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Observational study on effect of myopia associated with poor sleep and screen time

Mahejabeen M Jikare[1], Prof. Nilakshi S Pradhan[2]

[1]*Post Graduate Scholar, Dept. of Shalakya Tantra, Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra, India.*

[2]*Professor, Dept. of Shalakya Tantra, Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra, India.*

ABSTRACT

Myopia or short-sightedness is the most common vision disorder among children and young adults in which defective vision and loss of vision occur. Global cases of myopia are on the rise, with some research indicating a link between excessive screen use and on the onset of the condition. In myopia patient can see objects near to them clearly, but objects far away like road signs are blurry. The condition is caused by excessive elongation eye. As a result the rays of light entering the eye focus in front of the retina instead of directly on the retina, causing blurriness. In Ayurveda symptoms of *Timira* can be considered as more similar to refractive error i.e. myopia. With screen based devices, e.g., tablets, smart phones, laptop, computers, televisions etc. these causes glare, extra eye strain, dry, irritate eye, loss of focus flexibility i.e. eyes stay focused close-up for long periods then it is difficult to adjust to distance vision. And increases the risk of myopia. The blue light from computer and device screens, when used in the evening, alters the brain's sleep rhythm. The brain reads the screen light as daytime and shifts the body's circadian rhythm which causes poor sleep time. The main object of this study is to know the incidence of myopia associated with poor sleep and screen time. The study was carried out as an observational study among 100 volunteers having poor sleep and more screen time.

Key words: *Myopia, Poor sleep, Screen time, Timira, Ayurveda, Patalagat Doshadushti*

INTRODUCTION

Ayurveda consists of 8 branches in which treatment of diseases are described. *Urdhvanga Chikitsa* deals with treatment of disease of head inclusive of the eye (ophthalmology), ear (otology), nose (rhinology), throat (laryngology) and teeth (dentistry).[1] *Shalakya Tantra* is the name of that branch which describe the diseases and treatment of parts above the shoulders such as ear, eyes, mouth, nose etc.[2]

Urdhvanga contains all four out of five *Dnyanendriya* (Sense organs). Humans depend on these sense organs. Among these *Netra* is *Pradhan Indriya* said by *Acharya*. *Acharya Sushruta* and *Acharya Vagbhata* say various disease of *Netra*. In which Timir is one of the main disease of *Drishtigat Rogas*.[3] *Timira* is characterized by *Avykatmekshateroopam*, *Vyaktmapyanimitta*, *Dooramnekshate* (Clear objects also appear blurred without any reason).[5] This sign and symptoms are more similar to myopia. The sign and symptoms of myopia are blurriness, difficult to distant vision and visual hallucination.[4]

The study indicates that people with short-sightedness have more delayed circadian rhythms and lower production of melatonin, a hormone secreted in the brain and responsible for regulating sleep at night. Melatonin is a hormone secreted by brain's pineal

Address for correspondence:
Dr. Mahejabeen M Jikare
Post Graduate Scholar, Dept. of Shalakya Tantra, Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra, India.
E-mail: mjikare@gmail.com

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gland to maintain the body's sleep-wake cycle and circadian rhythms. We produce melatonin soon after the onset of darkness, peaking our secretion between 2-4am.[13] The purpose of these study is to find out the incidence of myopia associated with poor sleep and screen time.

Aims and Objective

To know the incidence of myopia associated with poor sleep and screen time.

Material and Methods

Total 100 volunteer participants were selected for the present survey studying the period of 2 Months (18 June 2021 to 18 Aug 2021) from OPD of *Shalakya Tantra* (Netra), Sane Guguji Arogya Kendra, Hadapsar, Pune.

Selection of Volunteer Participants

Number of total participants were 100 Participants were selected irrespectively their sex, religion, habitat etc. between age of 18-40 years.

