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SEVERITY OF HEADACHE WITH DIGITAL EYE STRAIN AMONG CALL CENTRE AGENTS DUE TO PROLONG SCREEN TIME AND ITS IMPACT ON WORK PRODUCTIVITY

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Abstract

Severity of Headache with Digital Eye strain Among Call Centre Agents due to prolong screen time and its impact on work productivity. A cross- sectional survey of prolong screen time and associated symptoms. Background With the increasing extent of work in call centers in Pakistan especially in Rawalpindi and Islamabad, a lot of students and youngsters are choosing this field. Due to increase in screen time and use of non-work devices and increment of digital eye strain symptoms has been seen. This study is conducted to seek the prevalence of digital eye strain symptoms and their severity due to prolong screen time. Previous studied have also been conducted on prevalence of digital eye strain symptoms but none of them aims to find out the severity and association of symptoms with work productivity. Determine the symptoms of digital eye strain. Assess the level of severity of symptoms. Identify the prevalence of symptoms regarding screen time. Evaluate the association of digital eye strain and headache. Associations of severity with prolong screen time. Also evaluate the impact of severity on work productivity. A cross-sectional survey was done using a convenient sampling technique. The sample size was 348 calculated through the open EPI tool. Data was collected from April to July from study settings of H&M Telesolutions, Mars BPO and other call centers. The tools used in the study were DES-Q and a self-generated questionnaire. Data Analysis IBM SPSS 21 sheet was used to analyze the data. Results People in the age of 26-35 mostly males were facing the

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symptoms of digital eye strain due to prolong screen time and use of non work devices. Association of headache with digital eye strain is highly significant and also having a slight impact on work productivity. In conclusion, the study reveals that prolong screen time causes symptoms of digital eye strain like headache, blurred vision, burning of eyes etc. Most of the time headache is significantly associated with severity of symptoms. Prevalence and severity of symptoms impact a slight effect on work productivity but it does not disturb the work efficiency if worker is not having other associated eye disease. Mostly participants think that these are common symptoms and not aware of digital eye strain. They do not visit any medical professional leave the symptoms to be alleviated on its own.

INTRODUCTION

Digital eye strain (DES) is an entity encompassing visual and ocular symptoms arising due to prolonged use of digital electronic devices. It is characterized by dry eyes, itching, foreign body sensation, watering, blurring of vision and headache. (Kaur, 2020).Broadly these symptoms can be classified into three categories:Ocular surface-related symptoms are secondary to reduce blink and related to dry eye. These symptoms typically include irritation/burning eyes, dry eyes, eye strain, headache, tired eyes, sensitivity to bright light and eye discomfort.Accommodation or vengeance-related symptoms are secondary to excessive work and related to anomalies of accommodation or binocular visual system. These symptoms include blurred near or distance vision after computer use, difficulty refocusing from one distance to another or diplopia.

Extra ocular symptoms include musculoskeletal symptoms include inconvenience in daily routine activities. These may include body discomfort like headache, neck or shoulder pain and back pain.

Now, even myopia progression has been linked to the digital eye strain in the children.

This would remain unique to pediatric population only. At this point, there is sufficient evidence to suggest that this may linked, but it would need further work to cement its place in the syndrome complex of digital eye strain. (Kaur, K.2020).

Despite advances in the management of headache disorders, some patients with migraine do not experience adequate pain relief with acute and preventive treatments. This correlates with higher burden and disability, as well as despair of patients who suffer from it. The mainstay of management is educating the patients about CVS and the various preventive measures. Some of them are the following: 1. Correction of any refractive error present 2.

The terms “refractory” and “intractable” headache have been used to describe this particular condition and various definitions have been suggested over time. However, wide acceptance of proposed definitions was not reached so far. Moreover, the International Classification of Headache Disorders (ICHD) neither includes a definition for refractory or resistant migraine nor for other primary headaches.

A previous consensus statement of European Headache Federation (EHF) defined as refractory migraine those chronic migraine patients who do not show response to adequate dosages of at least 3 drugs from the following classes: beta-blockers, anticonvulsants, tricyclics, onabotulinumtoxinA and others (e.g., flunarizine, candesartan) for at least 3 months each, in the absence of medication overuse. The aim of the present consensus paper is to critically revise the definition of those migraines which are difficult-to-treat, to help Healthcare Authorities in understanding the implications and to create a basis to develop a better pathophysiological understanding and to support further therapeutic advances. (Sacco, S. 2020).

Similarly, Portello et al also identified a clear split of computer related symptoms into two categories: those associated with accommodation (namely, blurred vision at near, blurred vision at distance after use of computer and difficulty focusing from one distance to another) and those that seemed to be linked to dry eye (irritated/burning eyes, dry eyes, eye strain, headache-tired eyes, sensitivity to light and eye discomfort). (Sheppard, A. L.2018).

