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RESEARCH ARTICLE

PREVALENCE OF CERVICOGENIC HEADACHE IN A POPULATION USING COMPUTERS AND MOBILE PHONES AND ITS EFFECT ON QUALITY OF LIFE

Dr. Rexlin Vaz¹ and Dr. Tina Parkar²

1. [Occupational Therapist MoThMusculoskeletal science], [Occupational Therapy], [Seth GS Medical college and KEM hospital], [Mumbai, 4000012], India.
2. [3rd year Mo Thonology student], [Occupational Therapy], [Tata memorial centre], [Mumbai, 400097, India].

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Key words:-

cervicogenic headache; quality of life;
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Abstract

Background: Cervicogenic headache is pain referred to the head from a source in the cervical spine, arising from compression of sensory nerves supplying the scalp. The soft tissue, fascia, and discs of the upper cervical region are the principal structures implicated. The pain typically begins as tightness in the neck and upper cervical musculature and arises from nociceptive stimuli in the cervical and occipital regions. Cervicogenic headache has a marked impact on an individual's quality of life, including emotional, relationship, sexual, and social functioning.

Objective: To determine the prevalence of cervicogenic headache among individuals using computers and mobile phones and to assess its effect on quality of life.

Methods: A literature search was conducted using PubMed, Research Gate, and Google Scholar. Free full-text interventional studies and review articles published in the past 10 years on the prevalence of cervicogenic headache in computer and mobile phone users, and its effect on quality of life, were reviewed. A structured Google Form was distributed, and 101 responses were collected and analysed.

Results: Of the 101 respondents, quality of life was found to be affected among computer and mobile phone users, largely attributable to poor ergonomic posture. Cervicogenic headache was found to have a substantial impact on health-related quality of life.

Conclusion: Poor posture, inadequate rest periods, and excessive screen time were found to considerably affect the emotional, social, and psychosexual domains of quality of life through their association with cervicogenic headache. Incorporation of ergonomic modification and correct positioning may help reduce the prevalence of cervicogenic headache attributable to poor posture.

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Corresponding Author:-Dr. Tina Parkar

Address:-[3rd year Mo Thonology student], [Occupational Therapy], [Tata memorial centre], [Mumbai, 400097, India].

Introduction:-

Cervicogenic headache generally arises from compression of the sensory nerves supplying the scalp. The soft tissues around the neck, the cervical fascia, and the intervertebral discs are sensitive structures capable of initiating cervicogenic headache, which is characterised by chronic hemicranial pain. The pathophysiology of cervicogenic headache results from convergence of sensory input from the upper cervical spine, including the C2-C3 facet joints, onto the trigeminal spinal nucleus^(1,2). Unilateral pain, reduced cervical range of motion, ipsilateral shoulder and arm discomfort, and awkward neck postures are among the diagnostic features of cervicogenic headache⁽³⁾.

The primary aim of this study was to determine the prevalence of cervicogenic headache among mobile phone and computer users and to evaluate its effect on their quality of life. A forward head posture, commonly adopted during prolonged use of laptops and mobile devices, is considered a principal contributor to cervicogenic headache; individuals who habitually posture the neck forward develop tightness in the upper cervical vertebrae and surrounding musculature, resulting in restricted range of motion^(1,4,5). Reduced spinal postural variability has also been reported among individuals with cervicogenic headache, an effect compounded when periods of continuous sitting exceed 30 minutes without a change in position or mobilisation^(4,5,6,11).

Quality of life, as conceptualised by the World Health Organization, refers to an individual's perception of their position in life, including satisfaction with the ability to perform daily activities. Kocjan and colleagues reported that impairment of quality of life is commonly present among clinical samples of patients with cervicogenic headache⁽²⁾. Quality of life encompasses several components, including sleep quality, physical activity, and psychosocial functioning; prior studies have reported that sleep quality and physical activity are reduced in individuals with cervicogenic headache, with a consequent lowering of quality of life, increased stress, and altered psychosocial functioning^(7,9,10).

Increasing duration of computer and mobile phone use, coupled with poor ergonomic posture, has been associated with increased neck pain and the triggering of cervicogenic headache. Cervicogenic headache in computer and mobile phone users has been reported to have a considerable impact on quality of life, social interaction, and relationships^(10,11,12). This study was therefore undertaken to determine the prevalence of cervicogenic headache among computer and mobile phone users and to examine its effect on their quality of life.

