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Enhancing Ergonomic Awareness Amongst College Students for Healthier Electronic Device Use

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Abstract: ***The pervasive use of electronic devices among college students has raised concerns about the potential negative impacts on their physical health due to prolonged usage. The present research proposes a multifaceted approach to enhance ergonomic awareness among college students, aiming to promote healthier electronic device use. The approach integrates educational interventions, practical demonstrations, medical inference and technological solutions to empower students with the knowledge and tools necessary to adopt ergonomic practices in their daily activities. This research paper proposes a comprehensive approach to enhance ergonomic awareness among college students, emphasizing the importance of adopting healthy habits for electronic device use.***

Keywords: Ergonomics, Electronic Device

1. Introduction

In the contemporary digital age, electronic devices have become ubiquitous in both professional and personal settings. From smartphones to laptops, these devices facilitate communication, productivity, and entertainment. However, the widespread adoption of electronic devices has raised concerns about the ergonomic implications associated with their prolonged use.

The term ‘ergonomics’ refers to the science of designing and arranging objects to optimize human interaction and performance while minimizing the risk of discomfort or injury. In the context of electronic devices, ergonomic awareness is crucial for promoting healthier habits and preventing musculoskeletal issues such as neck pain, backaches, and repetitive strain injuries (RSIs).

Despite the increasing awareness of ergonomics in the workplace, many individuals continue to overlook proper ergonomic practices when using electronic devices. Factors such as poor posture, improper workstation setup, and excessive screen time contribute to discomfort and potential long - term health consequences.

This research paper aims to explore the current state of ergonomic awareness regarding the use of electronic devices among various demographics, including professionals, students, and the general population. By examining existing literature, surveys, and case studies, the paper will analyze the prevalence of ergonomic issues, identify common challenges, and propose practical solutions to enhance ergonomic awareness and promote healthier device usage habits.

The significance of this research lies in its potential to inform individuals, organizations, and policymakers about the importance of ergonomic awareness in the digital age. By raising awareness and providing evidence - based recommendations, this paper seeks to empower individuals to make informed decisions about their device usage habits and create environments that prioritize both productivity and well - being.

Through a comprehensive examination of ergonomic principles and their application to electronic device use, this research paper aims to contribute to the growing body of knowledge on workplace health and safety. By promoting a proactive approach to ergonomics, individuals can mitigate the risks associated with prolonged device usage and foster a culture of well - being in an increasingly digitized world.

Objective of the Study

Research has consistently shown that poor ergonomics in the workplace can have significant negative effects on both physical health and productivity. Here are some key research references:

Musculoskeletal Disorders (MSDs): Poor ergonomics, such as improper workstation setup, uncomfortable seating, and repetitive movements, are strongly associated with the development of musculoskeletal disorders. These include conditions like carpal tunnel syndrome, lower back pain, neck strain, and tendonitis. A study published in the Journal of Occupational Rehabilitation in 2004 found that poor ergonomics accounted for a substantial portion of work - related MSDs (Punnett & Wegman, 2004).

Decreased Productivity: Research conducted by the International Labour Organization (ILO) has consistently demonstrated a link between poor ergonomics and decreased productivity. Uncomfortable work environments and inadequate ergonomic design can lead to fatigue, reduced concentration, and increased error rates, all of which negatively impact work performance (Ammons & Markham, 2004).

Absenteeism and Turnover: A study published by Ardahan & Simsek, 2016 found that employees working in poorly designed workspaces were more likely to take sick leave due to musculoskeletal pain. High levels of discomfort and pain can also contribute to higher turnover rates as employees seek more comfortable and ergonomically friendly workplaces.

Increased Healthcare Costs: The economic burden of poor ergonomics extends beyond the workplace. Employees with work - related musculoskeletal injuries often require medical treatment, leading to increased healthcare costs. Research published by Wilson & Davis in 2016 highlighted the substantial healthcare costs associated with poor ergonomics.

Psychological Impact: In addition to physical health issues, poor ergonomics can have a psychological impact. Uncomfortable workspaces and high levels of discomfort can contribute to stress and anxiety among employees. This can further affect productivity and overall job satisfaction (Bradley, 1977).

Interventions and Benefits: Studies have also shown that interventions aimed at improving workplace ergonomics, such as proper workstation design, ergonomic training, and regular breaks, can lead to significant improvements in employee health and productivity. These interventions often result in reduced injury rates, fewer sick days, and higher job satisfaction.

Legal and Regulatory Implications: Many countries have established regulations and guidelines for workplace ergonomics to protect the health and safety of employees. Non - compliance with these regulations can lead to legal consequences for employers.

