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Association Between Laptop use and Cognitive Functioning: An Observational Study.

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ABSTRACT: Introduction: Cognitive decline and dementia are major global health concerns. Pursuant to the premise behind the concept of "computer-related dementia," an excessive use of internet-connected gadgets and online resources might accelerate the progression of dementia in its early stages and result in cognitive deficits such as short concentration as well as memory span.

Objective: This study explores the association between prolonged computer use and cognitive decline, emphasizing the potential risks of "computer-related dementia."

Methods: An online observational survey was conducted among 1004 participants from Uttar Pradesh and Uttarakhand between January and March 2025, in compliance with the Declaration of Helsinki and reported in accordance with the CHERRIES (checklists for reporting results of internet E-surveys) guidelines. Results: Participants included 64.4% males, 30.05% females, and 5% transgender individuals, with most (59.6%) aged 15–25 years. Laptop usage varied: 48.7% did not use one, 29.1% used <1 hour/day, 17.6% used 3–5 hours/day, and 4.7% used >8 hours/day. Statistical analysis ($F = 3.501$, $p = 0.15$) revealed significant group differences, suggesting a link between extended screen time and impaired cognitive functioning.

Conclusion: As digital dependency grows; clinical pharmacists play a vital role in promoting cognitive health and mitigating technology-related cognitive risks.

INTRODUCTION:

Cognitive impairment, dementia is growing as a serious health concern globally [[WHO guideline](#)]. According to the theory underlying the term "digital dementia," excessive use of online resources and devices with internet connectivity can hasten the onset of early-onset dementia and cause cognitive impairments like diminished attention and memory span [Baek and Park, 2025]. The pervasive nature of digital screens over the last 10 years including smartphones, tablets, laptops, and high-definition televisions has entirely redefined the working manner of human being on basis of work, learn and even socialize [Hoehe and Thibaut, 2020]. Social networking has become the imperative part of everyday life especially for young adults. These platforms provide opportunities for connection as well as knowledge exchange; however, apprehensions have arisen regarding their possible effects on cognitive functions [Naik and Mathias, 2025].

A research investigation in year 2020 investigated the manner in which sedentary habits, such as watching TV and working on computer or laptop, increases the risk of dementia among general population [Raichlen et al., 2022].

As per the report of WHO published in 2025, the worldwide count of people with 60 years of age and older is expected to rise to about 2 billion by 2050, raising health concerns about the aging population on a global scale [Livingstone et al., 2020].

As per study published in 2023, researchers discovered evidence suggesting too much time spent on screens has detrimental effects on working memory and executive functioning, among other characteristics, in kids and teenagers [Muppalla et al., 2023].

An additional extensive study conducted and published in year 2023 examined the connection between sedentary activities involving screens and the risk of dementia in more than 462,000 participants. The researchers evaluated both television watching and computer use in this study. This study stated that, subjects with high television and screen time are on risk of developing cognitive impairment respectively [Yuan et al., 2023].

Although as per the study published in year 2018, it was stated that, memory impairment in dementia is not a diagnosable illness, there may be scientific support for the idea that excessive use of technology impairs cognitive function. In fact, a number of studies have discovered a connection between "screen time," internet use, and cognitive alterations [Moledina et al., 2018].

However, these devices make life easier and keep everything right at fingertips. Still, more and more research show that always being plugged in—especially at the wrong times—throws off basic processes in our bodies, especially sleep. And sleep isn't just downtime. Sleep fuels attention, executive function, memory, and our ability to learn. The light produced by screens in the evening of blue-rich color has been reported to inhibit melatonin release and modulate circadian rhythms, thereby shortening the sleep onset lag and sleep duration [Haghani et al., 2024].

Longitudinal cohort studies have also provided evidence to show that an ongoing laptop use is associated with higher levels of insomnia, daytime drowsiness and poor sleep quality [Chen et al., 2024].

Deprived sleep—whether it's just one rough night or a long stretch of poor rest—affects attention, memory, and ability to make decisions. Studies where researchers limit people to only four to six hours of sleep show clear drops in performance on neuropsychological tests. Additionally, sleep studies using polysomnography make it clear that deep sleep and REM phases help brain actually consolidates the acquired knowledge. Another pattern reveals, big population studies find both too little sleep (less than six hours) and too much (more than nine) are linked to worse cognitive performance [Ren et al., 2025].

While digital technology certainly makes life easier in countless ways, more and more evidence show that excessive screen time can slow down thinking, hurt our ability to focus, and even affect memory. Extensive use of mobile phones, tablets, and computers every day makes it especially crucial to study this issue closely. This research aims to address the relation between prolonged screen time and cognitive impairment. This majorly underline the need of our study, to assess the possible relation and further developing the possible intervention to fortify cognitive health and make it more comprehensive to check on possible underlying risk factors.