Computer glasses were found to reduce the symptoms over a 15-week period study done on 79 VDT users. However, larger studies are required to see if they are effective. In a study done by Feĭgin et al., on 23 subjects,

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it was found that there was improvement of VF after 4 weeks of using the eye glasses with spectral filters. Commercially available blue light filtering spectacles have been suggested for protecting the eyes against blue light hazard as theoretically it reduces phototoxicity by 10.6%–23.6%, without affecting visual performances. Various studies on the effects of blue light filtering spectacles gave nonunanimous results. Therefore, there is a requirement for high-quality research, like a randomized control trial. 3. The mean luminance of the screen should not be less than the 1/3rd of the luminance of the room. Workers have promoted the use of flat screens and an antiglare cover. In school children with myopia, the use of screen filters improve overall functional indices after half an hour of computer use. 4. The recommended distance for various devices are mobile phones at a distance of 30 cm, desktop and laptop 60 cm, and television at 3 m. Sitting at a distance of 30″-40″ away from the computer screen helps in relaxing the eyes and reducing eyestrain. 5. The viewing angle of the computer should be adjusted 15° lower than the horizontal level to reduce musculoskeletal and visual discomfort. A good sitting posture should be maintained to avoid neck pain and back pain. 6. Increase in comfort and relaxation of the accommodative system is seen when frequent breaks is taken during computer use. Instead of taking longer breaks every 2 or 3 h it is better to take smaller breaks of 5–10 min more frequently. Practicing of 20-20-20 rule is recommended. After 20 min of working on the computer, the user should gaze into the distance of 20 feet or more for at least 20 s. This is believed to help in preventing eyestrain and improving the work efficiency. 7. Using lubricating eye drops helps in reducing the symptoms such as eyestrain, dryness, and difficulty focusing during prolong computer use.(Basur, J.2024).

Significance/Rationale of the study

Severity of Headache with Digital Eye strain Among Call Centre Agents due to prolong screen time and its impact on work productivity. A cross-sectional survey of prolong screen time and associated symptoms. Background With the increasing extent of work in call centers in Pakistan especially in Rawalpindi and Islamabad, a lot of students and youngsters are choosing this field. Due to increase in screen time and use of non-work devices and increment of digital eye strain symptoms has been seen. This study is conducted to seek the prevalence of digital eye strain symptoms and their severity due to prolong screen time.

Previous studied have also been conducted on prevalence of digital eye strain symptoms but none of them aims to find out the severity and association of symptoms with work productivity. Determine the symptoms of digital eye strain. Assess the level of severity of symptoms. Identify Gloria et al. 2017 conducted a situational analysis of visual ergonomics and ocular symptoms among call centre agents in city of tshwane call centre. Most participants (61.7%) viewed their screen from a distance greater than the recommended 50-70cm.(Tamenti 2017)

A survey was conducted by Shitole in 2017 on eye related complaints undertaken in call center agents in Pune. Among 180 participants, eyestrain (67.22%), headache (66.66%), and blurred vision (56.66%) were most common.Symptoms severity increased with longer computer use. (Shitole and Deshmukh 2017)

the prevalence of symptoms regarding screen time. Evaluate the association of digital eye strain and headache. Associations of severity with prolong screen time. Also evaluate the impact of severity on work productivity.

REVIEW OF LITERATURE

A survey was undertaken by S. Richard G in 2010 with agents employed in a call center in Metro Manila."A total of 277 respondents (mean age: 24.56 ± 4.14 years), comprising 130 males (47%) and 147 females (53%), participated in the study. The three most commonly reported eye-related complaints were eye strain or tiredness (68%), headaches (66%), and blurred vision (53%). Most symptoms lasted less than an hour, except for headaches."(Cabrera III and Siong 2010).

Sumeer Singhet al. 2021 conducted a study to investigate if blue-blocking lenses are effective in reducing the ocular signs and symptoms of eye strain associated with computer use. No adverse effect was documented.(Singh, Downie et al. 2021)

According to Sunil Neupane et al. in 2017 undertaken research on text neck syndrome- systematic review. Studies reported a noticeably variation in the scales related to neck pain and disability and also a greater incidence.(Neupane, Ali et al. 2017).

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In 2013, conducted a study by Mona Lisa Chanda on behavioral evidence for photophobia and stress-related ipsilateral head pain in transgenic Cacna1a mutant mice. Study suggesting that these mice experience stress-induced lateralized head pain (ie, migraines).(Chanda, Tuttle et al. 2013)

Devina Oodith et.al. 2012 executed research in University of KwaZulu-Natal (Westville Campus), Durban, South Africa to assess the impact of sick building syndrome among Call Centre Agents' Effectiveness. Sick Building Syndrome negatively effects the employee performance. Their study revealed that these environmental issues significantly reduce employee effectiveness and wellbeing. (Oodith and Parumasur 2012).

Yasir et al. 2023 carried out research to determine the status of Digital Eye Strain (DES) among medical college staff and medical students. A cross-sectional questionnaire-based study was conducted. DES is highly prevalent among medical students and medical staff. The dominant characteristics are female, age, hour of screen use, dry eye and refractive error (Yasir, Sharma et al. 2023).

In 2006 A research was conducted byPaul R. Martin DPhillto investigate the relationship between exposure and sensitivity as noise as a trigger for Headaches. The subjects attended a laboratory session divided into 3 stages: Preintervention test, intervention and postintervention test. There is a curvilinear relationship found between exposure length of trigger and pain response for individuals who do not suffer from regular headaches.(Martin, Reece et al. 2006).

In at el. 2009 undertaken research by Yen -HuiLin in Taiwan on physical discomfort and psychosocial job stress among male and female operators at telecommunication call centers. Long term working in call center associated with whole body discomfort (odds rates ranges from 1.65 to 2.15) (Lin, Chen et al. 2009).

A research on eye discomfort, headache and back pain among mayan Guatemalan women taking part in a randomized stove intervention trial by Esperanza Diaz in 2007 was significantly lower than control (95% CL 0.42 to 0.94,respectively).(Diaz, Smith-Sivertsen et al. 2007).