Materials and Methods:-**Literature search strategy:-**

A total of 35 articles were initially identified, of which 12 were included in the final review, spanning the years 2001-2023. The search engines used were Google Scholar, PubMed, ResearchGate, and the NCBI library. The keywords used were “cervicogenic headache”, “quality of life”, “computer user”, and “mobile user”, combined using the Boolean operators AND, OR, and NOR, as follows:

- Cervicogenic headache [AND] quality of life
- Cervicogenic headache [OR] ergonomic
- Cervicogenic headache [NOR] computer user
- Cervicogenic headache [OR] mobile user
- Quality of life [AND] ergonomics
- Ergonomics [OR] mobile user

The full text of the available articles was screened independently by two reviewers, and details of articles meeting the eligibility criteria were entered into a spreadsheet for ease of access and analysis, recording the website link, study type, citation, study outcome, and conclusion drawn.

Study design and setting:-

This was a quantitative, cross-sectional survey study conducted between 18 January 2022 and 28 March 2022.

Participants and sampling:-

A total of 101 adult subjects, aged 18-50 years, of either sex, who used computers and/or mobile phones for a minimum of two to eight or more hours daily, were recruited. Participants were sent an online Google Form link to complete the survey, which was circulated through WhatsApp and email along with the consent form and outcome measures. Of the respondents, 52.4% identified as primarily mobile phone users and 42.6% as primarily computer

users. The questionnaire captured demographic details together with validated scales assessing quality of life and cervicogenic headache impact.

Inclusion criteria:-

1. Individuals using mobile phones and/or computers
2. Individuals reporting headache
3. Individuals reporting disturbance in quality of life
4. Device use of more than 2 hours per day
5. Age 18-50 years
6. Both male and female participants
7. Individuals meeting the diagnostic criteria for cervicogenic headache
8. Headache duration of at least 3 weeks
9. Willingness to provide informed consent

Exclusion criteria:-

1. Individuals with a diagnosed psychiatric disorder (e.g., depression)
2. Individuals without any headache complaints
3. Individuals with more than one headache syndrome
4. Individuals with relevant comorbidities
5. Individuals unwilling to participate

Outcome measures and statistical analysis:-

Data were collected through a structured Google Form incorporating the WHOQOL-BREF and the Headache Impact Test, together with demographic questions and a section for informed consent. Descriptive statistics (frequency and percentage) were computed for demographic and headache-related variables. A one-way multivariate analysis of variance (MANOVA) was used to compare WHOQOL-BREF domain scores (Physical Health, Psychological Well-being, Social Relationships, and Environment) across categories of headache impact severity, with Tukey's honestly significant difference (HSD) test used for post hoc pairwise comparisons. A p-value of less than 0.05 was considered statistically significant.

Ethical clearance:-

This study was conducted following approval from the Institutional Ethics Committee [insert institution name and approval/registration number]. All participants were provided with information about the study and provided informed consent prior to participation, in accordance with the Declaration of Helsinki.

Results:-

A total of 101 individuals participated in the survey. The socio-demographic and device-use characteristics of the sample are summarised in Table 1.

Table 1: Socio-demographic and device-use characteristics of participants (N = 101)

Variable	Category	n	%
Age (years)	18-25	73	74.5*
	26-35	13	13.3*
	36-55	12	12.2*
Gender	Female	57	56.4
	Male	43	42.6
	Prefer not to say	1	1.0
Device used more often	Both computer and mobile	53	52.5
	Computer/laptop only	5	5.0
	Mobile phone only	43	42.6

Variable	Category	n	%
Duration of continuous sitting at work	1-2 hours	28	27.7
	3-4 hours	28	27.7
	4-6 hours	1	1.0
	More than 6 hours	44	43.6
Daily duration of mobile phone use	Less than 2 hours	1	1.0*
	2-3 hours	27	27.0*
	4-5 hours	38	38.0*
	More than 5 hours	32	31.7*
	Rarely uses mobile phone	1	1.0*

*Valid percentage (excludes missing responses).

Overall, 40.6% of participants reported experiencing neck pain or headache after using a mobile phone/computer, a further 40.6% reported this sometimes, and 18.8% reported no such symptoms (Table 2). Among the 82 participants who reported headache, responses to individual items of the Headache Impact Test are summarised in Table 3.

Table 2: Neck pain or headache after prolonged use of mobile phone/computer, and overall headache severity (N = 101)

Item	Response	n	%
Neck pain/headache after device use	No	19	18.8
	Sometimes	41	40.6
	Yes	41	40.6
Severity of headache when present (n = 82)	Always	3	3.7*
	Often	7	8.5*
	Sometimes	43	52.4*
	Rarely	22	26.8*
	Never	7	8.5*

*Valid percentage among the 82 respondents who reported headache.

