

Project Report

On

**A STATISTICAL STUDY ON THE EFFECT
OF INTERNET ADDICTION ON SLEEP
QUALITY**

Submitted

in partial fulfilment of the requirements for the degree of

BACHELOR OF SCIENCE

in

MATHEMATICS

by

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Under the Supervision of

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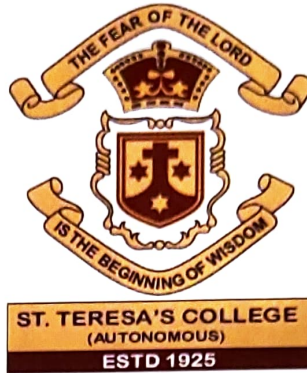
DEPARTMENT OF MATHEMATICS

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CERTIFICATE

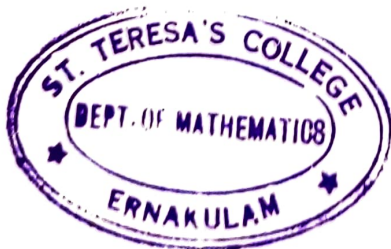
This is to certify that the dissertation entitled, **A STATISTICAL STUDY ON THE EFFECT OF INTERNET ADDICTION ON SLEEP QUALITY** is a bonafide record of the work done by Ms. **DEVIKA K S** under my guidance as partial fulfillment of the award of the degree of **Bachelor of Science in Mathematics** at St. Teresa's College (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam. No part of this work has been submitted for any other degree elsewhere.

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DECLARATION

I hereby declare that the work presented in this project is based on the original work done by me under the guidance of Dr. SUSAN MATHEW PANAKKAL, Assistant Professor, Department of Mathematics, St. Teresa's College (Autonomous), Ernakulam and has not been included in any other project submitted previously for the award of any degree.

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Chapter 1

INTRODUCTION

Internet addiction is the excessive use of the internet typically observed when an abnormal amount of time is spent on social media to the point that it significantly reduces the person's social life. Today it has become a new-age addiction that gripped people around the world. People belonging to different age groups are suffering from this addiction, though it is more prevalent among the youth. People make use of the internet for their studies, jobs, shopping, to kill time and boredom, to escape from loneliness, and to have some fun in this busy world. And this addiction leads to many adverse consequences. The person loses their social life. It can affect the person both physically and mentally.

Sleep is one of the most important factors in our daily lives. Sleep is inevitable for the proper functioning of our body. We must sleep for about 8 hours daily. It is a process in which brain cells get recharged and the body relaxes and gains its lost energy. In today's world people are reluctant to get adequate sleep because of their hectic life. Deprivation of sleep can lead to many physical and mental problems. The person's creative thinking, and ability to make decisions, remember things, concentrate and pay attention to depend on sleep. The lack of sleep affects these abilities of the person. The person may become frustrated at home and workplace. Lack of sleep in students may affect their concentration in their studies. In children, it may affect their growth as sleep is essential for the child's growth.

The internet has led to the revolution of the world in the past few

decades with explosive growth in worldwide internet usage. This global digitalization has provided better opportunities in all sectors including education, communication, banking, businesses, health-seeking, and social interaction. Unfortunately, uncontrolled use of the internet may lead to maladaptive behaviours. It was found that spending ample time on the internet was associated with poor sleep quality and may further lead to an increase in psychological distress among young adults.

Additionally, internet addiction resulted in the dysfunction of daily activities and reduced productivity. However, the increasing popularity of smartphones has made the use of smartphones before sleep a habit for most youngsters. As a result of the lockdown during the pandemic, students have begun to spend more time on digital devices before sleep and experiencing irregular sleep patterns, which may lead to poor sleep quality. Insufficient sleep and poor sleep quality may result in poor memory and weakened learning abilities, which jeopardize the academic performance of students and may also result in other growth and developmental disorders. Excessive internet addiction may lead to grey matter atrophy, which negatively affects one's ability to concentrate and hinders their decision-making capacity.

1.1 STATISTICS

Statistics is a branch of mathematics involving the collection, classification and analysis of data. We infer conclusions about the study from the sample data collected using surveys or experiments. Data should be either in numbers or transformed into numbers by the researcher. We use statistics mainly for description and prediction. It describes the characteristics of a population or group. The two important and basic ideas involved in statistics are uncertainty and variation. The uncertainty and variation in different fields can be identified and determined only through statistical analysis. These are determined by probability and probability plays an important role in statistics. Statistical analysis is used for collecting the interpretations of research and developing

statistical models, plans, surveys and studies. It helps us to research various fields such as medicine, economics, business, psychology and so on. It also provides different types of organized data with the help of graphs, diagrams and charts.