MATERIALS AND METHODS:

This online observational questionnaire-based study was conducted among general population. Across 1004 subjects were participated from Uttar Pradesh and Uttarakhand states in India. The study period spanned from 01 January 2025 to 31 march 2025. This study was conducted in compliance with the Declaration of Helsinki and reported in accordance with the CHERRIES (checklists for reporting results of internet E-surveys) guidelines. The study followed the guidelines and the informed consent was taken from participants before the participation into the study. The methodology includes a google form including approximately 30-35 open-ended general questions related to their day to day lifestyle. The questionnaire was validated from clinicians and senior academicians.

The questionnaire was sectioned into several sections; focusing on sociodemographic variables, working hours, sleep hours and questions related to forgetfulness, recall, and memory as referenced from MOCA and MMSE scale.

The data was collected using the questionnaire which was circulated through electronic methods like: emails, what's app and google form links. The subjects willing to participate, enrolled into the study by e-signing the informed consent form.

It is important to note that the study was limited by the lack of physical one to one interaction with the subjects enrolled. This restrain the enrollment of a greater number of subjects into the study. The study analyzed the important variables like:

- **Age:** Subjects were classified into five different categories from 15-85 years. This age classification includes the all three categories i.e. adolescents, adults, and older subjects.
- **Gender:** The three genders i.e. male, female and transgenders were included into the study to analyze the cognitive disparities among the genders.
- **Eating habits:** Eating habits either veg and non-veg diet pattern widely affect the sleep pattern and memory among both male and female genders [Ruopeng et al., 2019].
- **Occupation:** Occupation determines the time duration of laptop use as and the screen time use for the right analyzes of forgetfulness.
- **Laptop use:** The time duration of laptop usage is used as a primary analysis tool for determining the forgetfulness.

Data recorded was further analyzed for authenticity, an approx. 1201 subjects participated into the study but after scrutiny of authenticity and relevance 1004 subject's data was selected and further processed for result analysis.

Data was further interpreted in MS. Excel and significance was statistically analyzed using statistical package for the social sciences, version 26. ANOVA and variance were checked and the results were examined. Discrete variables were portrayed using pie charts and bar graphs while the continuous variables were represented using histograms. Additionally, measures of central tendency and other variables were estimated to constructively represent the distribution of feedback obtained from the subjects.

RESULTS

The study results estimated uneven distribution of gender having male participants as doubled form female participants and a smaller fraction of transgenders participated with 64.4% male and 30.05% identified as female and 5% subjects participated as transgenders. Participants based on age were distributed into seven categories, is as follows: 15-25 years (59.6%), 25-35 years (19.1%), 35-45 years (13.9%), 45-55 years (3.6%), 55-65 years (2.5%), 65-75 years (1.1%), and screen time among this group. Among 1004 participating subjects, 751 (74.8%) subjects were from Uttar Pradesh and 253 subjects participated from Uttarakhand. More than half subjects were students by occupation i.e. 597(59.5%) indicates high indulgence into digital devices, 215 (21.4%) subjects were private job employees, whereas 87 (8.7%) subjects were farmers, shopkeepers by occupation, 71(7.1%) subjects were govt. employees whereas the minimal number of participants were homemakers 34 (3.4%). [Table 1]

Table 1: Demographic Profile of Participants

Gender of Participants		
Variables	N (1004)	%
Male	647	64.4%
Female	306	30.5%
Transgender	51	5.1%
Age of Participants		
15-25	598	59.6%
25-35	192	19.1%
35-45	140	13.9%
45-55	36	3.6%
55-65	25	2.5%
65-75	11	1.1%
75-85	2	0.2%
State-wise distribution of subjects		
Uttar Pradesh	751	74.8%
Uttarakhand	253	25.2%
Occupation of patients		

Govt job	71	7.1%
Homemaker	34	3.4%
Other	87	8.7%
Pvt job	215	21.4%
Student	597	59.5%

As per the use of laptop on daily basis the study finds that majority of the subjects 489 (48.7%) stated no laptop use, 292 (29.1%) reported to less than 1-hour laptop use, 177(17.6%) reported laptop use for 3-5 hours daily whereas only 47 (4.7%) responded to laptop use for more than 8 hours. [Table 2]

Table 2. Participants description based on laptop use daily		
Variables	N	%
Approximate 3-5	177	17.6%
less than 1 hour	292	29.1%
More than 8 hours	47	4.7%
No laptop use	489	48.7%