Criteria for Inclusion

1. Patients having signs and symptoms of myopia associated with poor sleep and screen time included i.e., blurriness, difficult to distant vision, visual hallucination
2. The patients of age 18-40 years, irrespective of gender
3. Patient who having a vision of 6/9 or less i.e., 6/12, 6/18, 6/24, 6/36, 6/60

Criteria for Exclusion

1. Know case of myopia associated with other ocular diseases such as Retinal diseases, Vitreous opacity, iridocyclitis, chorioretinitis.
2. Patient having known case of HIV, HBsAg, malignancy

Study Setting: Type of study design - Observational Cross-sectional study

Study population: Diagnosed patients of myopia

Sample size: 100

Sampling technique: Subject selected by using a purposive sampling method

Methods of measurement

Objective Parameter for Assessment: Visual acuity measured by Snellen's Chart for distant vision. 6/6, 6/9, 6/12, 6/18, 6/24, 6/36, 6/60

Study instrument: Snellen's chart for visual acuity, Auto Refractive methods findings, Torch

Data management and analysis procedure

All data from the OPD papers will be recorded in MS – EXCEL and will be analysed using appropriate statistical methods.

Data analysis plan and methods: Chi-Square test will be applied to analysis the data.

Observations and Results

Table 1: Age wise Distribution

Age Group	Frequency	Percentage
16-20 Years	18	18.00
21-25 Years	18	18.00
26-30 Years	15	15.00
31-35 Years	27	27.00
36-40 Years	22	22.00
Total	100	100.00

Table 2: Gender wise Distribution

Gender	Frequency	Percentage
Male	56	56.00
Female	44	44.00
Total	100	100.00

Table 3: Education wise Distribution

Education	Frequency	Percentage
SSC	11	11.00

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HSC	15	15.00
Graduate	61	61.00
Post Graduate	13	13.00
Total	100	100.00

Table 4: Occupation wise Distribution

Occupation	Frequency	Percentage
Housewife	10	10.00
Labour	5	5.00
Service	62	62.00
Student	23	23.00
Total	100	100.00

Table 5: Religion wise Distribution

Religion	Frequency	Percentage
Hindu	97	97.00
Muslim	3	3.00
Total	100	100.00

Table 6: Marital Status wise Distribution

Marital Status	Frequency	Percentage
Married	57	57.00
Unmarried	43	43.00
Total	100	100.00

Table 7: *Ahara* wise Distribution

Ahara	Frequency	Percentage
Abhishyandi	1	1.00
Amla	20	20.00
Lavana	24	24.00
Teekshna	28	28.00
Ushna	27	27.00
Total	100	100.00

Table 8: *Vihara* wise Distribution

Vihara	Frequency	Percentage
Divasvap	8	8.00
Krodha	4	4.00
Ratrijagaran	65	65.00
Rodana	4	4.00
Shitvayusevan	5	5.00
Shoka	2	2.00
Vegadharana	12	12.00
Total	100	100.00

Table 9: Addiction wise Distribution

Addiction	Frequency	Percentage
Alcohol	3	3.00
Gutka	2	2.00
Mishri	3	3.00
Paan	1	1.00
Smoking	5	5.00
Tobacco	2	2.00
None	84	84.00
Total	100	100.00

Table 10: Screen wise Distribution

Screen	Frequency	Percentage
Computer	30	30.00
Laptop	33	33.00
Mobile	24	24.00

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Tablet	5	5.00
Television	8	8.00
Total	100	100.00

Table 11: Screen Time wise Distribution

Screen Time	Frequency	Percentage
< 3 Hours	0	0.00
3 to 6 Hours	83	83.00
> 6 Hours	17	17.00
Total	100	100.00

Table 12: Sleep Duration wise Distribution

Sleep Duration	Frequency	Percentage
< 5 Hours	0	0.00
5-9 Hours	100	100.00
> 9 hours	0	0.00
Total	100	100.00

Table 13: Autorefractometer Reading wise Distribution for Right Eye

Autorefractometer Reading	Frequency	Percentage
-0.5 to -3.0	100	100.00
-3.0 to -6.0	0	0.00
< - 6.0	0	0.00
Total	100	100.00