Leslie Kelman MD et al. 2005 conducted research on the examination of sleep pattern and complaints in a large clinical sample of migraineurs. Those people with the average sleep period of 6 hours are more likely to exhibit morning headaches on awakening.(Kelman and Rains 2005).

Tripathi conducted research on dry eye disease related to digital screen exposure in medical students. Based on OSDI scoring,59% (n=47) participants were normal , 28% (n=21) had mild DED,11% (N=9) had moderate , while 2% (N=2) had sever DED.(Tripathi, Agarwal et al. 2022)

Osama E Shalaby et al.in 2018 conducted research on ocular surface alterations in visual display terminal users. The position of VDT in regarding to the eye in addition to lighting used during VDT affects the ocular surface.(AWARA, OSAMA et al. 2018).

MATERIAL AND METHODOLOGY

STUDY DESIGN

The design of this study is Cross-sectional survey.

SAMPLING TECHNIQUE

Convenient sampling technique is used in this study.

STUDY SETTINGS

Delve Business network, IBEX Call center, Chinese Call Center, Dotcom BPO, Supra BPO, Mars BPO, Ravon, Meta Link BPO, Globe Call Center, H & M Telesolutions.

SAMPLE SIZE

The sample size is calculated via the Open EPI tool. The total population of

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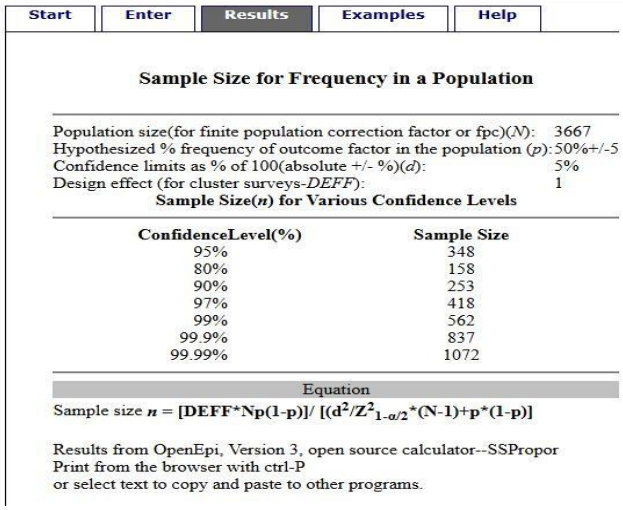
Rawalpindi and Islamabad is 4.7 million. 52% of this total population 4.7million people are the working age group according to our inclusion criteria.



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Sample Size for Frequency in a Population

Population size(for finite population correction factor or fpc)(*N*):	3667
Hypothesized % frequency of outcome factor in the population (*p*):	50%+/-5
Confidence limits as % of 100(absolute +/- %)(*d*):	5%
Design effect (for cluster surveys-*DEFF*):	1

Sample Size(*n*) for Various Confidence Levels

ConfidenceLevel(%)	Sample Size
95%	348
80%	158
90%	253
97%	418
99%	562
99.9%	837
99.99%	1072

Equation

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Results from OpenEpi, Version 3, open source calculator--SSPropor
Print from the browser with ctrl-P
or select text to copy and paste to other programs.

TUDY DURATION

Data is collected four months after synopsis approval.

INCLUSION CRITERIA

- Both Genders
- Age18-45
- Work duration 6-10 hours
- Working experience at least 3 months

EXCLUSION CRITERIA

- Preexisting eye problems
- Recent ocular surgery/injury
- Congenital eye problems

TOOLS

The tool used during the study is the DESQ (Digital eye strain Questionnaire) (Harshika et al.2023). The tool demonstrated excellent reliability (Cronbach's alpha 0.94). The ICC indicating retest reliability was 0.77(Ioanna Mylona et al 2022). DESQ validity was excellent (ICC: 0.86, 95%CI 0.81 to 0.91 (Christine Blome et al 2020).

ETHICAL CONSIDERATIONS

Researchers should sign the consent form (present in the appendix) from participants before collecting any data, the researcher should let the subject give his data voluntarily without any force. Keep the confidentiality of the patient's information. Do not harm the subject in any way, either psychologically, physically, or emotionally. Respect for the dignity of research participants.

RESULTS AND DISCUSSIONS

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FREQUENCIES:

TABLE 4.1.1 Prevalence of Age

Age in years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	153	44.0	44.0	44.0
	26-35	175	50.3	50.3	94.3
	36-45	20	5.7	5.7	100.0
	Total	348	100.0	100.0	

Table 4.1.1 shows that out of 348 participants age category 18-25 has a frequency of 153 and a percentage of 44.0, the age category 26-35 has a frequency of 175 and a percentage of 50.3, the age category 36-45 has a frequency of 20 and a percentage of 5.7.

Table 4.1.2 Prevalence of Gender

Gender of participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	112	32.2	32.2	32.2
	male	236	67.8	67.8	100.0
	Total	348	100.0	100.0	

Table 4.1.2 shows that out of 348 participants male have a frequency of 236 and a percentage of 67.8 while female have a frequency of 112 and a percentage of 32.2%.

Table 4.1.3 Prevalence of Working Hours

Working hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 2 hours	23	6.6	6.6	6.6
	2 to 4 hours	46	13.2	13.2	19.8
	4 to 6 hours	30	8.6	8.6	28.4
	more than 6 hours	249	71.6	71.6	100.0
	Total	348	100.0	100.0	

Table 4.1.3 shows that out of 348 participants, working hours category of less than 2 hours has frequency of 23 and a percentage of 6.6, the time category of 2 to 4 hours has frequency of 46 and a percentage of 13.2, the time category of 4 to 6 hours has a frequency of 30 and a percentage of 8.6, the time category of more than 6 hours has a frequency of 249 and a percentage of 71.6.