This study analyzed the important correlation for analysis of Variance (ANOVA) A one Way among subject. Analysis of variance was done to test the effect of duration of using the laptops on the degree of forgetfulness. The respondents were divided in four groups based on the self-reported daily usage based on less than one hour, approximately 3–5 hours, more than eight hours, and no laptop use. The results indicated that there was a statistically significant difference between at least two groups with the F statistic of 3.501 and the p -value of 0.15. The mean square between groups (24.001) was far beyond the mean square within groups (6.848), which means that the difference seen could not be as a result of pure chance. [Table 3]

Table 3. ANOVA based on forgetfulness and laptop use					
Between Groups	72.003	3	24.001	3.501	0.15
Within Groups	6854.829	1001	6.848		
Total	6926.832	1004			

Post Hoc Analysis Since the omnibus F -test was significant, localization of specific inter-group differences was done by making post hoc comparisons using Tukey Honestly Significant Difference (HSD) procedure. The comparison revealed that there was a statistically significant difference between the forgetfulness scores of the participants whose time using laptops was bellow one hour and those whose time was about 3 to 5 hours ($p = .044$). Precisely, the average difference of the under 1-hour category compared to that of the 3-5 hours category stood at -0.669, with an average difference of 3-5 hours category at -0.31 to -0.03. These results indicate that moderate impaired recall is linked with limited use of laptops (less than an hour) in comparison with moderate use (3 to 5 hours). None of the other pairwise comparisons were statistically significant at the $\alpha = .05$ level. [Table 4]

Table 4: Post HOC analysis of laptop use and forgetfulness

(I) Laptop Use (J) Laptop Use		Mean Difference (I- J)	Std. Error	Sig.	95% ... Lower Bound
Approximate 3-5	less than 1 hour	-.669*	.249	.044	-1.33

less than 1 hour	More than 8 hours	.310	.429	1.000	-.83
	No laptop use	-.372	.230	.632	-.98
	Approximate 3-5	.669*	.249	.044	.01
More than 8 hours	More than 8 hours	.979	.411	.105	-.11
	No laptop use	.297	.194	.752	-.21
	Approximate 3-5	-.310	.429	1.000	-1.45
No laptop use	less than 1 hour	-.979	.411	.105	-2.07
	No laptop use	-.682	.400	.528	-1.74
	Approximate 3-5	.372	.230	.632	-.23
More than 8 hours	less than 1 hour	-.297	.194	.752	-.81
	More than 8 hours	.682	.400	.528	-.37
	Approximate 3-5	.372	.230	.632	-.23

Non-Significant Comparisons No extra pairwise comparisons were more than the standard significance of 0.05. The comparison of variance in the less than 1 hour and greater than eight-hour group did not exceed the conventional 0.083 standard, giving a mean difference of 0.310. In addition, no statistically significant differences were observed between no-laptop-use group, and any other cohort (including those with >8 hours use ($p = .372$) and having an average of 3-5 hours use ($p = .400$). The difference between high-use segment (>8 hours) and moderate-use segment (≈ 3 -5 hours) was also not significant ($p = .888$). [Table 5]

Table 5: Multiple pairwise comparison among forgetfulness and laptop use

(I) Laptop Use (J) Laptop Use		95% ... Upper Bound
Approximate 3-5	less than 1 hour	-.01
	More than 8 hours	1.45
	No laptop use	.23
less than 1 hour	Approximate 3-5	1.33
	More than 8 hours	2.07
	No laptop use	.81
More than 8 hours	Approximate 3-5	.83
	less than 1 hour	.11
	No laptop use	.37
No laptop use	Approximate 3-5	.98
	less than 1 hour	.21
	More than 8 hours	1.74

p has a significant influence on forgetfulness and this is clearly demonstrated by the fact that there is a significant difference between light and moderate users of laptops (less than one hour and 3-5 hours respectively). However, both high-usage (>8 hours) and zero-usage groups showed no more significant effects on recall than the other groups in the sampled population.

Discussion: The results of this study indicated that, the moderate laptop users were having significant forgetfulness as compared to no laptop users and subjects responded to laptop use less than 1 hour and laptop users using laptop for more than 8 hours respectively. A similar study was conducted in year 2019 on 323 subjects as per the frequency of their laptop

use. The results findings were the digital devices users were having high cognitive performance as compared to non-digital device users [Alhola et al., 2007]. Similarly, in our study the average laptop users were having more instances of forgetfulness as compared to high users and non-digital devices users.

The study findings indicate that, the moderate laptop users who are spending the time of 3-5 hours daily were having more instances of forgetting day to day tasks of forgetting wallet, keychain, car keys, and difficulty recalling names of people and difficulty memorizing indicate the forgetfulness which indicate cognitive impairment. It can be further assessed and interpreted that, the moderate laptop users may develop mild cognitive impairment in coming 5-10 years.

