), followed by laptops (78.7%) and Tablets (42.3%).(21)

Upon evaluating the sleep quality of participants, it was found that 74% had poor sleep quality according to PQSI. Several studies have reported similar findings om the adverse impact of excessive screen time on sleep patterns. Research by Hale and Guan reported that prolonged screen time particularly the use of electronic device like smartphones and computers was associated with reduced sleep duration and increased sleep disturbances among children and adolescents.(22)Similarly, a study by Cain &Gradisar highlighted the negative effects of screen exposure before bedtime on sleep onset latency and overall sleep quality, aligning with the association observed in our study.(17)Furthermore,continuous smartphone use for more than 1 hour had 5 times more chance of having a poor sleep quality, consistent with a prior research conducted on smartphone usage and sleep quality in a general population.(23)

The sample was restricted to individuals with internet access and the ability to complete online surveys, potentially excluding non-digital users or those with limited internet literacy. The use of self-reported data for screen time and sleep quality, may result in selection or recall bias asparticipants may under-report or over-report their behaviours, leading to potential inaccuracies in the data. To enhance the validity and generalizability of findings, further studies with a larger sample size and greater number of variables are recommended.

Conclusion:-

This study highlights the significant impact of screen time on sleep quality among the general population. A substantial proportion of participants (74%) exhibited poor sleep quality, with prolonged screen usage (>2 hours daily) being significantly associated with inadequate sleep duration and disrupted sleep patterns.

The lack of targeted government programs addressing sleep quality in India highlights an unmet public health need.Initiatives under the Ministry of Health and Family Welfare, such as Ayushman Bharat comprehensive primary health care through health and wellness center, focus on holistic healthcare and encompass components related to lifestyle and overall well-being.(24) Although not specifically targeted at sleep, these programs address factors that indirectly impact sleep quality as part of broader health promotion efforts. It is imperative to raise awareness about the importance of regulating screen time and promoting healthy sleep hygiene practices. Interventions such as blue light filters, screen time reduction programs, and mindfulness-based strategies to mitigate screen time may improve sleep quality and overall well-being.

Figure 1 - Type of screen used



Figure 2 - Error bar Plot of Sleep quality and Screen time



Screentime

Demographic factors	Frequency (n)			
Demogruphic fuctors	Percentage (%)			
	Tereenage (70)			
Cander				
Gender	154(40.70()			
Male	154 (49.7%)			
Female	157 (50.3%)			
Age				
16-22	138 (44%)			
26-35	118 (37.9%)			
36-45	39 (12.5%)			
46-51	16 (5.1%)			
Occupation				
Employed	162 (52.3%)			
Un-employed	8 (2.6%)			
Student	104 (33.5%)			
Homemaker	36 (11.6%)			
Shift basis of employed				
General shift	113 (69.8%)			
Night shift	49 (30.2%)			

Table-2 Distribution of sleep quality&screen time

Screen Time		Sleep Quality		
>2 hours	73.2 %	Poor	74 %	
< 2 hours	26.8 %	Normal	26 %	

Table 3 - Association between age and sleep quality

SLEEP QUALITY						
AGE	NORMA	L	POOR SLEEP		CHI SQUARE	P VALUE
(YEARS)	SLEEP				VALUE	
	Ν	%	n	%		
16-22	68	85%	70	30.4%		
					72.927	0.000
26-35	6	7.5%	111	48.3%	, _, _,	0.000
36-45	3	3.8%	36	15.7%		
46-51	3	3.8%	13	5.7 %		

SLEEP	SCREEN TIME				CHI SQUARE VALUE	P VALUE
DURATION	LESS THAN 2 HOURS		MORE THAN 2 HOURS			
	n	%	n	%		
LESS THAN 8 HOURS	67	81	219	96	21.116	0.0001
MORE THAN 8 HOURS	16	19	8	4		

 Table 4 - Association between sleep duration and screen time

Reference:-

1.Kamaruzihan N, Soe M. A comparative study: Impact of screen time on sleep quality among university students and school children. 2023 Feb 12;3:75–85.

2.Pandya A, Lodha P. Social Connectedness, Excessive Screen Time During COVID-19 and MentalHealth: A Review of Current Evidence. Front Hum Dyn [Internet]. 2021 Jul 22 [cited 2024 Jul 29];3. Available from: https://www.frontiersin.org/journals/human-dynamics/articles/10.3389/fhumd.2021.684137/full

3.Baby RS, Issac A, Vasudev A, Sabu DK, Gopika TS, Pal M, et al. Impact of Screen Time on Sleep Quality. Indian Journal of Psychiatric Nursing. 2021 Jun;18(1):29.

4.Wood B, Rea MS, Plitnick B, Figueiro MG. Light level and duration of exposure determine the impact of self-luminous tablets on melatonin suppression. Appl Ergon. 2013 Mar;44(2):237–40.