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Table 4.1.4 Prevalence of Usage of Digital Devices for Non-Work purposes

Usage of Digital Devices for Non-work purposes

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	Yes	263	75.6	75.6	75.6
	No	85	24.4	24.4	100.0
	Total	348	100.0	100.0	

Table 4.1.4 shows that out of 348 participants, the participants who use digital devices for non-work purposes have frequency of 263 and a percentage of 75.6, the people who do not use have frequency of 85 and a percentage of 24.4

Table 4.1.5 Prevalence of Usage of antiglare or blue light filter glass/screens

Usage of antiglare or blue light filter glass/screens

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	yes	116	33.3	33.3	33.3
	no	232	66.7	66.7	100.0
	Total	348	100.0	100.0	

Table 4.1.5 shows that out of 348 participants, the participant who use antiglare or blue light filter glass/screens have frequency of 116 and a percentage of 33.3, the people who do not use have frequency of 232 and a percentage of 66.7

Table 4.1.6 Prevalence of Regular Breaks

Prevalence of Regular Breaks

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	yes	159	45.7	45.7	45.7
	no	189	54.3	54.3	100.0
	Total	348	100.0	100.0	

Table 4.1.6 shows that out of 348 participants, 45.7% with a frequency of 159 take regular breaks and 54.3% with a frequency of 189 do not take regular breaks.

Table 4.1.7 Prevalence of Symptoms Affected your Work Productivity

Symptoms affected your work productivity

Frequency	Percent	Valid Percent	Cumulative Percent

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Valid	not at all	145	41.7	41.7	41.7
	slightly	135	38.8	38.8	80.5
	moderately	46	13.2	13.2	93.7
	significantl y	22	6.3	6.3	100.0
	Total	348	100.0	100.0	

Table 4.1.7 shows that out of 348 participants, the participants in category of "not at all" have frequency of 145 and a percentage of 41.7, the category of "slightly" has frequency of 135 and a percentage of 38.8, the category of "moderately" has frequency of 46 and a percentage of 13.2, the category of "significantly" has frequency of 22 and a percentage of 6.3.

Table 4.1.8 Prevalence of Professional Help

Professional help

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	yes	122	35.1	35.1	35.1
	no	226	64.9	64.9	100.0
	Total	348	100.0	100.0	

Table 4.1.8 shows that out of 348 participants, the 35.1% with a frequency of 122 took professional help against Digital Eye Strain; the 64.9% with a frequency of 226 do not take professional help.

Table 4.1.9 Prevalence of Relieving Eye Strain Symptoms

Relieving eye strain symptoms

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	resting eyes	158	45.4	45.4	45.4
	reducing screen time	90	25.9	25.9	71.3
	eye drops	41	11.8	11.8	83.0
	adjusting posture/uses glasses	44	12.6	12.6	95.7
	Other	15	4.3	4.3	100.0
	Total	348	100.0	100.0	

Table 4.1.9 shows that out of 348 participants, 45.4% with a frequency of 158 rested their eyes during work to relieve eye strain symptoms, 25.9% with a frequency of 90 reduced screen time, 11.8% with a frequency of 41 used eye drops, 12.6% with frequency of 44 adjusted their postures/used glasses, 4.3% with a frequency of 15 uses other methods or techniques to relieve their eye strain symptoms.

Table 4.1.10 Prevalence of Symptoms of Eye Strain and Headache

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Prevalence of Symptoms of Eye Strain and Headache

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	mild	215	61.8	61.8	61.8
	moderate	108	31.0	31.0	92.8
	severe	25	7.2	7.2	100.0
	Total	348	100.0	100.0	

Table 4.1.10 shows that out of 348 participants, 61.8% with a frequency of 215 have mild symptoms of Eye Strain and Headache, 31.0% with a frequency of 108 shows moderate, 7.2% with a frequency of 25 shows severe Symptoms of Eye Strain and Headache.

Table 4.1.11 Prevalence of Headache Associated with near Work

Headaches associated with near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	91	26.1	26.1	26.1
	mild	130	37.4	37.4	63.5
	moderate	70	20.1	20.1	83.6
	severe	25	7.2	7.2	90.8
	very severe	32	9.2	9.2	100.0
	Total	348	100.0	100.0	

Table 4.1.11 shows that out of 348 participants, 26.1% participants with a frequency of 91 shows no headache associated with near work, 37.4% with a frequency of 130 shows mild association, 20.1% with a frequency of 70 shows moderate association, 7.2% with a frequency of 25 has severe association, 9.2% with a frequency of 32 shows very severe association of headache with near work.

Table 4.1.12 Prevalence of Headache Associated with Far Vision

Headaches associated with far vision

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	128	36.8	36.8	36.8
	mild	86	24.7	24.7	61.5
	moderate	83	23.9	23.9	85.3
	severe	27	7.8	7.8	93.1
	very severe	24	6.9	6.9	100.0
	Total	348	100.0	100.0	

Table 4.1.12 shows that out of 348 participants, 36.8% with a frequency of 128 showed no association of headache with far vision, 24.7% with a frequency of 86 shows mild association, 23.9% with a frequency of 83

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shows moderate association, 7.8% with a frequency of 27 shows severe association, 6.9% with a frequency of 24 shows very severe association of headache with far vision.