1.2 VARIABLE

A variable is any characteristic or quantity which is measurable or countable. Since the value may vary between data units in a population and may change in value over time, it is referred to as a variable. Numeric variables have values that describe a measurable quantity and are also called quantitative variables. Categorical variables have values that describe a quality or characteristic of a unit, and are also called qualitative variables and tend to be represented by a non-numeric value.

1.3 DESCRIPTIVE AND INFERENTIAL STATISTICS

Descriptive statistics is a branch of statistics that deals with describing the characters of the data in the form of mean, median and mode. Inferential statistics deals with deriving conclusions about the population under study based on inferences obtained from the random sample taken from the larger population.

1.4 INFERENTIAL STATISTICS

In statistical analysis, we use functions of sample units to study the unknown parameters of a population. This branch of study is known as Statistical Inference. Inferential statistics is mainly used to derive estimates about a large population and draw conclusions based on hypotheses testing methods. Inferential statistics make use of sample data as it is more cost-effective and less tedious than collecting data from an entire population. It allows one to reach reasonable assumptions

about the larger population based on the characteristics of a sample. Sampling methods should be unbiased and random for validation of statistical conclusions and inference.

1.5 STATISTICAL SURVEY

A survey is the study of the characteristics of a given population using collecting data from a sample of that population and estimating their characteristics through the systematic use of the statistical methodology. Statistical surveys have different stages which have to be done in sequential order. Systematic following of these steps is very important to get good results from the survey. Some important steps concerning a statistical survey are as follows:

- Defining the problem and determining the objective
- Preliminaries to the collection of data
- Collection of data
- Classification and Tabulation of data
- Analysis and Interpretation of data
- Preparation of Report

1.6 OBJECTIVES

- To analyze the correlation between Internet Addiction and Sleep Quality.
- To check whether the above correlation is significant in a population.
- To check whether internet addiction and sleep quality are dependent on each other.
- To conduct a comparative study of the effect of internet addiction on sleep quality between males and females using double bar graphs.

1.7 DATA SOURCE

Data was collected by circulating a google form consisting of carefully prepared 18 questions among males and females.

1.8 DATA DESCRIPTION

The data collected was the primary data for studying different individuals' internet usage and sleep patterns. The study was conducted using an online self-administered questionnaire. This questionnaire was distributed using google forms through various social media platforms. 376 responses were listed in this data. Options of 0-3 were given to indicate the extent of sleep quality or time spent on the internet.

1.9 SIGNIFICANCE OF STUDY

In this modern world, people are immersed in smartphones and other gadgets. This affects them mentally, physically and psychologically. Moreover, excessive usage of these gadgets can lead to sleep insomnia and other sleep disorders. It can even lead to depression and death. This totally destroys the life of an individual and affects his/her family and loved ones. Sleep plays a major role in the health of an individual. There are numerous studies demonstrating that Internet addiction affects sleep quality. Internet and social media usage around bedtime can negatively affect how long and how well you sleep. Looking at the phone during bedtime makes it harder to fall asleep. It also reduces the amount of sleep time and leaves you lethargic and unrefreshed the next day. Digital devices emit blue light which makes our brain alert and it results in the reduction of the release of a sleep hormone called melatonin. This affects the sleep at the time when we should be winding down.

Checking phones after falling asleep has a great impact of blue light on them. This is resulting in the loss of sleep and developing a sleep disorder like insomnia. Therefore, it is necessary to study the correlation and effect of internet addiction on sleep and provide corrective

and regulatory measures.

1.10 LIMITATIONS

Since we are drawing conclusions from a population only based on data from a small sample, inaccuracies are bound to occur. Sampling method involves biased selection and lead to errors in conclusions. To select a truly representing sample is difficult. We use simple tests on data obtained by a specific questionnaire which limits the extent of the test. There are many other factors on which sleep quality and internet addiction depends upon. While the sleep quality in the study is limited to the structures in the PSQI, the internet usage is limited to the structures in IAT. The study is confined to a small area, hence the conclusions may not be generalized. Due to constraint in time of the project done, less than 400 responses were obtained. While filling the questionnaire, the respondent bias also affects the results and conclusions obtained.

1.11 LITERATURE REVIEW

A research conducted on university students in Taiwan showed that the sleep quality of students with internet addiction was 1.4 times worse than students who were not addicted to the Internet. This study was designed to examine the prevalence and the risk factors of poor sleep quality in 4318 incoming university students in Taiwan. The test comprised a self-administered structured questionnaire, including items related to personal medical history and lifestyle habits, the Measurement of Support Functions (MSF), Pittsburgh Sleep Quality Index (PSQI), Chinese Internet Addiction Scale-Revision (CIAS-R), neuroticism subscale of the Maudsley Personality Inventory (MPI), and the 12-item Chinese Health Questionnaire. The study was published on 30 May 2012 [2].