5.Guo X, Zheng L, Wang J, Zhang X, Zhang X, Li J, et al. Epidemiological evidence for the link between sleep duration and high blood pressure: a systematic review and meta-analysis. Sleep Med. 2013 Apr;14(4):324–32. 6.Depner CM, Stothard ER, Wright KP. Metabolic consequences of sleep and circadian disorders. Curr Diab Rep. 2014 Jul;14(7):507.

7.Cappuccio FP, D'Elia L, Strazzullo P, Miller MA. Quantity and quality of sleep and incidence of type 2 diabetes: a systematic review and meta-analysis. Diabetes Care. 2010 Feb;33(2):414–20.

8.Cappuccio FP, Cooper D, D'Elia L, Strazzullo P, Miller MA. Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies. Eur Heart J. 2011 Jun;32(12):1484–92.

9.Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, et al. Recommended Amount of Sleep for a Healthy Adult: A Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society. Sleep. 2015 Jun 1;38(6):843–4.

10.Definition of SCREEN TIME [Internet]. 2024 [cited 2024 Aug 6]. Available from: https://www.merriam-webster.com/dictionary/screen+time

11.Hysing M, Pallesen S, Stormark KM, Jakobsen R, Lundervold AJ, Sivertsen B. Sleep and use of electronic devices in adolescence: results from a large population-based study. BMJ Open. 2015 Jan 1;5(1):e006748.

12.Khalsa SBS, Jewett ME, Cajochen C, Czeisler CA. A phase response curve to single bright light pulses in human subjects. J Physiol. 2003 Jun 15;549(Pt 3):945–52.

13.internet usage: How India is using the Internet - The Economic Times [Internet]. [cited 2024 Nov 28]. Available from: https://economictimes.indiatimes.com/tech/technology/how-india-is-using-the-internet/orticleshow/108354854.cms

internet/articleshow/108354854.cms

14.(PDF) The Internet in India: Better Times Ahead? ResearchGate [Internet]. 2024 Oct 22 [cited 2024 Nov 28]; Available from: https://www.researchgate.net/publication/220426576_The_Internet_in_India_Better_Times_Ahead 15.Mendelsohn AR, Larrick JW. Sleep facilitates clearance of metabolites from the brain: glymphatic function in aging and neurodegenerative diseases. Rejuvenation Res. 2013 Dec;16(6):518–23.

16.West KE, Jablonski MR, Warfield B, Cecil KS, James M, Ayers MA, et al. Blue light from light-emitting diodes elicits a dose-dependent suppression of melatonin in humans. J Appl Physiol (1985). 2011 Mar;110(3): 619–26. 17.Mundy LK, Canterford L, Hoq M, Olds T, Moreno-Betancur M, Sawyer S, et al. Electronic media use and

academic performance in late childhood: A longitudinal study. PLOS ONE. 2020 Sep 2;15(9):e0237908. 18.Hale L, Kirschen GW, LeBourgeois MK, Gradisar M, Garrison MM, Montgomery-Downs H, et al. Youth Screen Media Habits and Sleep: Sleep-Friendly Screen Behavior Recommendations for Clinicians, Educators, and Parents.

Child AdolescPsychiatr Clin N Am. 2018 Apr;27(2):229–45.

19.Portello JK, Rosenfield M, Bababekova Y, Estrada JM, Leon A. Computer-related visual symptoms in office workers. Ophthalmic Physiol Opt. 2012 Sep;32(5):375–82.

20.Patel B, Pandya D, Prajapati B, Doshi O. Exploring the associations between screen time and sleep quality in adult residents of Ahmedabad: A cross-sectional study [Internet]. medRxiv; 2024 [cited 2024 Nov 27]. p.

2024.11.11.24315299. Available from: https://www.medrxiv.org/content/10.1101/2024.11.11.24315299v1 21.Yeluri K, Hs K, H BG, Bj SC. Electronic Gadget Screen-time, Perceived Sleep Quality & Quantity and Academic Performance in Medical Students. J Assoc Physicians India. 2021 Nov;69(11):11–2.

22.Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: a systematic literature review. Sleep Med Rev. 2015 Jun;21:50–8.

23.Alzhrani AM, Aboalshamat KT, Badawoud AM, Abdouh IM, Badri HM, Quronfulah BS, et al. The association between smartphone use and sleep quality, psychological distress, and loneliness among health care students and workers in Saudi Arabia. PLoS One. 2023;18(1):e0280681.

24.Operational_Guidelines_For_CPHC.pdf [Internet]. [cited 2024 Nov 28]. Available from:

 $https://www.nhm.gov.in/New_Updates_2018/NHM_Components/Health_System_Stregthening/Comprehensive_primary_health_care/letter/Operational_Guidelines_For_CPHC.pdf$