Table 3: Headache Impact Test item responses among participants reporting headache (n = 82)

Item	Never	Rarely	Sometimes	Often	Always
Headaches limit ability to perform usual daily activities (work/household/social)	8.5%	40.2%	42.7%	8.5%	—
Wished to lie down because of headache	2.4%	20.7%	34.1%	24.4%	18.3%
Felt too tired to work/carry out daily activities because of headache	18.3%	24.4%	31.7%	24.4%	1.2%
Felt fed up or irritated because of headache	15.9%	24.4%	36.6%	12.2%	11.0%
Headaches limited ability to concentrate on work/daily activities	15.9%	28.0%	36.6%	17.1%	2.4%

Based on the Headache Impact Test score, participants reporting headache ($n = 82$) were categorised into four impact groups: 23.2% reported little-to-no impact, 18.3% moderate impact, 24.4% substantial impact, and 34.1% severe impact on daily functioning (Table 4, Figure 6).

Table 4: Distribution of headache impact category ($n = 82$)

Headache impact category	n	%
Little-to-no impact	19	23.2
Moderate impact	15	18.3
Substantial impact	20	24.4
Severe impact	28	34.1
Total	82	100.0

Figures 1-5 illustrate the distribution of neck pain/headache and the domain-wise impact of headache severity on physical health, psychological well-being, social relationships, and environment, as scored on the WHOQOL-BREF.

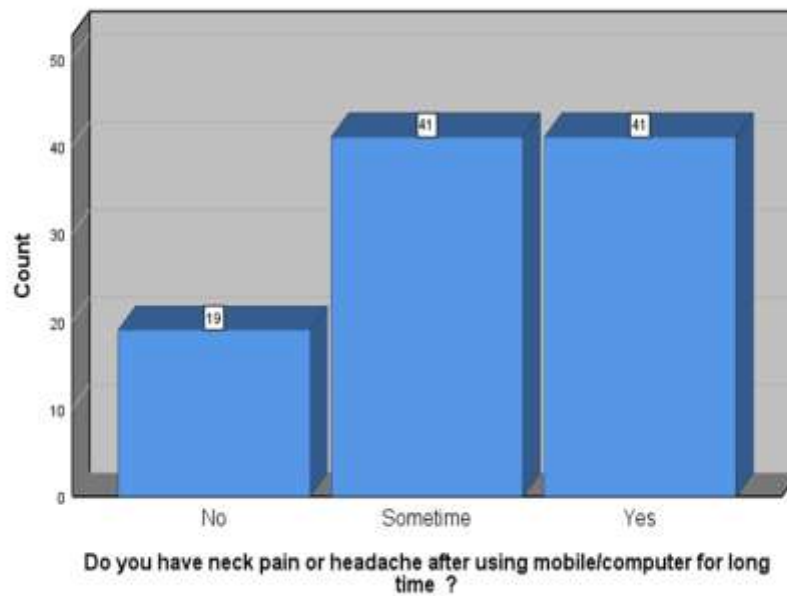


Figure 1: Distribution of neck pain/headache among participants after using a mobile phone/computer