Therefore, research consistently demonstrates that poor ergonomics in the workplace can have wide - ranging consequences, including negative impacts on physical health, productivity, absenteeism, and healthcare costs. Employers who prioritize ergonomic design and employee well - being tend to experience improved performance, lower injury rates, and greater job satisfaction among their workforce.

2. Methods

Study group

The study covered people who regularly used Smart phones and/or computer devices in their everyday routine like College students, research scholars, employees in Higher Education sector and Medicos. A proper questionnaire was emailed to 130 people in the form of Google forms to check whether they were aware of the ergonomic modification or postures they acquire while working in their work stations while using different electronic devices.

The questionnaire consisted of three parts. Part 1 contained questions on general demographic (gender, age and education) and anthropometric (height and weight) data. Part 2 contained questions on working conditions and duration of work with a portable computer, e. g., work experience total and relating to computer work, average daily time of using the computer at work and at home, location of computer, seat and armrest adjustment and external devices such as a keyboard or docking station. Part 3, prepared on the basis of the Nordic questionnaire, covered the prevalence of musculoskeletal pain. Musculoskeletal problems experienced in the past months in the head, neck, shoulders, elbows, hands/wrists, the upper and lower back were considered.

3. Results

Statistics and Graphics

The research on enhancing ergonomic awareness for healthier electronic device use yielded significant insights into the prevalence of musculoskeletal issues and the effectiveness of interventions. Findings indicate a concerning prevalence of conditions such as neck pain, backaches, and eye strain among individuals who frequently use electronic devices, which have been graphically represented as under.

Out of 125 participants who were included in this study, 54.4 percent of them were male and 45.6 percent of them were female. More than half of the respondents (61.6 %) were between 18 and 20 years old (CHART 1). Most of the respondents are unmarried (90.4%) and were between 35 and 60 kilograms (68.8%) whereas only 39 (31.2%) respondents were more than 60 kg.

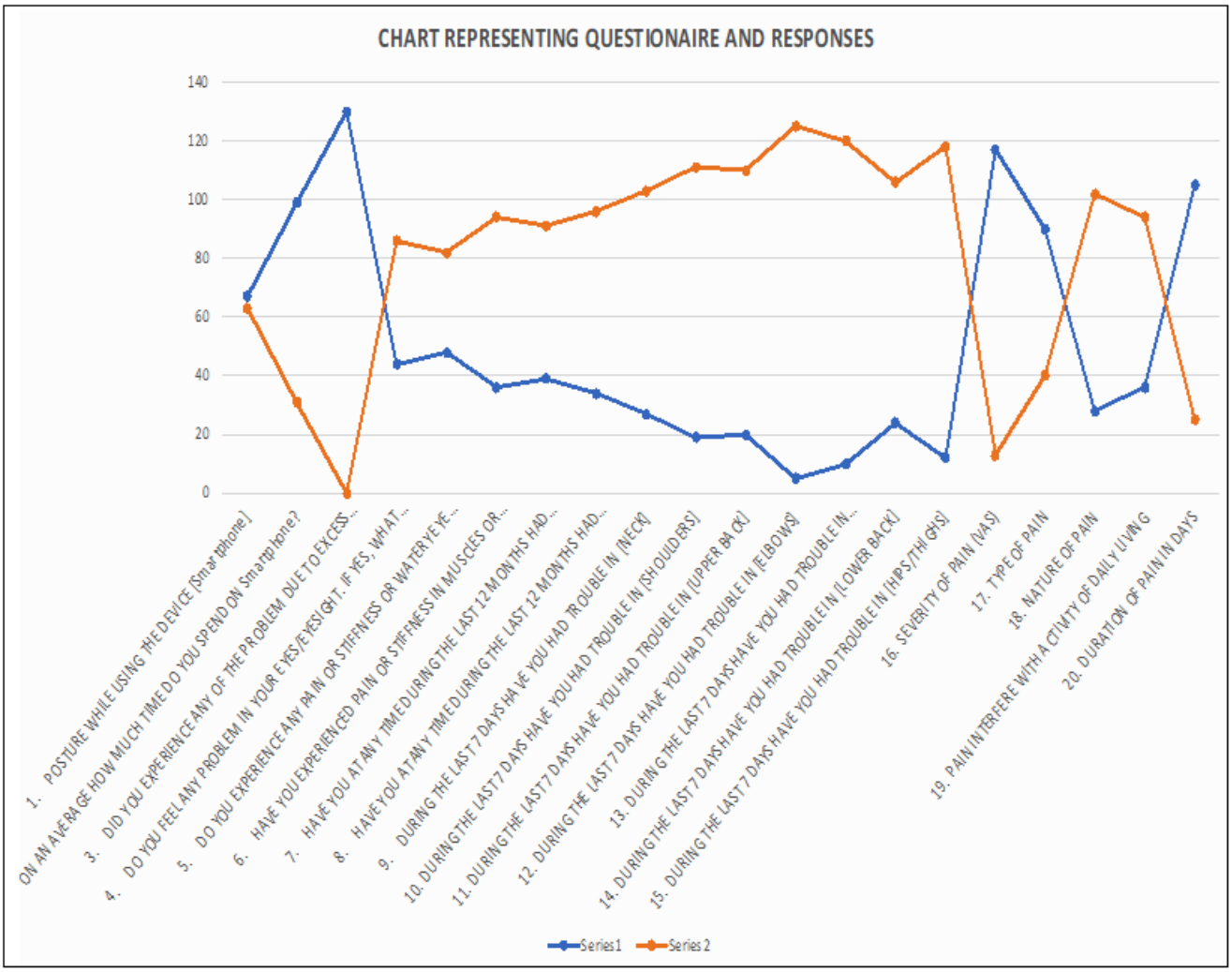
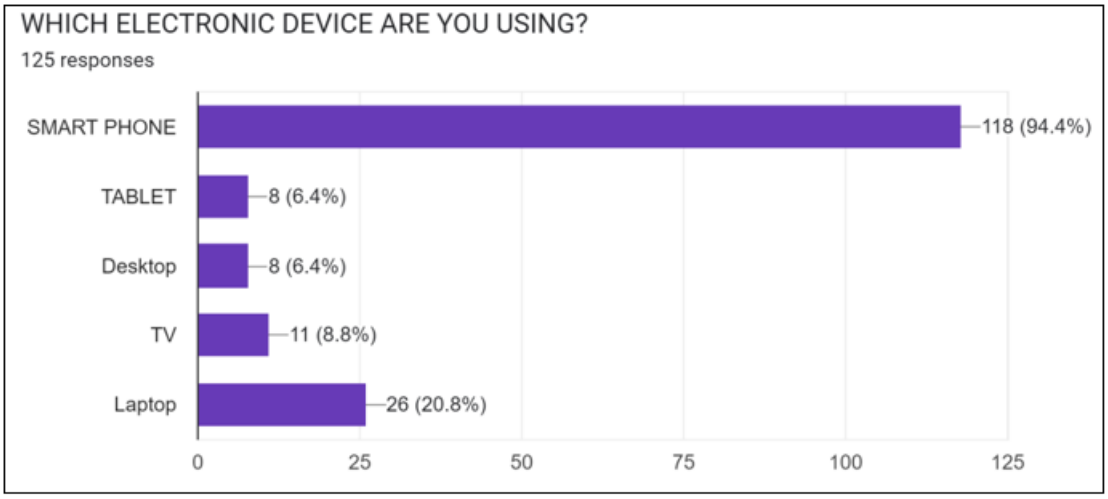