A cross-sectional questionnaire-based survey was conducted among

students of three faculties: medicine, dentistry and pharmacy at Saint Joseph University, from September to December 2015 (4 months). Inclusion criteria were: students aged 18 years and above, and willing to participate in the study. Students were randomly selected within each class using a random number. This random selection was proportional to the number of students in each class. The result was published on September 12, 2016 [6].

A group of Taiwanese professors conducted research on the relationship between sleep quality and internet addiction among female college students. They used the Pittsburgh Sleep Quality Index (PSQI) and Internet Addiction Test (IAT) for the purpose. The research was published on 12 June 2019. The objective of the research was to investigate the relationship between internet addiction and sleep quality [5].

Department of Public Health, Asian College for Advance Studies, Purbanchal University, Lalitpur, Nepal directed a cross-sectional school-based research that employed a questionnaire survey among 390 adolescent students taken from schools in Kirtipur Municipality in Nepal. They conducted this study to find internet addiction and sleep quality among teens in a peri-urban setting in Nepal. Two secondary-level schools were selected randomly from 37 schools in the studied municipality. The number of schools was calculated based on the sample size for selecting the students. A total of 390 students from classes 9 and 10 were selected and all students there at the time of the survey filled out and completed the questionnaires. This study was approved by the Ethical Review Board of Nepal Health Research Council (Reg. no. 688/2018). The recruitment and data collection was done between May to September 2019. The Internet Addiction Test and the Pittsburgh Sleep Quality Index were used to check internet addiction and poor sleep quality respectively. The relationship between internet addiction and sleep quality was analyzed by logistic regression [3].

Faculties from the Department of Neuropsychiatry, Faculty of Medicine, Sohag University, Sohag, Egypt conducted a cross-sectional study was conducted from January 2021 to October 2021. Four medical Faculties at Sohag University (Medicine, Nursing, Pharmacy, and Veterinary Medicine) were chosen to be involved in the current study. The sample size was calculated to be 525 students as calculated using the Open EPI program. . The random cluster sampling method was also used to choose sections and departments among four facilities. For the assessment of socio-demographic, and academic data of the student, and patterns of Internet usage, a self-administered questionnaire was applied. They applied the Young Internet addiction test and a self-administered questionnaire on the students; then, applied the Pittsburgh Sleep Quality Index (PSQI) The Scientific Research Ethical Committee of Sohag University's Faculty of Medicine provided the ethical approval for conducting the study [4].

The effect of internet addiction and smartphone addiction on sleep quality among Turkish adolescents was conducted with Turkish adolescents aged 13–18 years in Izmir—Turkey between March and April 2018. Participants were students studying at a public high school (N = 593) and two private high schools (N = 659). All students were requested to complete the questionnaires of the study, without sampling. 910 of the 1,252 students completed the questionnaires and the response rate was 72.7%. Pearson's Chi-square test, Chi-square test for trend, Mann–Whitney U test, logistic regression analysis, and Spearman's correlation analysis were used for the analysis of data collected. This study was conducted in accordance with the principles of the Helsinki Declaration. Ethical approval was obtained from the Non-invasive Research Ethics Committee of Dokuz Eylul University, Izmir, Turkey. The research was published online on Feb 2, 2022 [1].

Chapter 2

METHODOLOGY

2.1 MEASURES

The two tests conducted prior to the analysis are Internet Addiction Test (IAT) and Pittsburgh Sleep Quality Index (PSQI).

2.1.1 MEASUREMENT OF INTERNET ADDICTION (IAT)

The sample population answers a total of 11 questions relating to their internet usage to measure addiction. The sample population is given options 0-3 for each question, such that in each question 0 indicates the least addiction symptoms and 3 indicates the most.

For example: How often do you find that you stay online longer than you intended?

Not Applicable - 0

Rarely - 1

Frequently - 2

Always - 3

In this way, data relating to 11 questions is collected. And hence, each person's internet addiction score is found out with a total possible score achievable as 33. (Maximum score 3 for 11 questions). Each person's IAT score will be a sum of 0, 1, 2 or 3 corresponding to their answers. Each person's IAT score will be taken as the variable x for finding the correlation coefficient. Therefore, variable x represents in-

ternet addiction.

The IAT scores found out of total score 33 (variable x) are then converted to percentages. This now becomes the IAT score percentages of the population. These are categorized as follows:

0-30% - Normal Level

31-49% - Mild Level

50-79% - Moderate Level

80-100% - Severe Level

Then the number of people having normal, mild, moderate and severe internet addiction are noted.

2.1.2 MEASUREMENT OF SLEEP QUALITY (PSQI)

Sleep quality is measured using the Pittsburgh Sleep Quality Index test. This test, found in 1989 is typically used to analyze the sleep quality of patients in clinical testing. PSQI test evaluates the sleep quality on the basis of the past one month.

Here, the sample population answers a total of 7 questions relating to their sleep to measure quality. The sample population is given options 0-3 for each question, such that in each question 0 indicates best conditions for good sleep qualities and 3 indicates the worst sleep quality.