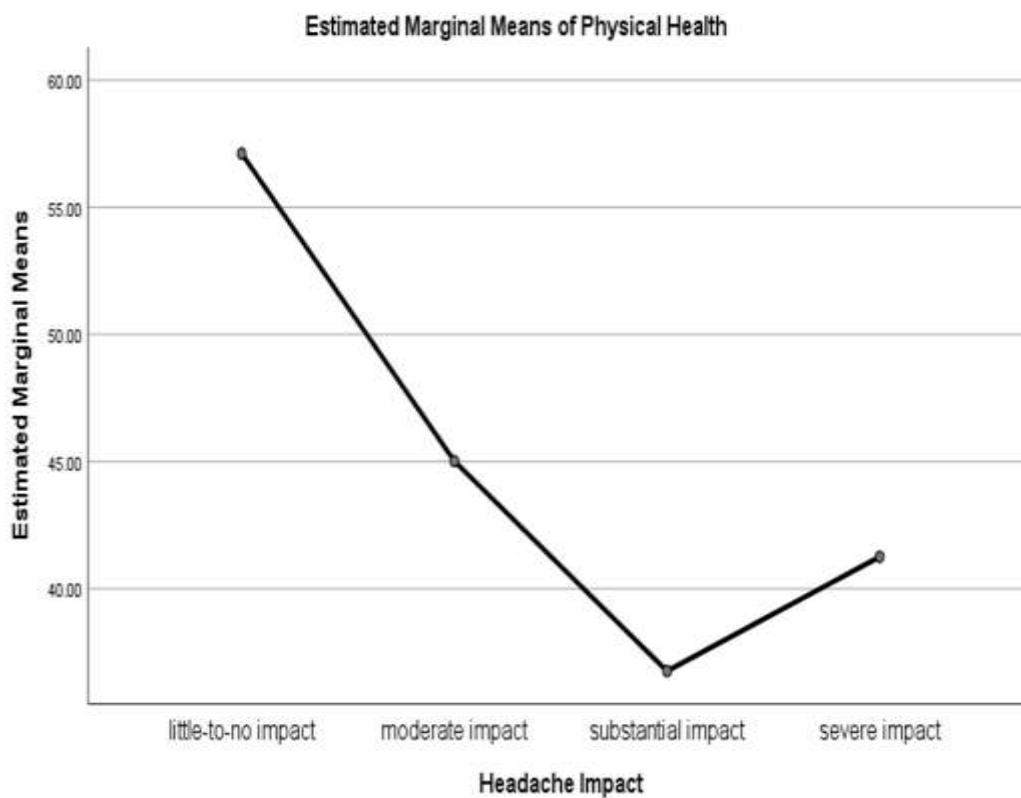


Figure 2: Impact of headache severity on the Physical Health domain of quality of life

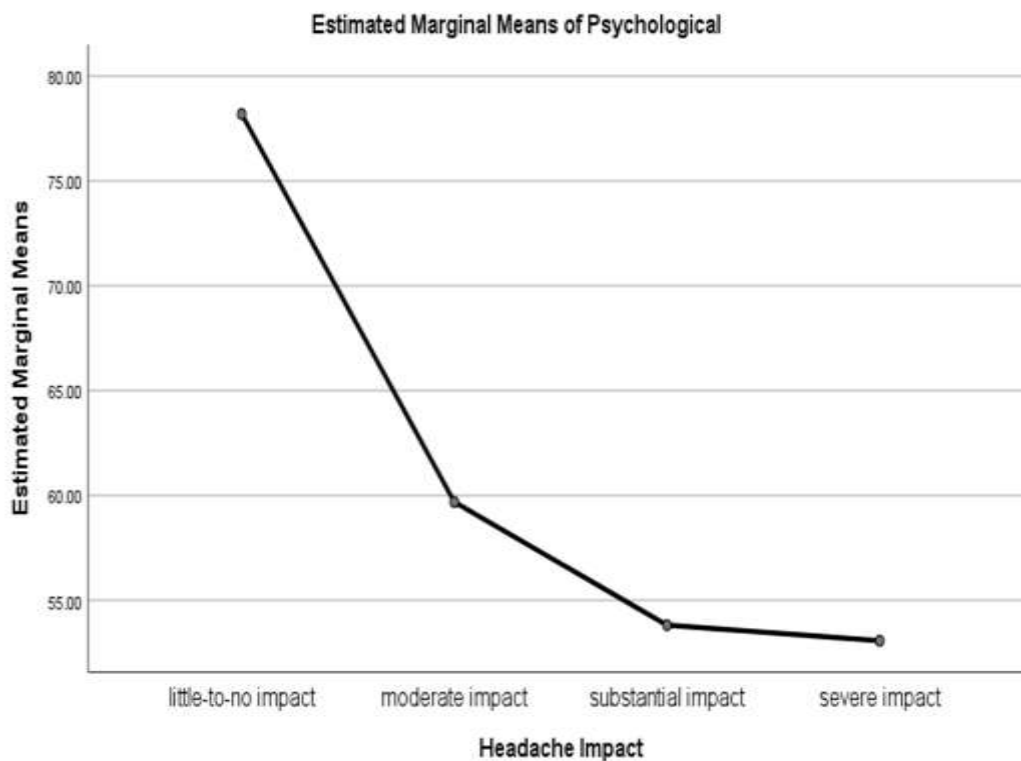


Figure 3: Impact of headache severity on the Psychological Well-being domain of quality of life