Chart 1



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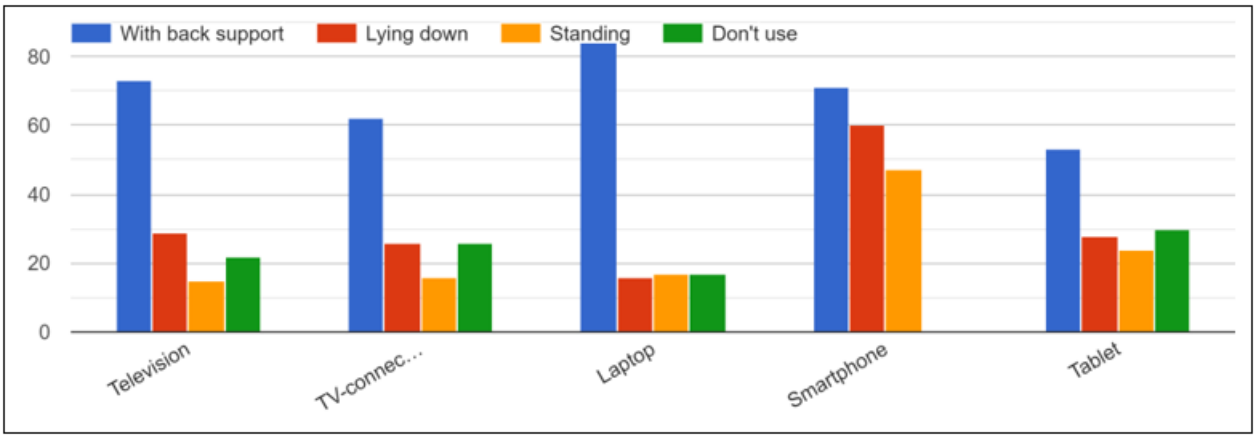