Table 14: Autorefractometer Reading wise Distribution for Left Eye

Autorefractometer Reading	Frequency	Percentage
-0.5 to -3.0	100	100.00
-3.0 to -6.0	0	0.00
< - 6.0	0	0.00
Total	100	100.00

Table 15: Visual Acuity wise Distribution for Right Eye Before Refraction

Visual Acuity Before Refraction (RE)	Frequency	Percentage
0.00-0.20	32	32.00
0.30-0.50	28	28.00
0.60-0.80	23	23.00
1.00	17	17.00
Total	100	100.00

Table 16: Visual Acuity wise Distribution for Left Eye Before Refraction

Visual Acuity Before Refraction (LE)	Frequency	Percentage
0.00-0.20	33	33.00
0.30-0.50	33	33.00
0.60-0.80	22	22.00
1.00	12	12.00
Total	100	100.00

Table 17 - Visual Acuity wise Distribution for Right Eye After Refraction

Visual Acuity After Refraction (RE)	Frequency	Percentage
0.00-0.20	93	93.00
0.30-0.50	7	7.00
0.60-0.80	0	0.00
1.00	0	0.00
Total	100	100.00

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Table 18: Visual Acuity wise Distribution for Left Eye After Refraction

Visual Acuity After Refraction (LE)	Frequency	Percentage
0.00-0.20	95	95.00
0.30-0.50	5	5.00
0.60-0.80	0	0.00
1.00	0	0.00
Total	100	100.00

Table 19

		Autorefractometer Reading (RE)	Autorefractometer Reading (LE)	Visual Acuity Before Refraction (RE)	Visual Acuity Before Refraction (LE)	Visual Acuity After Refraction (RE)	Visual Acuity after Refraction (LE)
Screen Time	Pearson Correlation	-0.012	-0.079	-0.066	-0.067	-0.147	-0.078
	P-Value	0.906	0.435	0.516	0.510	0.147	0.445
	N	100	100	100	100	100	100

From above table it can be observed that, there is no significant correlation (association) observed between Screen time and various parameters.

Table 20

		Autorefractometer Reading (RE)	Autorefractometer Reading (LE)	Visual Acuity Before Refraction (RE)	Visual Acuity Before Refraction (LE)	Visual Acuity After Refraction (RE)	Visual Acuity after Refraction (LE)
Sleep Duration	Pearson Correlation	0.216	0.235	-0.197	-0.040	-0.162	0.005
	P-Value	0.031	0.019	0.051	0.695	0.109	0.961
	N	100	100	100	100	100	100

From above table it can be observed that, there is significant correlation (association) observed between Sleep Duration and Autorefractometer readings.

Discussion

The blue light emitted by a lot of digital devices, which can decrease the production of melatonin & causes delay in circadian rhythm of sleep at night that resulting in delayed sleep; poor sleep. Adequate sleep is important for learning, memory, attention & general wellbeing. So it is important to limit the exposure to digital screen. This type of study will provide unique perception into biological & environmental factors underlying myopia, which will help in early diagnosis & treatment of myopia.[13]

According to *Ayurveda*, intake of *Apathyakara* & *Achakshushya Ahar-Vihar* leads to increase in symptoms of disease & *Doshas* travels through *Siras* upto *Patals* in turn causing *Drushtimandya* i.e., *Timira*. Ayurveda described many treatment modalities in the form of *Pathyakara Ahar-Vihar, Kriyakalpa, Chakshushya* drugs & *Rasayana* etc.[14] According to modern medicine myopia can be corrected by optical treatment like concave lenses spectacles, contact lenses or by refractive surgery.[7]

This Observational study indicates there is no significant correlation observed between screen time & various parameters but we can see the significant correlation observed between sleep duration & autorefractometer readings.

Conclusion

This study has shown that there is no significant correlation (association) observed between Screen time and various parameters and also there is significant correlation (association) observed between Sleep Duration and Autorefractometer readings.

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