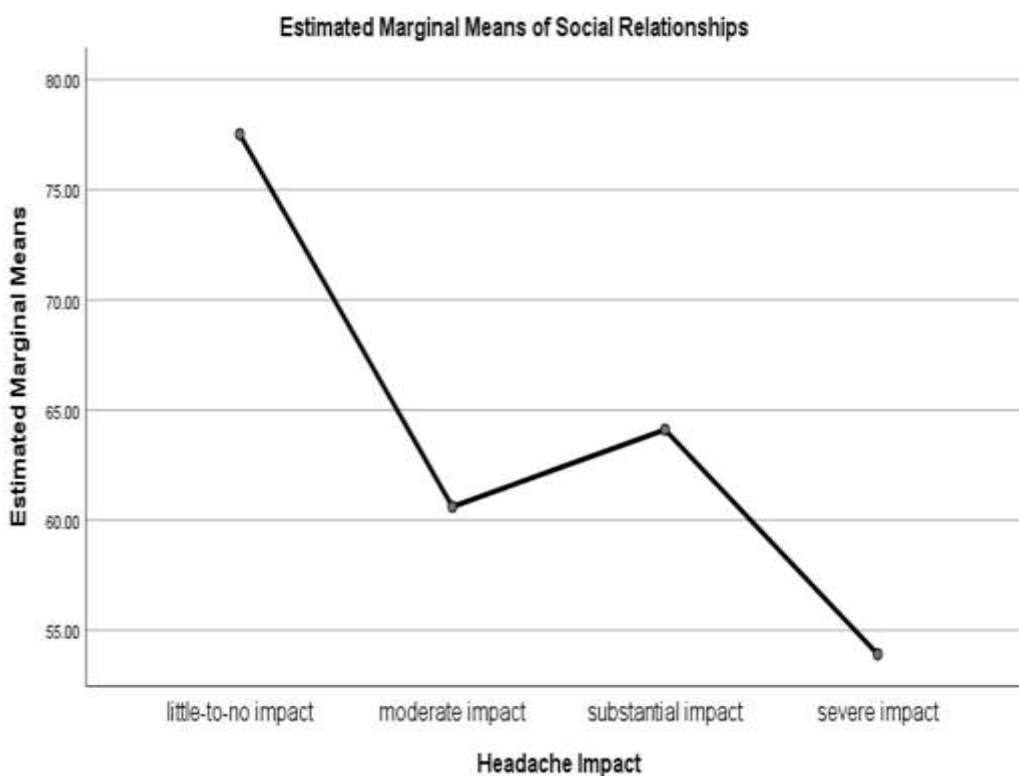


Figure 4: Impact of headache severity on the Social Relationships domain of quality of life

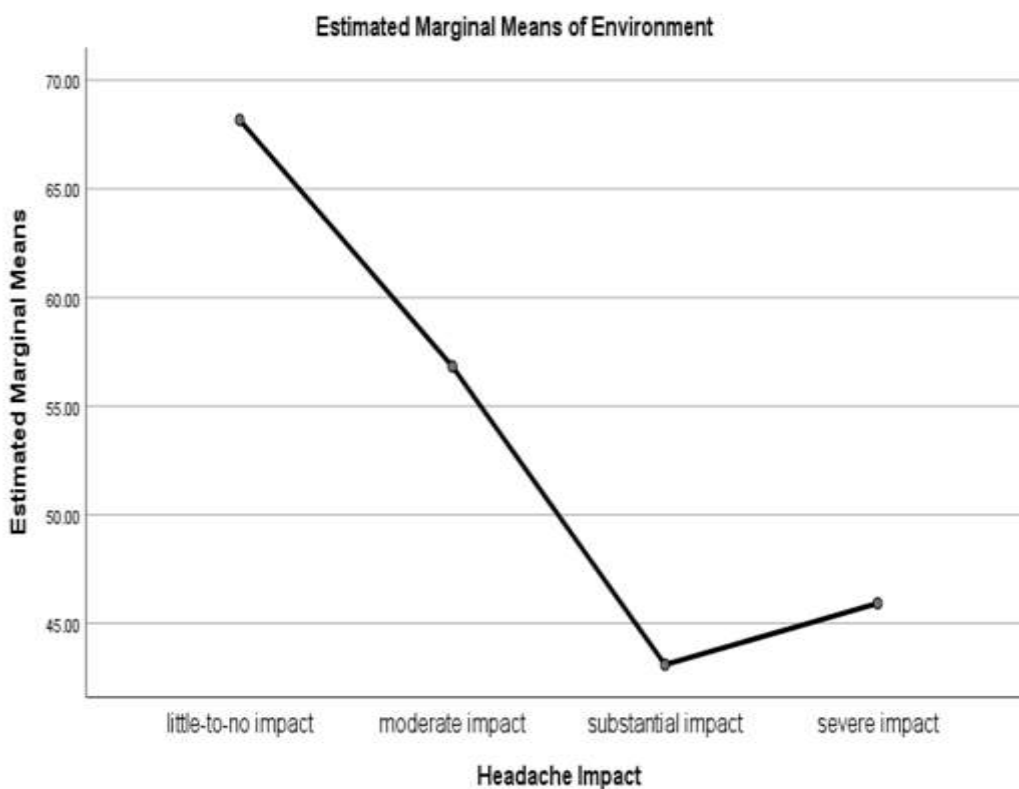


Figure 5: Impact of headache severity on the Environment domain of quality of life