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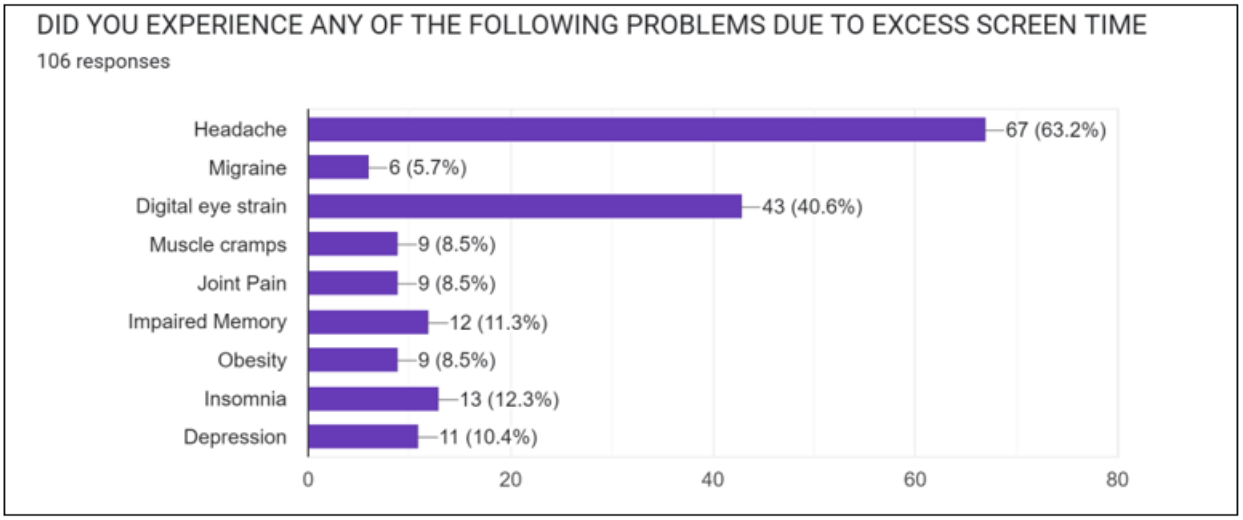

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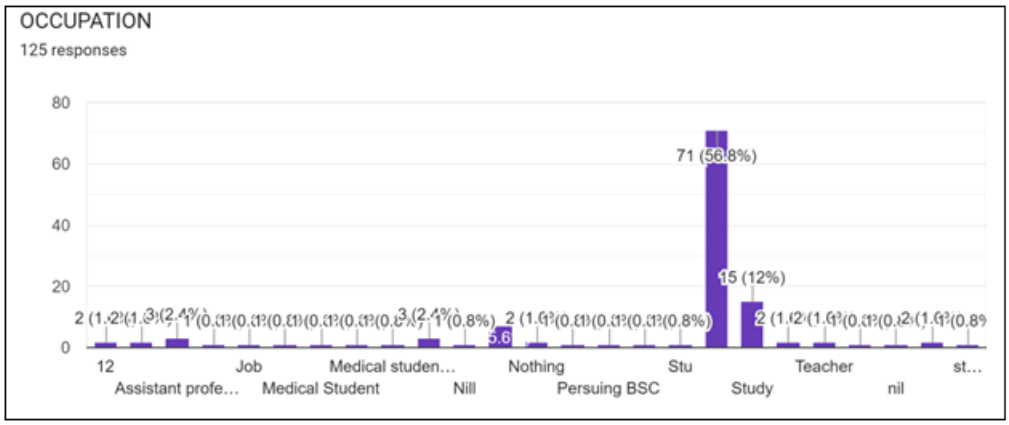

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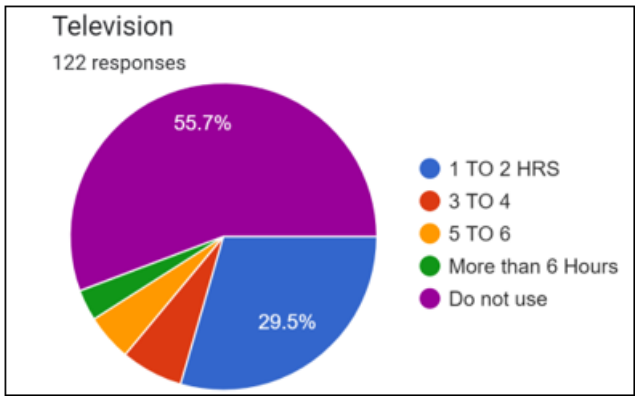

