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Mobile screen time, sleep quality, motor coordination, and cognitive functions in newly diagnosed epileptic patients

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ABSTRACT

Background: Epilepsy is a chronic condition of recurrent seizures that can also vary from brief and nearly undetectable symptoms to periods of vigorous shaking and convulsions. Understanding all these causative factors with epilepsy is very essential for early diagnosis and management of epilepsy effectively. Hence, the present study was undertaken to observe screen time, sleep quality, motor coordination, eating behavior, and cognitive functions in newly diagnosed epileptic patients. **Aims and Objectives:** The present study was undertaken to observe screen time, sleep quality, motor coordination, eating behavior, and cognitive functions in newly diagnosed epileptic patients. **Materials and Methods:** The present cross-sectional study recruited 44 newly diagnosed male and female epileptic patients during the study period. 44 age and gender-matched controls were also recruited. Screen time was recorded using digital well-being application installed in the mobile phone which provides average mobile screen time data of the individual. Sleep quality was assessed using insomnia severity index (ISI) questionnaire. 100 pin dexterity test was used to assess the motor coordination. Cognitive functions were assessed using spatial and verbal memory test. **Results:** Significantly higher mobile screen time duration (P = 0.0032) and higher insomnia severity scores (P = 0.0059) were observed in the cases. 100 pin dexterity test duration was not significantly different among the cases and controls. Spatial memory (P = 0.0306) and verbal memory (P = 0.0212) scores were significantly higher in cases than controls. **Conclusion:** The study results present longer mobile screen time, longer duration for 100 pin dexterity test, higher ISI scores, and lower memory scores in the newly diagnosed epileptic patients. Hence, these factors have to be considered in the diagnosis and prognosis of the epilepsy.

Key words: Epilepsy; Cognition; Motor coordination; Sleep; Insomnia; Memory

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INTRODUCTION

Epilepsy is a chronic condition of recurrent seizures that can also vary from brief and nearly undetectable symptoms to periods of vigorous shaking and convulsions. Epilepsy is not a single disease. Its clinical symptoms are heterogeneous and reflect multiple underlying causes.[1,2] On an average, approximately seventy million individuals are suffering with epilepsy worldwide and out of which ten million cases were reported in India. The prevalence of epilepsy was high in males when compared with females. Epilepsy not only implies burden to the individual but also to the families and

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the healthcare systems as well. There are many causative factors reported for epilepsy. Hence, understanding the causative factors helps to manage the epilepsy more effectively. Because if untreated, epilepsy worsens. There are no studies which directly link the excessive screen time and the epilepsy. Electromagnetic fields created by mobile phone use might have an effect on the activity of the brain. Excessive screen time deteriorates sleep quality and quantity.[3] Reciprocal relationship was reported between the sleep and epilepsy.[4,5] Association between nocturnal seizures and epilepsy was reported in patients with epilepsy.[6] Sleep disorders are commonly observed in patients with epilepsy.[7] Further, the presence of sleep disorders worsens the epilepsy symptoms.[8] Altered gait and motor evoked potentials were observed in the patients with epilepsy.[9] Epilepsy was observed in the patients with eating disorders.[10] Impairment of learning and memory was reported in the patients with epilepsy.[11] Damage of neurons of hippocampus might have a role in the cognitive decline in epileptic patients. Hence, understanding all these causative factors with epilepsy is very essential for early diagnosis and management of epilepsy effectively. Hence, the present study was undertaken.

Aim and objectives

The present study was undertaken to observe the mobile screen time, sleep quality, motor coordination, and cognitive functions in newly diagnosed epileptic patients.

MATERIALS AND METHODS

The present cross-sectional study recruited 44 newly diagnosed male and female epileptic patients during the study period. 44 age and gender-matched controls were also recruited. The sampling method is convenient sampling. Voluntary, written informed consent was obtained from all the participants before the recruitment. The study protocol was approved by the institutional human ethics committee (IHEC-112-34-9 dated December 12, 2023). Voluntary, written, informed consent was obtained from all the participants before the recruitment. Assent was obtained from the minor participants. The recruited patients underwent general physical examination after recording the demographic data. Willing male and female patients, who are newly diagnosed with generalized epilepsy, during the study period (February 2024–September 2024) were part of the study. Patients with any severe complications were excluded from the study. Screen time was recorded using digital well-being application installed in the mobile phone which provides average mobile screen time data of the individual. Sleep quality was assessed using the insomnia severity index (ISI) questionnaire.[11] 100 pin dexterity test was used to assess motor coordination.[12] It measures dexterity in activities involving the gross movements of fingers, hand, and arm. Cognitive functions were assessed using spatial and verbal memory tests.[13,14] Spatial memory test assesses the memory of pictures, and verbal memory test assesses the memory of words. The participants were made aware of the questionnaires and the tests used in the study and data collection was performed as per the convenience of the participants.