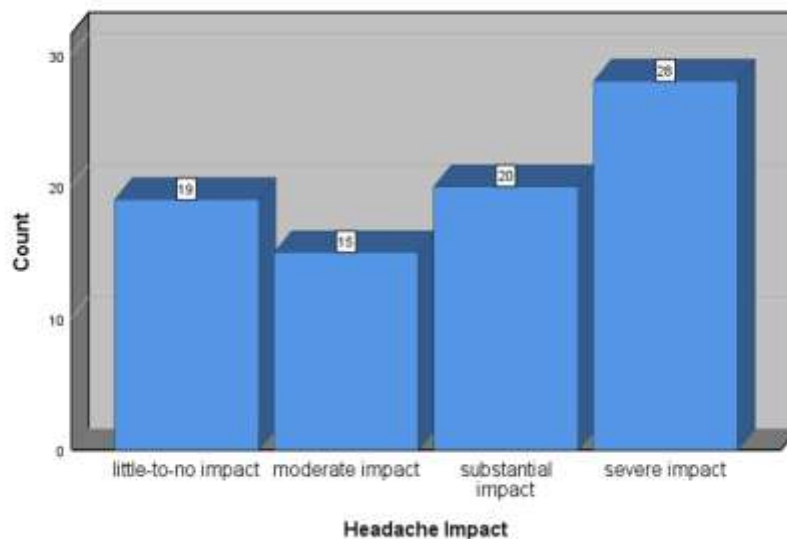


Figure 6: Distribution of Headache Impact Test category among participants

Table 5 presents the mean WHOQOL-BREF domain scores according to headache impact category. Across all four domains, mean scores were consistently lowest among participants with substantial or severe headache impact and highest among those with little-to-no impact.

Table 5: WHOQOL-BREF domain scores (mean $\pm$ SD) according to headache impact category

Domain	Little-to-no impact (n=19)	Moderate impact (n=15)	Substantial impact (n=20)	Severe impact (n=28)	Total (n=82)
Physical Health	57.11 $\pm$ 19.17	45.02 $\pm$ 15.35	36.76 $\pm$ 18.16	41.25 $\pm$ 21.71	44.52 $\pm$ 20.31
Psychological	78.19 $\pm$ 23.19	59.68 $\pm$ 21.43	53.81 $\pm$ 22.92	53.06 $\pm$ 18.54	60.28 $\pm$ 23.24
Social Relationships	77.52 $\pm$ 19.95	60.61 $\pm$ 25.87	64.11 $\pm$ 28.81	53.91 $\pm$ 23.07	63.09 $\pm$ 25.60
Environment	68.17 $\pm$ 22.73	56.83 $\pm$ 22.51	43.10 $\pm$ 22.20	45.92 $\pm$ 20.75	52.38 $\pm$ 23.65

A one-way MANOVA was conducted to examine the effect of headache impact severity on the four WHOQOL-BREF domains. The multivariate main effect of headache impact severity was statistically significant (Wilks' Lambda = 0.728, $F(12, 198.72) = 2.107$, $p = 0.018$). Univariate between-subjects effects were significant for all four domains (Table 6).

Table 6: One-way MANOVA — effect of headache impact severity on WHOQOL-BREF domains

Dependent variable	df	F	p
Physical Health	3, 78	4.066	0.010
Psychological Well-being	3, 78	6.171	0.001
Social Relationships	3, 78	3.581	0.018
Environment	3, 78	5.514	0.002

Post hoc comparisons using Tukey's HSD test identified the pairwise differences shown in Table 7 (significant comparisons only; all other pairwise comparisons were non-significant, $p > 0.05$).

Table 7: Significant pairwise comparisons (Tukey HSD) between headache impact categories

Domain	Comparison	Mean difference	p
Physical Health	Little-to-no vs. Substantial impact	20.35	0.008
Physical Health	Little-to-no vs. Severe impact	15.86	0.034
Psychological	Little-to-no vs. Substantial impact	24.38	0.003
Psychological	Little-to-no vs. Severe impact	25.12	0.001
Social Relationships	Little-to-no vs. Severe impact	23.61	0.009
Environment	Little-to-no vs. Substantial impact	25.08	0.003
Environment	Little-to-no vs. Severe impact	22.25	0.005

Overall, of the 101 respondents, 41 (40.6%) reported severe neck pain/headache after mobile phone/computer use, 41 (40.6%) reported a moderate/intermittent pattern, and 19 (18.8%) reported little to no impact on daily living attributable to cervicogenic headache.

Discussion:-

The present cross-sectional survey investigated the occurrence of headache and neck pain symptoms among computer and mobile phone users and examined their association with quality of life. Among the 101 participants, 40.6% reported experiencing neck pain or headache after using a mobile phone or computer, while an additional 40.6% reported experiencing these symptoms sometimes. Thus, more than four-fifths of the participants reported headache or neck pain either consistently or intermittently following device use. These findings indicate a considerable burden of musculoskeletal and headache-related symptoms among individuals with regular exposure to digital devices. Previous studies have similarly reported an association between computer use, mobile phone use, neck pain, and headache, particularly in the presence of prolonged or sustained postural loading [1,4,8].