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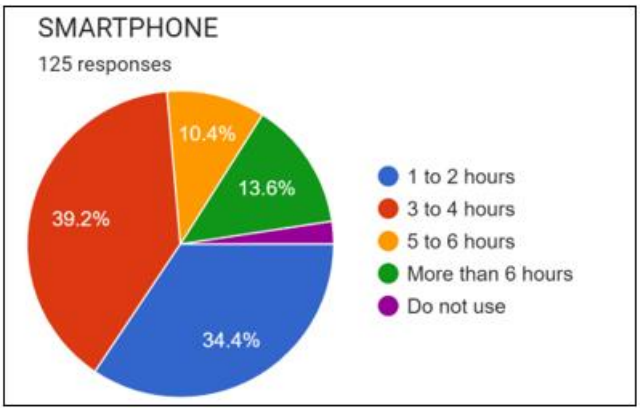

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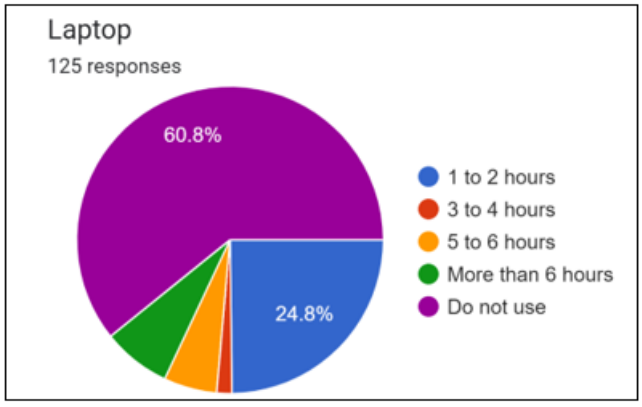

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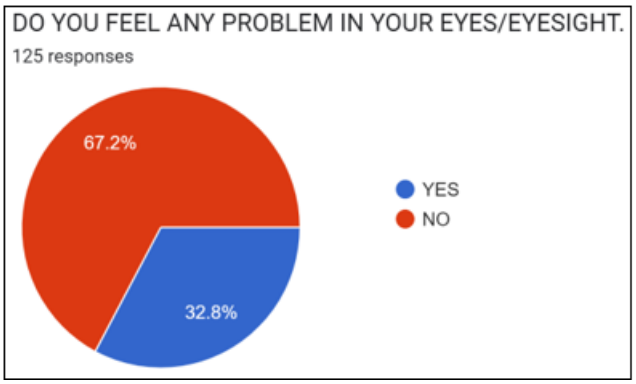

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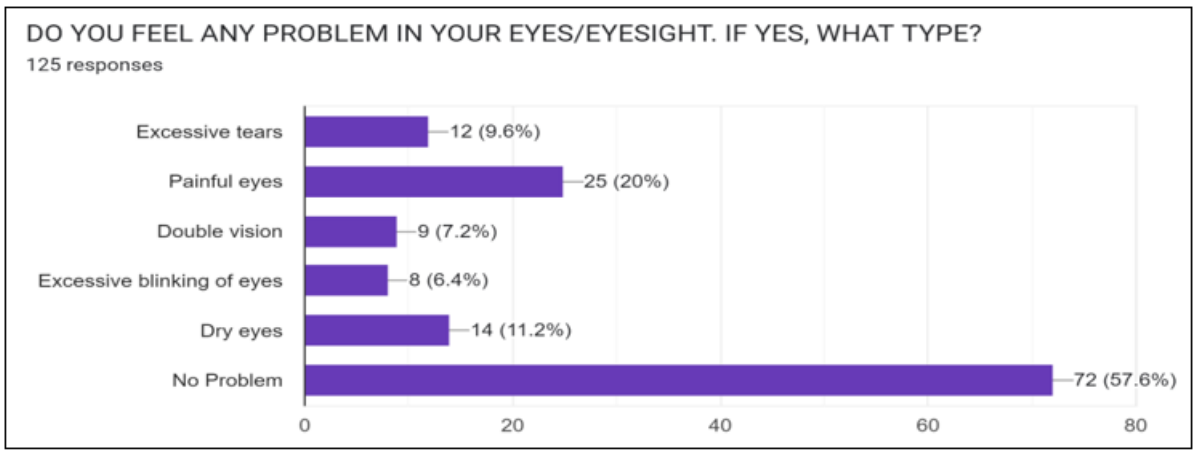