For example: During the past month, how often have you taken medication to fall asleep?

0 - Not during the past month

1 - Less than a week

2 - Once or twice a week

3 - three or more times a week

In this way, data relating to 7 questions are collected. And hence, each person's sleep quality score ie; the PSQI score is found out with total possible score achievable as 21. (Maximum score 3 for 7 questions). Each person's PSQI score will be the sum of the 0, 1, 2 or 3

corresponding to their answers. Each person's PSQI score is taken as the y variables for finding correlation coefficient.

The questionnaire is prepared using a sleep quality index consisting of seven components.

	Final Score
Component 1 - Subjective Sleep Quality	0 - 3
Component 2 - Sleep Latency	0 - 3
Q1 : ≤ 15 minutes	0
16 - 30 minutes	1
31 - 60 minutes	2
≥ 60 minutes	3
Component 3 - Sleep Duration (Actual Sleep)	0 - 3
Q2 : ≥ 7 hours	0
6 - 7 hours	1
5 - 6 hours	2
≤ 5 hours	3
Component 4 - Excessive Daytime Sleepiness	0 - 3
(Doze off during Daytime)	
Component 5 - Sleep Disturbances	0 - 3
Q3 : a) - d)	
3a) 0 - 3	
3b) 0 - 3	
3c) 0 - 3	
3d) 0 - 3	

Combining the above 4 sub scorings related to component 5, we get scores from 0 - 12. This in turn will be categorized as follows :

0	0
1-4	1
5-8	2
9-12	3

Component 6 - Use of Sleep Medication

Q5 0 - 3

Component 7 - Daytime Dysfunction

Q6 0 - 3

GLOBAL PSQI 0 - 21

The PSQI sleep scores recorded out of a total of score 21 are categorized as follows :

- 0-7 - Good Sleep
- 8-14 - Medium Sleep
- 15- 21 - Bad Sleep

The number of people with good, bad and medium quality sleep are noted.

2.2 TESTS USED FOR ANALYSIS

2.2.1 CORRELATION ANALYSIS

The correlation coefficient (γ) can range from - 1 to +1. The larger the absolute value of the coefficient, the stronger the relationship between the variables - internet addiction and sleep.

Positive correlation - Variables move in the same direction

Negative correlation - Variables move in opposite directions

Zero correlation - No correlation between the variables

After finding the x variables representing internet addiction, the arithmetic mean of x variables i.e; \bar{x} is found out.

Similarly, after finding the y variables representing the PSQI scores for sleep quality, the arithmetic mean of y variables i.e; \bar{y} is also found out.

After getting values of x , y , \bar{x} and \bar{y} , the correlation coefficient γ is found out using the following formula:

$$\gamma = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2 \times \Sigma(y - \bar{y})^2}}$$

2.2.2 TEST OF SIGNIFICANCE OF CORRELATION IN THE POPULATION

Here, we mean to find the significance of correlation using the correlation coefficient γ already found out in the previous test. For this, we are using a two-tailed test taking H_0 and H_1 as:

Null hypothesis H_0 : Correlation of the population is not significant ($\rho=0$)

Alternate hypothesis H_1 : Correlation of the population is significant ($\rho \neq 0$)

$$\text{Test Statistic} = \frac{\gamma - \rho}{\sqrt{\frac{1-\gamma^2}{n-2}}} \sim t_{n-2}$$

where

ρ represents the correlation of the population,

γ represents the correlation of the sample,

n represents the sample size

The level of significance, $\alpha = 0.05$.

By calculating the test statistic and comparing it with the Student's t -table, we can see if the Test Statistic lies in the critical region after plotting a graph of t -distribution.

If the value of the Test Statistic lies in the acceptance region of the graph, H_0 is accepted, that is, the correlation of the population is not significant.

If the value of the Test Statistic lies in the critical region of the graph, H_0 is rejected that is, H_1 is true. Therefore, the correlation of population is significant in that case.

2.2.3 CHI-SQUARE TEST

After creating a contingency table with two sets of categorizations relating to internet addiction scores and PSQI scores, Chi-square test is used to see if there exists a significant difference in the expected and observed values in the table.

From the above two categorizations of internet addiction and sleep quality, we can easily find the number of people having both normal addiction and good sleep, normal addiction and medium sleep, normal addiction and bad sleep, mild addiction and good sleep and so on. This way, the observed values (O) of the contingency table for doing the chi-square test are obtained.

We are aiming to test the independence of variables, x and y i.e., internet addiction and sleep quality. For this we are taking the Chi-square test with H_0 and H_1 as :

Null hypothesis H_0 : Variables are independent

Alternate hypothesis H_1 : Variables are not independent

$$\text{Test Statistic} = \sum \frac{(O_i - E_i)^2}{E_i} \sim \chi^2_{(m-1)(n-1)}$$

where

O_i = observed value

E_i = expected value

m = number of rows

n = number of columns

Expected values corresponding to each observed value can be found using the sums of observed values in each row and column in the table.