Table 4.1.13 Prevalence of Eye Fatigue Associated with near work

Eye fatigue associated with near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	93	26.7	26.7	26.7
	mild	108	31.0	31.0	57.8
	moderate	76	21.8	21.8	79.6
	severe	41	11.8	11.8	91.4
	very severe	30	8.6	8.6	100.0
	Total	348	100.0	100.0	

Table 4.1.13 shows that out of 348 participants, 26.7% with a frequency of 93 shows no association of eye fatigue with near work, 31.0% with a frequency of 108 shows mild association, 21.8% with a frequency of 76 shows moderate association, 11.8% with a frequency of 41 shows severe association, 8.6% with a frequency of 30 shows very severe association of eye fatigue with near work.

Table 4.1.14 Prevalence of Eye Fatigue Associated with Far Work

Eye fatigue associated with far work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	116	33.3	33.3	33.3
	mid	79	22.7	22.7	56.0
	moderate	91	26.1	26.1	82.2
	severe	30	8.6	8.6	90.8
	very severe	32	9.2	9.2	100.0
	Total	348	100.0	100.0	

Table 4.1.14 shows that out of 348 participants, 33.3% with a frequency of 116 shows no association of eye fatigue with far work, 22.7% with a frequency of 79 shows mild association, 26.1% with a frequency of 91 shows moderate association, 8.6% with a frequency of 30 shows severe association, 9.2% with a frequency of 32 shows very severe association of eye fatigue with far work.

Table 4.1.15 Prevalence of Blurred Vision with Near Work

Blurred vision at near

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	124	35.6	35.6	35.6
	mild	95	27.3	27.3	62.9
	moderate	77	22.1	22.1	85.1

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	severe	34	9.8	9.8	94.8
	very severe	18	5.2	5.2	100.0
	Total	348	100.0	100.0	

Table 4.1.15 shows that out of 348 participants, 35.6% with a frequency of 124 shows no association of blurred vision with near work, 27.3% with a frequency of 95 shows mild association, 22.1% with a frequency of 77 shows moderate association, 9.8% with a frequency of 34 shows severe association, 5.2% with a frequency of 18 shows very severe association of blurred vision at near work.

Table 4.1.16 Prevalence of Blurred vision at Far Work
Blurred vision at far

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	106	30.5	30.5	30.5
	mild	99	28.4	28.4	58.9
	moderate	72	20.7	20.7	79.6
	severe	41	11.8	11.8	91.4
	very severe	30	8.6	8.6	100.0
	Total	348	100.0	100.0	

Table 4.1.16 shows that out of 348 participants, 30.5% with a frequency of 106 shows no association of blurred vision with far work, 28.4% with a frequency of 99 shows mild association, 20.7% with a frequency of 72 shows moderate association, 11.8% with a frequency of 41 shows severe association, 8.6% with a frequency of 30 shows very severe association of blurred vision at far work.

Table 4.1.17 Prevalence of Watery Eyes at Near Work
Watery eyes (tearing) at near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	130	37.4	37.4	37.4
	mild	78	22.4	22.4	59.8
	moderate	70	20.1	20.1	79.9
	severe	45	12.9	12.9	92.8
	very severe	25	7.2	7.2	100.0
	Total	348	100.0	100.0	

Table 4.1.17 shows that out of 348 participants, 37.4% with a frequency of 130 shows no association of watery eyes with near work, 22.4% with a frequency of 78 shows mild association, 20.1% with a frequency of 70 shows moderate association, 12.9% with a frequency of 45 shows severe association, 7.2% with a frequency of 25 shows very severe association of watery eyes with near work.

Table 4.1.18 Prevalence of Watery Eyes at Far Work

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Watery eyes (tearing) at far work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	132	37.9	37.9	37.9
	mild	94	27.0	27.0	64.9
	moderate	63	18.1	18.1	83.0
	severe	34	9.8	9.8	92.8
	very severe	25	7.2	7.2	100.0
	Total	348	100.0	100.0	

Table 4.1.18 shows that out of 348 participants, 37.9% with a frequency of 132 shows no association of watery eyes at far work, 27.0% with a frequency of 94 shows mild association, 18.1% with a frequency of 63 shows moderate association, 9.8% with a frequency of 34 shows severe association, 7.2% with a frequency of 25 shows very severe association of watery eyes at far work.

Table 4.1.19 Prevalence of Double Vision Associated with Near Work

Double vision associated with near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	138	39.7	39.7	39.7
	mild	90	25.9	25.9	65.5
	moderate	70	20.1	20.1	85.6
	severe	26	7.5	7.5	93.1
	very severe	24	6.9	6.9	100.0
	Total	348	100.0	100.0	

Table 4.1.19 shows that out of 348 participants, 39.7% with a frequency of 138 shows no association of double vision with near work, 25.9% with a frequency of 90 shows mild association, 20.1% with a frequency of 70 shows moderate association, 7.5% with a frequency of 26 shows severe association, 6.9% with a frequency shows very severe association of double vision with near work.

Table 4.1.20 Prevalence of Double Vision Associated with Far work

Double vision associated with far work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	137	39.4	39.4	39.4
	mild	93	26.7	26.7	66.1
	moderate	50	14.4	14.4	80.5
	severe	46	13.2	13.2	93.7
	very severe	22	6.3	6.3	100.0
	Total	348	100.0	100.0	

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Table 4.1.20 shows that out of 348 participants, 39.4% with a frequency of 137 shows no association of double vision with far work, 26.7% with a frequency of 93 shows mild association, 14.4% with a frequency of 50 shows moderate association, 13.2% with a frequency of 46 shows severe association, 6.3% with a frequency of 22 shows very severe association of double vision with far work.