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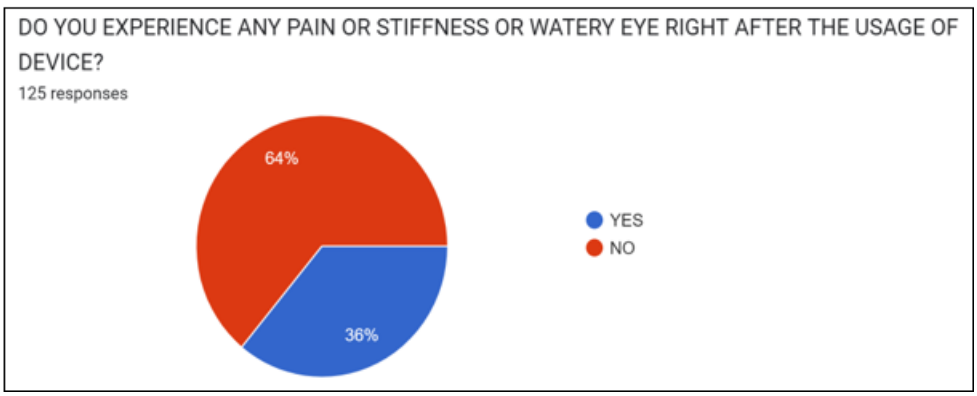

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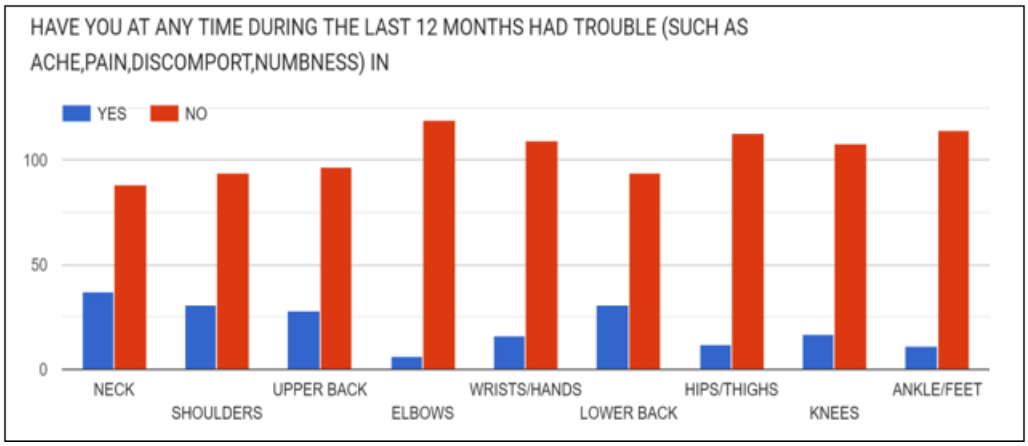

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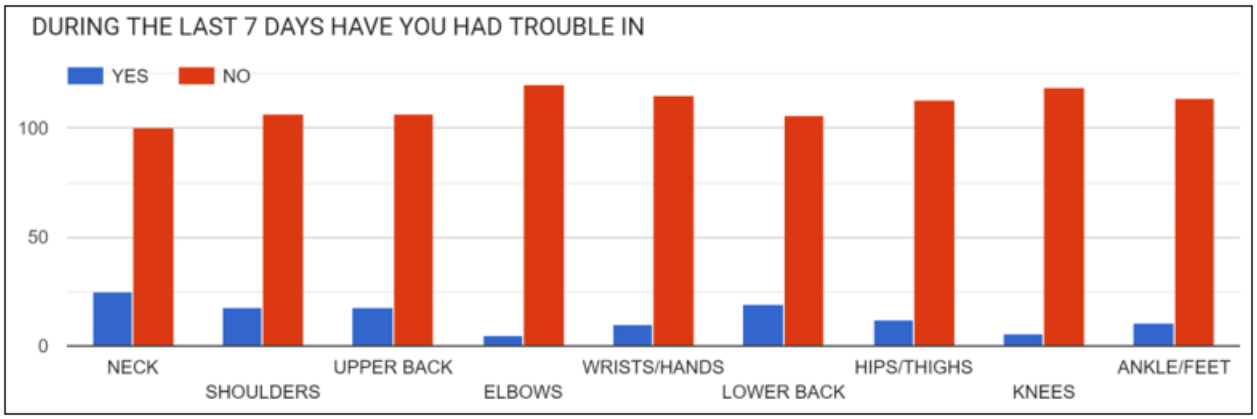

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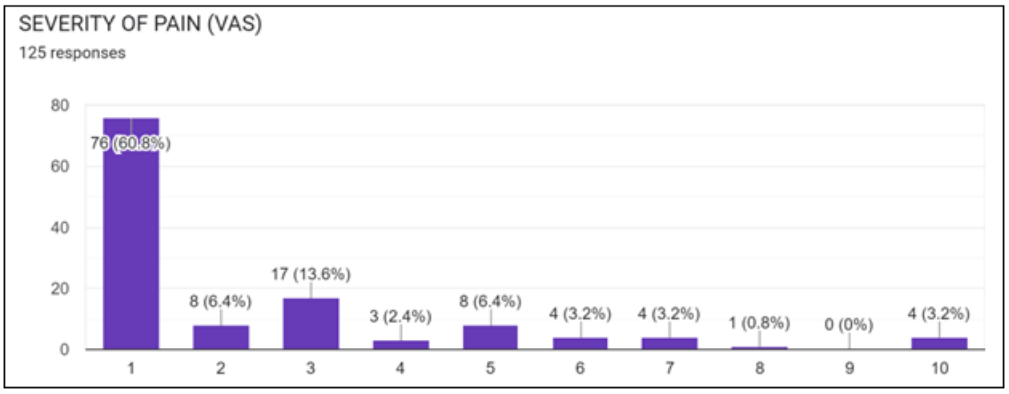