If your chi-square calculated value is greater than the chi-square critical value, then you reject the null hypothesis. Therefore, H_0 is false, i.e H_1 is true, variables are not independent.

If your chi-square calculated value is less than the chi-square critical value, then you "fail to reject" your null hypothesis, i.e., H_0 is true. Variables are independent.

2.2.4 COMPARATIVE STUDY BETWEEN MALES AND FEMALES

The sample population is now split into groups of males and females. A double bar graph is created representing the male population and the female population. The percentage of people with different combinations of sleep quality and Internet addiction is displayed. The percentages of people from both genders with different combinations of sleep quality and internet addiction are noted.

Chapter 3

DATA ANALYSIS

3.1 CORRELATION ANALYSIS

Correlation is a statistical technique used to find the relationship between two quantitative variables. This technique is used to find the influence of internet addiction on sleep quality.

Correlation between two variables x and y is represented by the formula:

$$\gamma = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2 \times \Sigma(y - \bar{y})^2}}$$

Here we take the scores of Internet Addiction Test (IAT) as the variable x and the Pittsburgh Sleep Quality Indices (PSQI) as the variable y .

Mean of Internet Addiction Test scores (\bar{x})

$$\bar{x}=15.329$$

Mean of Pittsburgh Sleep Quality Indices (\bar{y})

$$\bar{y}=6.4707$$

Correlation coefficient (γ) is given by:

$$\gamma = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2 \times \Sigma(y - \bar{y})^2}}$$

$$\gamma = \frac{\Sigma(x - 15.329)(y - 6.4707)}{\sqrt{\Sigma(x - 15.329)^2 \times \Sigma(y - 6.4707)^2}}$$

$$\gamma = +0.22225$$

Here the value of the correlation coefficient is positive, which indicates that internet addiction and problems in sleep quality are positively correlated.

3.2 TEST OF SIGNIFICANCE OF CORRELATION IN THE POPULATION

H_0 : Correlation of the population is not significant ($\rho = 0$)

H_1 : Correlation of the population is significant ($\rho \neq 0$)

Test Statistic = $\frac{\gamma - \rho}{\sqrt{\frac{1 - \gamma^2}{n - 2}}} \sim t_{n-2}$ where,

γ represents the correlation of the population ρ represents the correlation of the population n represents sample size

Sample size is equivalent to the number of responses collected (n) = 376

If H_0 is true, $\rho = 0$.

Applying this on the test statistic equation along with $\gamma = +0.22225$

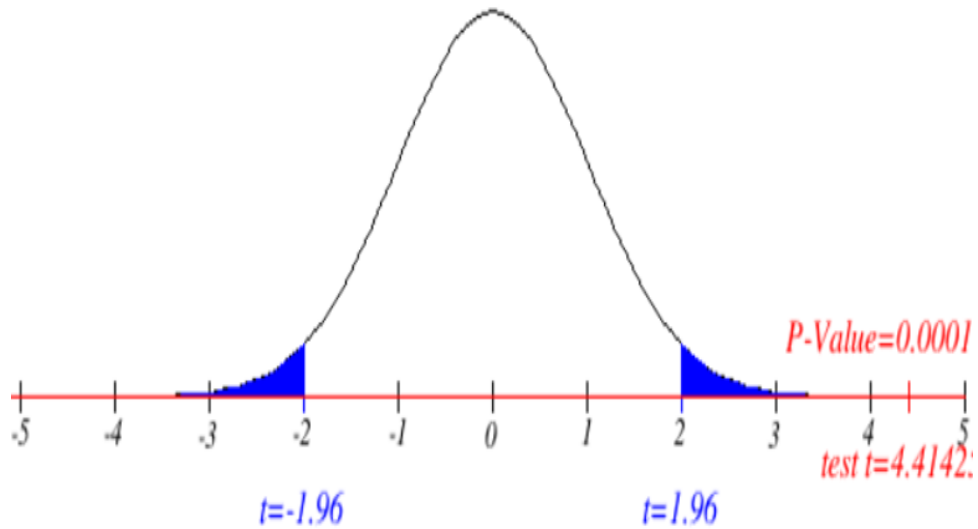
$$\text{Test Statistic} = \frac{\gamma - \rho}{\sqrt{\frac{1 - \gamma^2}{n - 2}}} \sim t_{n-2}$$

$$= \frac{0.22225 - 0}{\sqrt{\frac{1 - 0.22225^2}{376 - 2}}}$$

$$= \frac{0.22225}{0.050348}$$

$$= 4.41 \sim t_{374}$$

Since $(n-2) = 374 > 30$ is a large number, degrees of freedom can be taken as infinity (∞). Therefore, corresponding to $\alpha = 0.05$, a value can be found on the table for two-tailed test as 1.96.