Limitation and Strength of study:

Strength: This study helps identify patterns of laptop use and potential cognitive concerns. the scope of research exclusively was to find the significance between laptop use and cognitive impairment narrowing its scope and framing way for future researches.

Limitation:

The study would have been the follow up study to check the cognitive functioning among general population as pre and post follow up results. This cross-sectional study restricts to analyze more in depth about cognitive impairment among population. Finally,

CONCLUSION:

Cognitive impairment has been growing as a major issue among all age strata which is a major risk factor for diseases like Alzheimer's. As a major concern in domain of public health it is a duty of clinical pharmacist to focus on this area as digital occupancy and use of laptops is increasing day by day which is gaining the dependency of general population in bigger ways. Thus, this research can encourage the people and health care professionals to opt for more healthier options to preserve and delay the symptoms like cognitive impairment.

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Author contribution:

Conceptualization, methodology, investigation, writing review and editing: **first author.**

Conceptualization, Resources & Supervision: **corresponding author.**

All authors have read and agreed to the published version of manuscript.

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REFERENCES:

- [1] Alhola P, Polo-Kantola P. Sleep deprivation: Impact on cognitive performance. *Neuropsychiatr Dis Treat.* 2007;3(5):553-67. PMID: 19300585; PMCID: PMC2656292.
- [2] An R, Liu G, Khan N, Yan H, Wang Y. Dietary habits and cognitive impairment risk among oldest-old Chinese. *J Gerontol B Psychol Sci Soc Sci.* 2019;74(3):474-483. doi:10.1093/geronb/gbw170.
- [3] Baek IH, Park EJ. 'Digital dementia' is on the rise. *Korea JoongAng Daily.* 2013 Jun 24 [cited 2025 Dec 12]. Available from: Korea JoongAng Daily
- [4] Chen Y, Li Y, Li S, He M, Chen Q, Ru T, Zhou G. When and what: A longitudinal study on the role of screen time and

- activities in adolescent sleep. *Sleep Med.* 2024;117:33-39. doi:10.1016/j.sleep.2024.03.008.
- [5] Haghani M, Abbasi S, Abdoli L, Shams SF, Baha'addini Baigy Zarandi BF, Shokrpour N, et al. Blue light and digital screens revisited: A new look at blue light from the vision quality, circadian rhythm and cognitive functions perspective. *J Biomed Phys Eng.* 2024;14(3):213-228. doi:10.31661/jbpe.v0i0.2106-1355.
- [6] Hoehe MR, Thibaut F. Going digital: How technology use may influence human brains and behavior. *Dialogues Clin Neurosci.* 2020;22(2):93-97. doi:10.31887/DCNS.2020.22.2/mhoehe.
- [7] Livingston G, Huntley J, Sommerlad A, Ames D, Ballard C, Banerjee S, et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *Lancet.* 2020;396:413-446. doi:10.1016/S0140-6736(20)30367-6.
- [8] Moledina S, Khoja A. Letter to the Editor: Digital dementia—Is smart technology making us dumb? *Ochsner J.* 2018;18(1):12. doi:10.1043/1524-5012-18.1.12.
- [9] Muppalla SK, Vuppapapati S, Reddy Pulliahgaru A, Sreenivasulu H. Effects of excessive screen time on child development: An updated review and strategies for management. *Cureus.* 2023;15(6):e40608. doi:10.7759/cureus.40608.
- [10] Naik VS, Mathias EG, Krishnan P, Jagannath V. Impact of social media on cognitive development of children and young adults: A systematic review. *BMC Pediatr.* 2025;25(1):826. doi:10.1186/s12887-025-06041-5.
- [11] Raichlen DA, Klimentidis YC, Sayre MK, Bharadwaj PK, Lai MHC, Wilcox RR, et al. Leisure-time sedentary behaviors are differentially associated with all-cause dementia regardless of engagement in physical activity. *Proc Natl Acad Sci U S A.* 2022;119(35):e2206931119. doi:10.1073/pnas.2206931119.
- [12] Ren Z, Mao X, Zhang Z, Wang W. The impact of sleep deprivation on cognitive function in healthy adults: Insights from auditory P300 and reaction time analysis. *Front Neurosci.* 2025;19:1559969. doi:10.3389/fnins.2025.1559969.
- [13] World Health Organization. Risk reduction of cognitive decline and dementia: WHO guidelines. Geneva: World Health Organization; 2019 [cited 2025 Dec 4]. Available from: WHO guideline
- [14] Yuan S, Li W, Ling Y, Huang X, Feng A, Tan S, He N, et al. Associations of screen-based sedentary activities with all-cause dementia, Alzheimer's disease, vascular dementia: A longitudinal study based on 462,524 participants from the UK Biobank. *BMC Public Health.* 2023;23(1):2141. doi:10.1186/s12889-023-17050-3.