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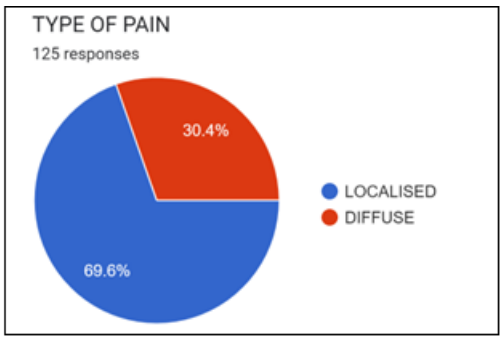

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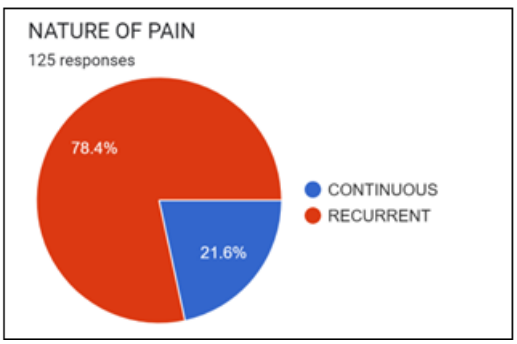

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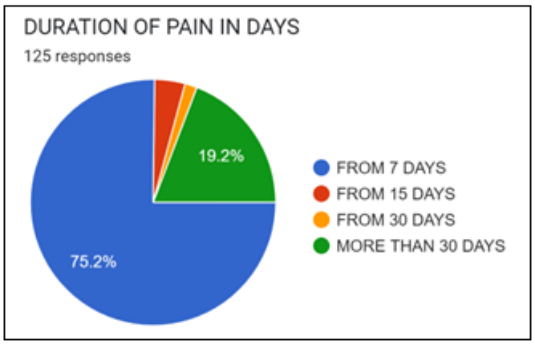

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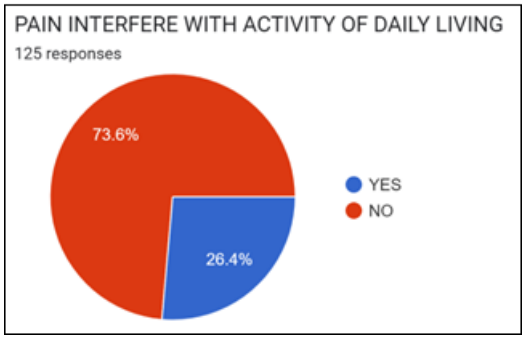

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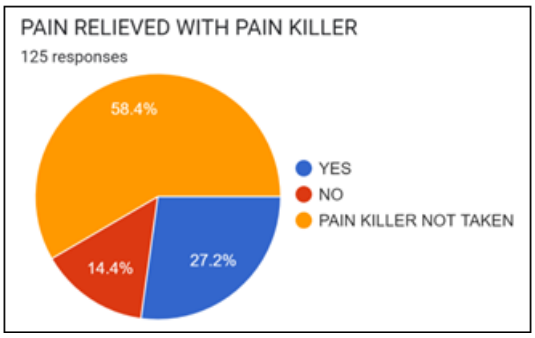

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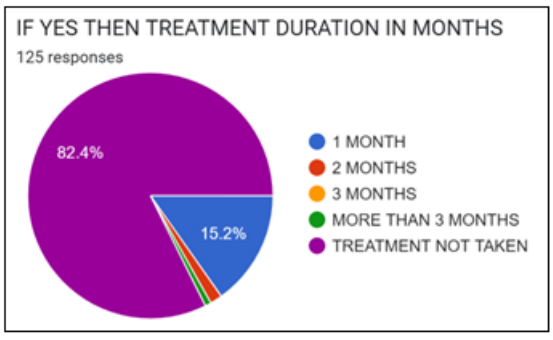