Statistical analysis

Data were analyzed using 22.0 version software. Student t-test was applied to observe the significance of difference between the two groups. A probability value <0.05 was considered as significant.

RESULTS

Demographic data were presented in Table 1. 27 males and 17 females diagnosed with epilepsy were recruited in the study. There was no significant difference in the demographic parameters among the cases and controls (Table 1). Significantly higher mobile screen time duration (P=0.0032) and higher insomnia severity scores (P=0.0059) were observed in the cases. 100 pin dexterity test duration was not significantly different among the cases and controls. Spatial memory (P=0.0306) and verbal memory (P=0.0212) scores were significantly lower in cases than controls (Table 2).

Table 1: Demographic data of the participants in cases and control groups

Parameter	Cases (n=44)	Control (n=44)	P-value
Age (years)	19±5.04	17.67±3.04	0.5134
Height (cm)	154.40±4.62	152.7±7.5	0.5493
Weight (kg)	50.4±7.18	51±9.32	0.8737

Data were expressed as mean and SD

Table 2: Mobile screen time, sleep quality, motor coordination, eating behavior, and cognitive functions in the participants in cases and control groups

Parameter	Cases (n=44)	Control (n=44)	P-value
Mobile screen time (min)	2.76±0.63	2.04±0.45	0.0032**
Insomnia severity index score	9±1.13	7.54±1.27	0.0059**
100 pin dexterity test time (sec)	330±56.25	296.67±47.55	0.1312
Spatial memory score	6.31±1.44	7.31±0.63	0.0306*
Verbal memory score	4.77±1.09	5.75±0.87	0.0212*

Data were expressed as mean and SD. (*P<0.05 is significant)

DISCUSSION

Diagnosis of epilepsy is the most important step in the management of the disease. During the diagnosis, the origin as well as the type of the seizures were determined.[15] Early diagnosis is most important in the management of epilepsy. Treatment gaps may worsen the condition. Although the patient has epilepsy, in some cases, there will be delay in the diagnosis or delay in the beginning of treatment, which accounts for treatment gaps.[16] The studies linking excessive screen time as a causative factor for epilepsy are not available. However, excessive screen time reduces the quality and quantity of sleep that has a role in epilepsy.[17] Reciprocal relationship was reported between the sleep and epilepsy.[18] The presence of insomnia in patients with epilepsy increases anxiety and depression levels that have a negative impact on sleep. This will continue like a vicious cycle unless the treatment has begun and breaks the cycle.[19] In the present study, significantly higher mobile screen time was observed and also higher scores of ISI. It was assumed that higher exposure to the mobile screen decreases the recommended sleep duration and is associated with the epilepsy. However, further detailed studies are needed to understand the linkage between the screen time and epilepsy. Earlier studies reported decline in motor skills and motor execution in patients with epilepsy.[20] Execution process is the most important function because it is the process that enables the individuals to perform various activities such as memory, planning, and attention. The prevalence of epilepsy was reported higher in males than females.[21] The present study supports the earlier studies as the male cases were 27 in number and females were 17 during the study period. Impairment of memory is commonly reported in epileptic patients and in specific, it is more in temporal lobe epilepsy.[22] A study reported decreased memory performance in epileptic patients and reduced blood supply to the temporal lobe of these patients.[23] Memory rehabilitation was shown to improve the memory in the patients with epilepsy and in specific to verbal memory.[24] Apart from the site of epilepsy, other factors also influence the memory in epileptic patients such as age at which epilepsy onset, duration of disorder, type of the seizures, and their frequency of occurrence.[25] In the present study, both the spatial and verbal memory scores were low in the cases that support the earlier studies. Hence, the study results support assessment of sleep quality and memory during the diagnosis stage of epilepsy. Although the studies presenting direct link between excessive screen time and the epilepsy, there is a need for more studies in this area.

Limitations of the study

The study was a single-center study. Future studies will be planned involving multiple centers.

CONCLUSION

The study results present longer mobile screen time, longer duration for 100 pin dexterity test, higher ISI scores, and lower memory scores in the newly diagnosed epileptic patients. Hence, these factors have to be considered in the diagnosis and prognosis of epilepsy.

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NK, KS- Design of the study, review of literature, analysis, and preparing the manuscript; **KS, VS**- Data collection, preparing the manuscript; **SSKG, VS**- Analysis and preparing the manuscript.

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