Hence it is found that the value of the test statistic is lying in the rejection region. Therefore, the hypothesis H_0 is rejected i.e., H_1 is true. The correlation of the population is significant.

3.3 CHI SQUARE TEST

IAT SCORE PERCENTAGE

0 - 30% - Normal level

31 - 49% - Mild level

50 - 79% - Moderate level

80 - 100% - Severe level

PSQI SCORE

0 - 7 - Good Sleep

8 - 14 - Medium Sleep

15 - 21 - Bad Sleep

The hypotheses are defined as :

H_0 : Variables are independent

H_1 : Variables are not independent

Contingency table is constructed as follows:

OBSERVED FREQUENCY:

	Normal Level	Mild Level	Moderate Level	Severe Level	Row Total
GOOD SLEEP	58	113	76	11	258
MEDIUM SLEEP	6	27	50	8	91
BAD SLEEP	7	6	8	6	27
COLUMN TOTAL	71	146	134	25	376

EXPECTED FREQUENCY:

Expected frequency is calculated using the formula:

$$\text{Expected frequency} = \frac{\text{Row Total} \times \text{Column Total}}{\text{Grand Total}}$$

	Normal Level	Mild Level	Moderate Level	Severe Level	Row Total
GOOD SLEEP	48.7180851	100.180851	91.9468085	17.1542553	258
MEDIUM SLEEP	17.1835106	35.3351064	32.4308511	6.05053191	91
BAD SLEEP	5.0984042	10.4840426	9.62234043	1.79521277	27
COLUMN TOTAL	71	146	134	25	376

Test statistic is calculated using the formula:

$$\text{Test Statistic} = \sum \frac{(O_i - E_i)^2}{E_i} \sim \chi_{(m-1)(n-1)}^2$$

where

O_i = Observed value,

E_i = Expected value,

m = number of rows,

n = number of columns

$$\text{Test Statistic} = \sum \frac{(O_i - E_i)^2}{E_i}$$
$$= 40.5223$$

To find the table value:

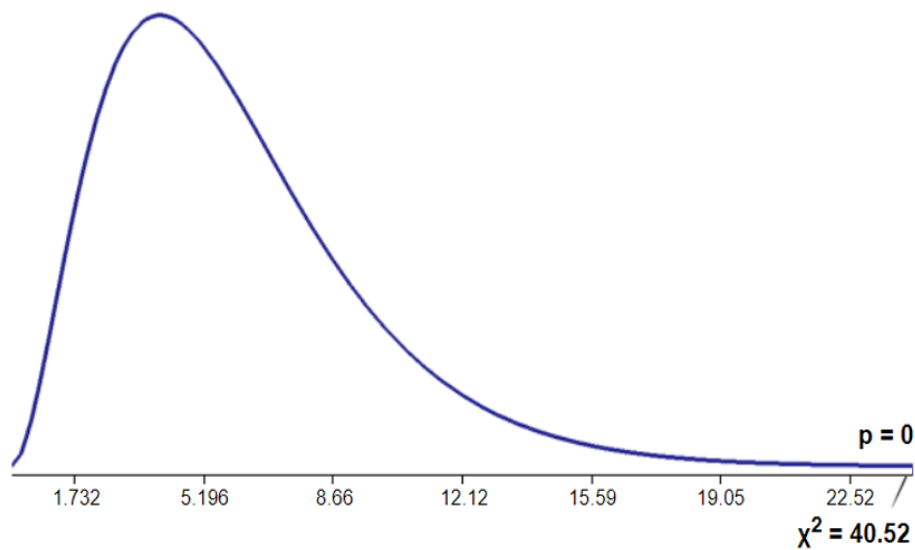
m = number of rows = 3

n = number of columns = 4

Degree of freedom = $(m - 1)(n - 1) = 2 \times 3 = 6$

Therefore,

Table value $(\chi_6^2) = 12.592$

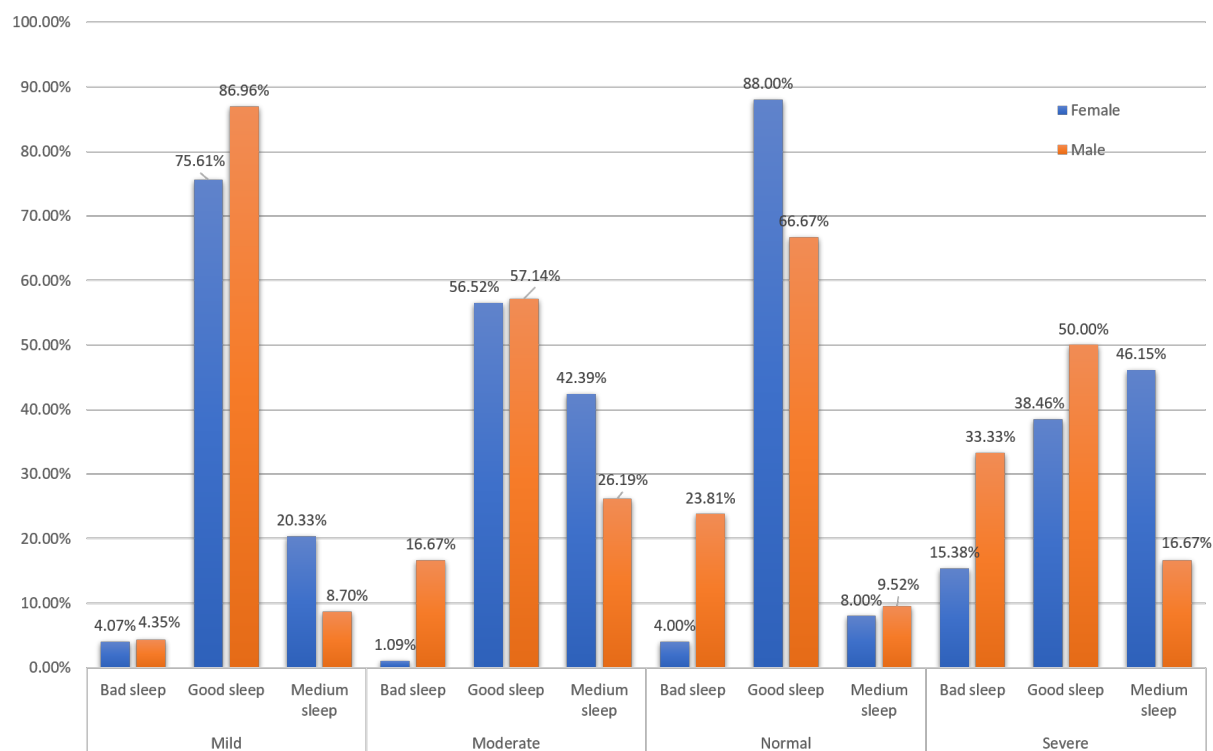


The value of the test statistic lies in the critical region.

Therefore, H_0 is rejected i.e., H_1 is true. The two variables internet addiction and sleep quality are not independent.

3.4 COMPARATIVE STUDY BETWEEN MALES AND FEMALES

Count of Gender IAT and Sleep Quality Index			
Gender	Female	Male	Grand total
Mild	44.24%	23.47%	38.83%
Bad sleep	4.07%	4.37%	4.11%
Good sleep	75.61%	86.96%	77.40%
Medium sleep	20.33%	8.70%	18.49%
Moderate	33.09%	42.86%	35.64%
Bad sleep	1.09%	16.67%	5.97%
Good sleep	56.52%	57.14%	56.72%
Medium sleep	42.39%	26.19%	37.31%
Normal	17.99%	21.43%	18.88%
Bad sleep	4.00%	23.81%	9.86%
Good sleep	88.00%	66.67%	81.69%
Medium sleep	8.00%	9.52%	8.45%
Severe	4.68%	12.24%	6.65%
Bad sleep	15.38%	33.33%	24.00%
Good sleep	38.46%	50.00%	44.00%
Medium sleep	46.15%	16.67%	32.00%
Grand total	100.00%	100.00%	100.00%



Chapter 4

RESULTS AND CONCLUSIONS

4.1 RESULT

From the study, the value of the correlation coefficient obtained is +0.22225 which indicates a positive correlation between sleep quality and internet addiction and this correlation is considered significant in a population.

From the Chi-square test, the χ^2 value was found out to be 40.5223 while the χ^2 critical value was found to be 12.592. Since the test statistic value lies in the critical region, it can be concluded that the two attributes are dependent, that is, internet addiction affects the sleep quality of people.

A total of 376 respondents filled out and completed the questionnaire out of which 26.06% are males and 73.94% are females. According to the graph, it can be seen that more than 50% of males get good sleep in all levels of internet addiction whereas sleep quality of females are more likely to be affected by different levels of internet addiction.

4.2 CONCLUSION

From the above analysis, it is seen that females are having a significant impact on their sleep quality compared to that of males with respect to their internet addiction level. Thus it was concluded that more female participants had a deteriorating sleep quality due to excessive internet usage.

This study and analysis were seen to be more effective for teens and young adults as they are well-versed with scientific technology and electronic gadgets when compared to adults and senior citizens.

Also, the above results show that internet addiction and sleep quality are positively correlated and are significant in a population.

Thus, evidently, Excessive use of the internet is associated with reduced sleep quality and increased day time sleepiness. High internet addiction causes less sleep quality.