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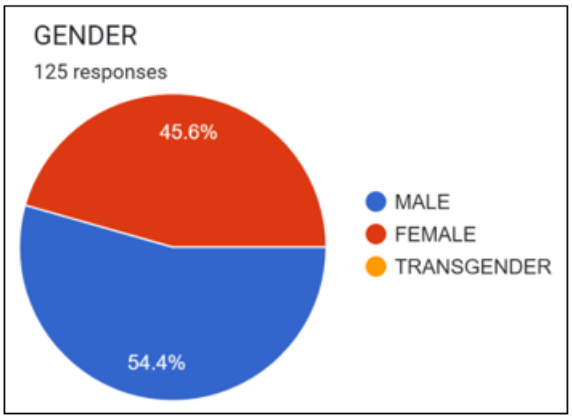

Chart 21

Table 1: Analysis of Variance Results
F - statistic value = 0. P - value = 1

Data Summary				
Groups	N	Mean	Std. Dev.	Std. Error
Group 1	2	65	2.8284	2
Group 2	2	65	48.0833	34
Group 3	2	65	91.9239	65
Group 4	2	65	29.6985	21
Group 5	2	65	24.0416	17
Group 6	2	65	41.0122	29
Group 7	2	65	36.7696	26
Group 8	2	65	43.8406	31
Group 9	2	65	53.7401	38
Group 10	2	65	65.0538	46
Group 11	2	65	63.6396	45
Group 12	2	65	84.8528	60
Group 13	2	65	77.7817	55
Group 14	2	65	57.9828	41
Group 15	2	65	74.9533	53
Group 16	2	65	73.5391	52
Group 17	2	65	35.3553	25
Group 18	2	65	52.3259	37
Group 19	2	65	41.0122	29
Group 20	2	65	56.5685	40

* Group represents each question

ANOVA Summary					
Source	Degrees of Freedom	Sum of Squares	Mean Square	F - Stat	P - Value
	DF	SS	MS		
Between Groups	19	0	0	0	1
Within Groups	20	64863.9874	3243.1994		
Total:	39	64863.9874			

Table 2: ANOVA Formulas

One - Way ANOVA Table					
Source	Degrees of Freedom	Sum of Squares	Mean Square	F - Stat	P - Value
	DF	SS	MS		
Between Groups	$k - 1$	SS_B	$MS_B = SS_B / (k - 1)$	$F = MS_B / MS_W$	Right tail of F (k - 1, N - k)
Within Groups	$N - k$	SS_W	$MS_W = SS_W / (N - k)$		
Total:	$N - 1$	$SS_T = SS_B + SS_W$			

Between Groups Degrees of Freedom: **DF = k − 1**, where **k** is the number of groups
Within Groups Degrees of Freedom: **DF = N − k**, where **N** is the total number of subjects
Total Degrees of Freedom: **DF = N − 1**
Sum of Squares Between Groups: $SS_B = S^k_{i=1} n_i (x_i - x)^2$, where n_i is the number of subjects in the i - th group
Sum of Squares Within Groups: $SS_W = S^k_{i=1} (n_i - 1) S_i^2$, where S_i is the standard deviation of the i - th group
Total Sum of Squares: $SS_T = SS_B + SS_W$
Mean Square Between Groups: $MS_B = SS_B / (k - 1)$
Mean Square Within Groups: $MS_W = SS_W / (N - k)$
F - Statistic (or F - ratio): $F = MS_B / MS_W$

However, studies examining the impact of ergonomic interventions have shown promising results. Implementing ergonomic training programs, workplace assessments, and providing ergonomic equipment were associated with reduced risk of musculoskeletal problems. Additionally, efforts to raise awareness and promote behavioural change through educational campaigns and technological innovations have shown potential in encouraging individuals to adopt healthier ergonomic habits. These research results underscore the importance of prioritizing ergonomic awareness and interventions to mitigate the negative health consequences of prolonged electronic device use and foster a culture of well - being in digitalized environments.

4. Discussion and Conclusion

A critical aspect of the discussion revolves around the effectiveness of interventions aimed at enhancing ergonomic awareness and promoting healthier device use habits. Research indicates that interventions such as ergonomic training programs, workplace assessments, and provision of ergonomic equipment can lead to a reduction in the risk of musculoskeletal problems. These findings emphasize the importance of implementing proactive measures to improve ergonomic practices in various settings.

Furthermore, research delves into the levels of awareness and knowledge regarding ergonomic principles among different demographics. Studies have identified knowledge gaps and misconceptions among users, highlighting the necessity of educational campaigns and interventions to increase awareness and promote behavior change.

In exploring strategies for behavioral change, researchers have investigated the efficacy of various approaches, including educational campaigns, personalized feedback, incentives, and technological solutions. Understanding how to effectively motivate individuals to adopt healthier ergonomic habits is crucial for the success of intervention programs.

Organizational policies and practices also play a significant role in shaping ergonomic behaviors among employees. Research suggests that implementing supportive policies, offering ergonomic training, and designing ergonomic workstations can positively influence employee health and productivity.

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