Table 4.1.21 Prevalence of Flashes of Light
Flashes of light

	Frequency		Percent	Valid Percent	Cumulative Percent
Valid	never	113	32.5	32.5	32.5
	mild	95	27.3	27.3	59.8
	moderate	86	24.7	24.7	84.5
	severe	41	11.8	11.8	96.3
	very severe	13	3.7	3.7	100.0
	Total	348	100.0	100.0	

Table 4.1.21 shows that out of 348 participants, 32.5% with a frequency of 113 shows no prevalence of flashes of light, 27.3% with a frequency of 95 shows mild, 24.7% with a frequency of 86 shows moderate, 11.8% with a frequency of 41 shows severe, 3.7% with a frequency of 13 shows very severe prevalence of flashes of light.

Table 4.1.22 Prevalence of Eye Strain with Near Work
Eyestrain with near work

	Frequency		Percent	Valid Percent	Cumulative Percent
Valid	never	101	29.0	29.0	29.0
	mild	62	17.8	17.8	46.8
	moderate	140	40.2	40.2	87.1
	severe	29	8.3	8.3	95.4
	very severe	16	4.6	4.6	100.0
	Total	348	100.0	100.0	

Table 4.1.22 shows that out of 348 participants, 29.0% with a frequency of 101 shows no prevalence of eye strain with near work, 17.8% with a frequency of 62 shows mild, 40.2% with a frequency of 140 shows moderate, 8.3% with a frequency of 29 shows severe, 4.6% with a frequency of 16 shows very severe prevalence of eye strain with near work.

Table 4.1.23 Prevalence of Eye Strain with Far Work
Eyestrain with far work

	Frequency		Percent	Valid Percent	Cumulative Percent
Valid	never	96	27.6	27.6	27.6

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	mild	121	34.8	34.8	62.4
	moderate	80	23.0	23.0	85.3
	severe	35	10.1	10.1	95.4
	very severe	16	4.6	4.6	100.0
	Total	348	100.0	100.0	

Table 4.1.23 shows that out of 348participants, 27.6% with a frequency of 96 shows no association of eye strain with far vision, 34.8% with a frequency of 121 shows mild, 23.0% with a frequency of 80 shows moderate, 10.1% with a frequency of 35 shows severe, 4.6% with a frequency of 16 shows very severe association of eye strain with far vision.

Table 4.1.24 Prevalence of Redness around Eye
Redness around eye

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	129	37.1	37.1	37.1
	mild	91	26.1	26.1	63.2
	moderate	67	19.3	19.3	82.5
	severe	38	10.9	10.9	93.4
	very severe	23	6.6	6.6	100.0
	Total	348	100.0	100.0	

Table 4.1.24 shows that out of 348 participants, 37.1% with a frequency of 129 shows no prevalence of redness around eye, 26.1% with a frequency of 91 shows mild, 19.3% with a frequency of 67 shows moderate, 10.9% with a frequency of 38 shows severe, 6.6% with a frequency of 23 shows very severe prevalence of redness around eye.

Table 4.1.25 Prevalence of Eye Pain with Near Work
Eye pain with near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	119	34.2	34.2	34.2
	mild	82	23.6	23.6	57.8
	moderate	79	22.7	22.7	80.5
	severe	47	13.5	13.5	94.0
	very severe	21	6.0	6.0	100.0
	Total	348	100.0	100.0	

Table 4.1.25 shows that out of 348 participants, 34.2% with a frequency of 119 shows no prevalence of eye pain with near work, 23.6% with a frequency of 82 shows mild, 22.7% with a frequency of 79 shows moderate, 13.5% with a frequency of 47 shows severe, 6.0% with a frequency of 21 shows very severe association of eye pain with near work.

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Table 4.1.26 Prevalence of Eye Pain with Far Work

Eye pain with far work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	134	38.5	38.5	38.5
	mild	89	25.6	25.6	64.1
	moderate	74	21.3	21.3	85.3
	severe	31	8.9	8.9	94.3
	very severe	20	5.7	5.7	100.0
	Total	348	100.0	100.0	

Table 4.1.26 shows that out of 348 participants, 38.5% with a frequency of 134 shows no prevalence of eye pain with far work, 25.6% with a frequency of 89 shows mild, 21.3% with a frequency of 74 shows moderate, 8.9% with a frequency of 31 shows severe, 5.7% with a frequency of 20 shows very severe association of eye pain with far work.

Table 4.1.27 Prevalence of Difficulty tracking Objects during Reading or Near Work

Difficulty tracking objects during reading or near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	140	40.2	40.2	40.2
	mild	85	24.4	24.4	64.7
	moderate	77	22.1	22.1	86.8
	severe	23	6.6	6.6	93.4
	very severe	23	6.6	6.6	100.0
	Total	348	100.0	100.0	

Table 4.1.27 shows that out of 348 participants, 40.2% with a frequency of 140 shows no prevalence of difficulty tracking objects during reading or near work, 24.4% with a frequency of 85 shows mild, 22.1% with a frequency of 77 shows moderate, 6.6% with a frequency of 23 shows severe, 6.6% with a frequency of 23 shows very severe association of difficulty tracking objects during reading or near work.