A substantial proportion of participants in the present study reported prolonged exposure to digital devices. Approximately 38.0% of participants reported using mobile phones for 4–5 hours per day, while 31.7% reported more than 5 hours of daily mobile phone use. In addition, 43.6% of participants reported continuous sitting at work for more than 6 hours. Prolonged device use frequently involves sustained neck and upper-body postures, which may reduce postural variability and increase mechanical loading of the cervical region. Mingels et al. reported reduced spinal postural variability in individuals with cervicogenic headache and further demonstrated lower spinal postural variability during laptop work compared with healthy individuals [6,11]. Therefore, the high frequency of symptoms observed in the present study may be related to prolonged periods of static positioning and sustained cervical loading, although causality cannot be established from the present cross-sectional design.

Among the 82 participants who reported headache, the Headache Impact Test demonstrated a considerable effect on daily functioning. Although 23.2% of participants reported little-to-no impact, 18.3% reported moderate impact, 24.4% reported substantial impact, and 34.1% reported severe impact. Therefore, more than half of the participants reporting headache were classified as having substantial or severe headache impact. The individual Headache Impact Test responses further demonstrated that headaches affected usual daily activities, concentration, energy levels, and emotional well-being. Approximately 42.7% reported that headaches sometimes limited their usual activities, while 34.1% reported sometimes wishing to lie down because of headache and 24.4% reported this occurring often. Similarly, 36.6% reported that headaches sometimes affected their concentration on work or daily activities. These findings suggest that the burden associated with headache extends beyond the physical sensation of pain and may interfere with functional participation and productivity.

The findings of the present study are consistent with previous literature describing cervicogenic headache as a condition that can affect physical, psychological, and social functioning. Kocjan reported impaired quality of life among individuals with cervicogenic headache [2], while Diener described the impact of cervicogenic headache among patients attending physiotherapy services [7]. Mingels et al. also identified relationships between cervicogenic headache, lifestyle, pain processing, and psychosocial factors [9]. The present findings support this multidimensional perspective, as greater headache impact was associated with poorer scores across all four domains of the WHOQOL-BREF.

The physical health domain demonstrated a statistically significant difference across headache impact categories ($F = 4.066$, $p = 0.010$). The mean physical health score was highest among participants with little-to-no headache impact (57.11 ± 19.17) and was lower among those with moderate (45.02 ± 15.35), substantial (36.76 ± 18.16), and severe headache impact (41.25 ± 21.71). Tukey's HSD analysis demonstrated significant differences between the little-to-no-impact group and both the substantial-impact group (mean difference = 20.35, $p = 0.008$) and severe-impact group (mean difference = 15.86, $p = 0.034$). These findings indicate that greater headache-related functional impact was associated with poorer perceived physical health. The reduction in physical health scores may reflect the influence of headache-related discomfort and fatigue on daily activities and physical functioning. Previous literature has similarly described the effects of cervicogenic headache on physical functioning and lifestyle [2,7,9].

The psychological well-being domain demonstrated the strongest statistical association among the WHOQOL-BREF domains, with a significant between-group effect ($F = 6.171$, $p = 0.001$). The mean psychological score decreased from 78.19 ± 23.19 in the little-to-no-impact group to 59.68 ± 21.43 in the moderate-impact group, 53.81 ± 22.92 in the substantial-impact group, and 53.06 ± 18.54 in the severe-impact group. Tukey's HSD analysis demonstrated significant differences between the little-to-no-impact group and both the substantial-impact group (mean difference = 24.38, $p = 0.003$) and severe-impact group (mean difference = 25.12, $p = 0.001$). These findings suggest that increasing headache impact is associated with poorer psychological quality of life. Recurrent headache and associated fatigue, irritation, and difficulty concentrating may contribute to reduced psychological well-being. This interpretation is consistent with previous work by Mingels et al., which highlighted the relationship between cervicogenic headache and psychosocial characteristics [9].

The social relationships domain also demonstrated a statistically significant difference between headache impact categories ($F = 3.581$, $p = 0.018$). Participants with little-to-no headache impact had a mean social relationship score of 77.52 ± 19.95 , compared with 60.61 ± 25.87 in the moderate-impact group, 64.11 ± 28.81 in the substantial-impact group, and 53.91 ± 23.07 in the severe-impact group. The Tukey HSD analysis showed a significant difference between the little-to-no-impact and severe-impact groups (mean difference = 23.61, $p = 0.009$). This finding suggests that severe headache impact may be associated with reduced perceived quality of social relationships. Headache-related fatigue, irritability, reduced concentration, and limitations in daily activities may potentially reduce participation in social and interpersonal activities. However, because the present study was cross-sectional, these factors should be considered possible explanations rather than established causal pathways.