4.3 SUGGESTIONS

Programs to increase awareness of the adverse effects of internet addiction on sleep and other developmental factors of the body must be conducted in various institutions, schools and universities. In light of the results obtained in the above study, adolescents who are moderately addicted to the internet and their families, loved ones and teachers must be informed about this subject and intervention programs should be started. Parents should control and limit the time of internet usage, plan sleep time, and stop the usage of mobile phones in bed. Families and parents should be good role models for their children. Intervention programs should be commenced for high-risk groups. Internet addiction is a growing health issue, mainly for youth, and is often associated with poor sleep habits and sleep problems. More intensive studies with larger samples and better research methodologies should be undertaken to understand this correlation and study's nature, kind, dimensions and etiological background of this correlation and study. Healthcare providers must be aware of the negative impacts of excessive internet usage on the sleeping patterns of children and adolescents. The cautious evaluation of their internet exposure, sleep habits and daytime function and work enables us to identify those people who are at higher risks of internet addiction and loss of sleep.

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PAPER PRESENTATIONS

The paper entitled "STATISTICAL SURVEY ON THE EFFECT OF INTERNET ADDICTION ON SLEEP QUALITY" was presented in the National Seminar on Fuzzy Logic, Neural Network and Machine Learning conducted on 15-16 December 2022, held at Al-Ameen College, Edathala.

The paper entitled "A STATISTICAL STUDY ON THE EFFECT OF INTERNET ADDICTION ON SLEEP QUALITY" was presented during QUAESITIO 2022-23, a Multi-Disciplinary Online International Conference organized by the Research Cell and IQAC of St. Stephen's College, Uzhavoor in association with Mahatma Gandhi University, Kottayam on 12/17/2022.

The paper entitled "STATISTICAL SURVEY ON THE EFFECT OF INTERNET ADDICTION ON SLEEP QUALITY" has been accepted for publication in the conference proceedings of National Seminar on Fuzzy Logic, Neural Network and Machine Learning conducted on 15-16 December 2022, held at Al-Ameen College, Edathala.

ANNEXURE

Effect of Internet Addiction on Sleep Quality

Hey, We are III BSc Mathematics students of St. Teresa's College, Ernakulam (Autonomous) We are conducting a research on the topic **'Effect of Internet Addiction on Sleep Quality'**. Our aim is to find the correlation between Internet Addiction and Sleep Quality Index of a person. Please answer the following questions and help us complete our survey.

aparnamar4@gmail.com [Switch account](#)



* Required

Email *

Your email

Your Name? *

Your answer



Age *

Your answer

Gender *

Male

Female

Others

The following questions relate to your **internet usage** and usual **sleep habits** during the **PAST MONTH** only. Please answer all questions.

1. How often do you find that you stay online longer than you intended? *

- Not Applicable
- Rarely
- Frequently
- Always

2. How often do others in your life complain to you about the amount of time you spend online? *

- Not Applicable
- Rarely
- Frequently
- Always

3. How often do your grades or school work suffer because of the amount of time you spend online? *

- Not Applicable
- Rarely
- Frequently
- Always

4. How often do you check your email/ whatsapp before something else that you need to do? *

- Not Applicable
- Rarely
- Frequently
- Always

5. How often do you block out disturbing ^{*} thoughts about your life with soothing thoughts of the Internet?

- Not Applicable
- Rarely
- Frequently
- Always

7. How often do you lose sleep due to ^{*} being online?

- Not Applicable
- Rarely
- Frequently
- Always

6. How often do you snap, yell or act ^{*} annoyed if someone bothers you while you are online?

- Not Applicable
- Rarely
- Frequently
- Always

8. How often do you find yourself saying ^{*} "just a few more minutes" when online?

- Not Applicable
- Rarely
- Frequently
- Always

9. How often do you try to cut down the amount of time you spend online and fail? *

- Not Applicable
- Rarely
- Frequently
- Always

10. How often do you choose to spend more time online over going out with others? *

- Not Applicable
- Rarely
- Frequently
- Always

11. How often do you feel depressed, moody or nervous when you are offline, which goes away once you are back online? *

- Not Applicable
- Rarely
- Frequently
- Always

12. How long (in minutes) has it usually taken you to fall asleep each night? *

Your answer _____

13. How many hours of actual sleep did you get each night? (This may be different than the number of hours you spend in bed.) *

Your answer _____

14. During the past month, how often have you had trouble sleeping because you...

A. Wake up in the middle of the night or early morning or get up to use bathroom *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

B. Cannot breathe comfortably or have pain *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

C. Cough or snore loudly *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

D. Had bad dreams *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

15. During the past month, how would you rate your sleep quality overall? *

- Very good
- Fairly good
- Fairly bad
- Very bad



16. During the past month, how often have you taken medicine to help you sleep? *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

17. During the past month, how often have you had trouble staying awake while driving, eating meals or engaging in social activity or lack enthusiasm in getting things done? *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

18. During the past one month, how often do you doze off or find yourself napping during daytime? *

- Not during the past month
- Less than a week
- Once or twice a week
- Three or more times a week

Submit

Clear form