Table 4.1.28 Prevalence of Difficulty tracking Objects during Reading or Far Work

Difficulty tracking objects during far vision

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	134	38.5	38.5	38.5
	mild	96	27.6	27.6	66.1
	moderate	67	19.3	19.3	85.3
	severe	26	7.5	7.5	92.8
	very severe	25	7.2	7.2	100.0
	Total	348	100.0	100.0	

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Table 4.1.28 shows that out of 348 participants, 38.5% with a frequency of 134 shows no prevalence of difficulty tracking objects during far vision, 27.6% with a frequency of 96 shows mild, 19.3% with a frequency of 67 shows moderate, 7.5% with a frequency of 26 shows severe, 7.2% with a frequency of 25 shows very severe prevalence of difficulty tracking objects during far vision.

Table 4.1.29 Prevalence of Burning Sensation with Near Work

Burning sensation with near work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	151	43.4	43.4	43.4
	mild	89	25.6	25.6	69.0
	moderate	62	17.8	17.8	86.8
	severe	30	8.6	8.6	95.4
	very severe	16	4.6	4.6	100.0
	Total	348	100.0	100.0	

Table 4.1.29 shows that out of 348 participants, 43.4% with frequency of 151 shows no prevalence of burning sensation with near work, 25.6% with a frequency of 89 shows mild, 17.8% with a frequency of 62 shows moderate, 8.6% with a frequency of 30 shows severe, 4.6% with a frequency of 16 shows very severe prevalence of burning sensation with near work.

Table 4.1.30 Prevalence of Burning Sensation with Far Work

Burning sensation with far work

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	146	42.0	42.0	42.0
	mild	103	29.6	29.6	71.6
	moderate	45	12.9	12.9	84.5
	severe	42	12.1	12.1	96.6
	very severe	12	3.4	3.4	100.0
	Total	348	100.0	100.0	

Table 4.1.30 shows that out of 348 participants, 42.0% with a frequency of 146 shows no prevalence of burning sensation with far vision, 29.6% with a frequency of 103 shows mild, 12.9% with a frequency of 45 shows moderate, 12.1% with a frequency of 42 shows severe, 3.4% with a frequency of 12 shows very severe prevalence of burning sensation with far vision.

Table 4.1.31 Association of Headache and Eye Strain with Near Work

Chi-Square Tests

Value		df	Asymptotic Significance (2-sided)
Pearson Chi-Square	59.328[a]	16	<.001
Likelihood Ratio	59.878	16	<.001

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Linear-by-Linear Association	22.094	1	<.001
N of Valid Cases	348		

Table 4.1.31 shows association of headache and eye strain with near work. The P value is <.001 indicating that association is highly significant.

Table 4.1.32 Association of Headache and Eye Strain with Far Work

Chi-Square Tests

Value		df	Asymptotic Significance (2-sided)
Pearson Chi-Square	55.461[a]	16	<.001
Likelihood Ratio	56.289	16	<.001
Linear-by-Linear Association	39.645	1	.000
N of Valid Cases	348		

Table 4.1.32 shows association of headache and eye strain with Far work. The P value is <.001 indicating that association is highly significant.

Table 4.1.33 Association of Headache and Eye Strain with Far Work

Chi-Square Tests

Value		df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.970[a]	6	<.002
Likelihood Ratio	8.230	6	.222
Linear-by-Linear Association	.427	1	.513
N of Valid Cases	348		

Table 4.1.33 shows association of symptoms of eye strain and headache with respect to working hours. The P value is <.001 indicating that association is highly significant.

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Chi-Square Tests

Table 4.1.34 Association of Symptoms of Eye Strain and Headache with respect

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.082a	6	<.001
Likelihood Ratio	24.320	6	.000
Linear-by-Linear Association	15.814	1	.000
N of Valid Cases	348		

Table 4.1.34 shows association of symptoms of eye strain and headache with respect to work productivity. The P value is <.001 indicating that association is highly significant.

RESULTS

Table 4.1.1 shows that participants with age categories 26-35 have high frequency of 175(50.3%) than others. Table 4.1.2 shows males participated more than females having a frequency of 236 (67.8%). Table 4.1.3 shows that participants with frequency of 249(71.6%) worked more than 6 hours. Table 4.1.4 shows that usage of digital devices for non-work purposes among participants have high frequency of 263(75.6%). Table 4.1.5 shows that participants have less frequency of 116(33.3%) of usage of anti-glare glasses or blue light filter glass/screens. Table 4.1.6 shows that participants who do not take regular breaks have high frequency of 189(54.3%). Table 4.1.7 shows that eye strain symptoms have no effect on work productivity with a frequency of 145(41.7%).

Table 4.1.8 shows that 226 participants with a percentage of 64.9% do not take professional help. Table 4.1.9 shows that out of 348 participants, 158 participants rested their eye to relieve their eye strain symptoms. Table 4.1.10 shows that 215(61.8%) shows mild prevalence of eye strain symptoms and headache. Table 4.1.11 shows that out of 348 participants 130(37.4%) shows mild headache associated with near work. Table 4.1.12 shows that 36.8% participants shows no association of headache with far vision. Table 4.1.13 shows that out of 348 participants 108(31.0%) shows mild association of eye fatigue with near work. Table 4.1.14 shows that for frequency of eye fatigue associated with far work answering in "never" is high with 116(33.3%). Table 4.1.15 shows that 124(35.6%) answering in "never" for frequency of blurred vision at near. Table 4.1.16 shows that 106(30.5%) participants answering "never" for frequency of blurred vision at far. Table 4.1.17 shows that 130 participants out of 348 having no association of watery eyes at near work. Table 4.1.18 shows that out of 348 participants 132(37.9%) answering "never" for frequency of watery eyes at far work. Table 4.1.19 shows that 138(39.7%) shows no prevalence of double vision at near work. Table 4.1.20 shows that out of 348, 39.4% answering "never" for frequency of double vision at far work. Table 4.1.21 shows that 113(32.5%) participants have no flashes of light. Table 4.1.22 shows that 140(40.2%) out of 348 having moderate eye strain at near work. Table 4.1.23 shows that 121(34.8%) out of 348 having mild eye strain at far work. Table 4.1.24 shows that high percentage (37.1%) participants having no redness around eyes. Table 4.1.25 shows that 119(34.2%) out of 348 answering "never" for frequency of eye pain with near work. Table 4.1.26 shows that 134(38.5%) out of 348 answering "never" for frequency of eye pain with far work. Table 4.1.27 shows that for the frequency of difficulty in tracking objects during reading or near, 140(40.2%) out 348 answering "never". Table 4.1.28 shows that for the frequency of difficulty in tracking objects during reading or far vision, 138(38.5%) out 348 answering "never". Table 4.1.29 shows that 151(43.4%) participants answering "never" for the frequency of burning sensation with near work. Table 4.1.30 shows that 146(42.0%) participants answering "never" for the frequency of burning sensation with far work. Table 4.1.31 shows

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association of eye strain and headache at near work that is highly significant with P value >0.001. Table 4.1.32 shows association of headache and eye strain at far work with significance less than 0.001. Table 4.1.33 shows association of eye strain symptoms and headache with respect to working hours is highly significance due to P is >0.001. Table 4.1.34 shows high significance of association of eye strain symptoms with work productivity.

DISCUSSIONS

According to the data there were different age groups including both male and female. Age group varies from 18-45. According to results of our study the most affected age group by eye strain symptoms is ranging from 26-35 which is higher than as compared to the study conducted in Riyadh, SAU (Maneea, M. W. B.2024). As both males and females were considered, according to results most affected gender is males but according to a study conducted in Colombia most affected gender was female (Munoz-Ceron, J.2018).

As we look for results of eye strain symptoms and headache those are the most significant factors of our study, eye strain with near work showing moderate and with far work showing mild level of severity and headache with near and far work showing mild and normal stages respectively. But when compare the results with a study conducted by Army Medical College comparatively related by showing mild level of headache and eye strain (Maroof, S.2019).

Association of Eye strain and headache shows moderate and mild relation according to near and far work that is highly significant as P value is >0.001 with respect to results of previous study. Prolong screen time and use of devices for non-work purposes are majorly contributing factors for symptoms of eye strain and headache, partially having impact on work productivity. Most of the participants suffering from the symptoms like headache, burning sensation, blurred vision and watery eyes do not seek professional medical help and leave the symptoms to be treated on their own. A large number of participants do not take regular breaks to relieve their eye strain symptoms and improve work productivity.

According to research data and results, severity of symptoms of eye strain and headache varies according to working time consuming daily on screen. While exploring the digital eye strain symptoms most common symptom is headache that is comparative as shown in previous study.

Second most common eye strain symptom is eye fatigue with near work comparatively associated with previous study showing most prevalent eye strain symptoms.

In our study other common symptoms are burning sensations with near and far work and blurred vision respectively. Results of these symptoms are comparatively related to studies conducted on frequency of eye strain symptoms (Maneea, M. W. B.2024).

CONCLUSION

In conclusion, research shows that symptoms of eye strain like blurred vision, burning of eyes, redness of eyes, eye fatigue and headache are most prevalent due to prolong screen time.

In addition, the association of digital eye strain and headache is highly significant and slightly affecting the work productivity due high working hours. Most of the participants do not regular breaks and professional help to relieve eye strain symptoms but they simply rest their eye and reduce screen time. Additionally usage of digital devices for non work purposes also affects the work productivity.

Digital eye strain (DES) is an entity encompassing visual and ocular symptoms arising due to prolonged use of digital electronic devices. Digital eye strain has been used synonymously with ocular asthenopia secondary to digital devices, computer vision syndrome, eye strain post computer or mobile usage or even visual fatigue. The most common symptom is a sense of eye discomfort. It is characterized by dry eyes, itching, foreign body sensation, watering, blurring of vision and headache. Headache is the painful irritation disturbing the work productivity and most common symptom of digital eye strain. Due to increment in extent of call centers, most of the students and youngsters are suffering from eye strain symptoms.

The study aims to find out the prevalence of eye strain symptoms and headache. Also to identify the association of headache and eye strain symptoms with respect to working hours and work productivity.

Prevalence of eye strain symptoms and headache is highly considerable to identify the preventive measurements and therapeutic managements. Literature review shows prevalence of eye strain symptoms but our study mainly focuses on severity of symptoms and their association with headache and working hours and impact on work productivity.

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LIMITATIONS

- Following are the limitations of our study;
- Data was collected only from Rawalpindi ad Islamabad, limiting generalizability to other regions.
- Impact on work productivity was reported as “slight” but not quantitatively measured beyond perception based questions.
- Individuals with Pre-existing eye conditions were excluded which could omit significant segments of the affected populations.
- Data was not collected properly due to permission issues from call centers authorities.
- Poor literacy rate.

RECOMMENDATIONS

- Use objective tools to measure work productivity.
- Use a larger and more diverse sample from different cities and professions.
- Include clinical eye checkups along with the questionnaires.
- Compare digital eye strain in other job types like students or office workers.

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