The environment domain showed a statistically significant difference across headache impact categories ($F = 5.514$, $p = 0.002$). The mean score decreased from 68.17 ± 22.73 in the little-to-no-impact group to 56.83 ± 22.51 in the moderate-impact group, 43.10 ± 22.20 in the substantial-impact group, and 45.92 ± 20.75 in the severe-impact group. Significant differences were identified between the little-to-no-impact group and both the substantial-impact group (mean difference = 25.08, $p = 0.003$) and severe-impact group (mean difference = 22.25, $p = 0.005$). The relatively lower environmental quality-of-life scores among participants with substantial and severe headache impact may be relevant to the role of work and device-use environments. Prolonged sitting, workstation-related factors, sustained postures, and inadequate opportunities to change position may contribute to the overall burden experienced by computer and mobile phone users. Keown and Tuchin have previously highlighted workplace factors associated with neck pain among computer users [12].

The overall multivariate analysis further supports the relationship between headache impact and quality of life. The one-way MANOVA demonstrated a statistically significant multivariate effect of headache impact severity on the four WHOQOL-BREF domains (Wilks' Lambda = 0.728, $F(12, 198.72) = 2.107$, $p = 0.018$). Significant effects were subsequently observed for physical health, psychological well-being, social relationships, and environment. The consistent reduction in domain scores with increasing headache impact indicates that the burden of headache may extend across multiple dimensions of perceived health and daily life rather than being restricted to physical symptoms.

The present findings are broadly consistent with evidence from previous studies investigating cervicogenic headache and device-related headache symptoms. Afzal et al. reported cervicogenic headache and neck pain among computer users [1], while Wang et al. identified an association between mobile phone use and headache in a systematic review and meta-analysis of cross-sectional studies [4]. Demirci et al. also investigated headache among smartphone users and reported an association between smartphone use and headache symptoms [8]. These findings, together with the present results, suggest that prolonged use of digital devices may represent an important area for ergonomic and preventive attention.

A possible explanation for the observed findings is the sustained cervical posture commonly adopted during computer and mobile phone use. Forward-head positioning and prolonged neck flexion may increase the demand placed on cervical musculature and surrounding structures. Reduced variability in spinal posture may further contribute to sustained loading of the cervical region. Sensory input arising from upper cervical structures may contribute to headache through the convergence of cervical and trigeminal sensory pathways described in the pathophysiology of cervicogenic headache [3]. However, the present study did not directly assess cervical posture, muscle activity, cervical range of motion, or specific anatomical sources of pain. Therefore, this proposed mechanism should be interpreted as a possible explanation supported by previous literature rather than a direct finding of the present study.

The findings have potential implications for ergonomic education and preventive strategies among frequent computer and mobile phone users. Ergonomic modification, appropriate positioning of digital devices, avoidance of prolonged static postures, and regular movement or rest breaks may be relevant strategies for reducing exposure to potentially aggravating postural factors. Such approaches are supported by previous literature examining cervicogenic headache, spinal postural variability, smartphone use, and workplace factors [1,4,6,8,11,12]. Nevertheless, the effectiveness of these interventions was not directly evaluated in the present study and therefore requires confirmation through intervention-based research.

The present study also highlights the importance of considering quality of life when evaluating headache-related symptoms among digital device users. The statistically significant differences across all four WHOQOL-BREF domains demonstrate that headache impact may be associated with physical, psychological, social, and environmental dimensions of daily life. Future studies could investigate these associations using clinically confirmed diagnoses of cervicogenic headache, objective assessment of cervical posture and range of motion, detailed measurement of screen exposure, and longitudinal or interventional study designs. Such research would help clarify whether modifications in device use, posture, workplace ergonomics, and scheduled movement breaks can reduce the frequency and functional impact of cervicogenic headache.

Overall, the present study demonstrates that headache and neck pain symptoms are common among the surveyed computer and mobile phone users and that greater headache impact is associated with significantly poorer quality of life across all four WHOQOL-BREF domains. The findings are consistent with previous literature linking cervicogenic headache and device-related factors with physical and psychosocial consequences [1,2,4,6,8,9,11,12]. While the cross-sectional design prevents conclusions regarding causality, the findings emphasize the importance of ergonomic awareness, postural education, and consideration of quality of life in individuals who experience recurrent headache or neck pain during prolonged digital device use.

Limitations:-

- The cross-sectional, self-reported nature of the survey precludes causal inference between device use, posture, and cervicogenic headache.
- Cervicogenic headache was identified through self-report against inclusion criteria rather than clinical examination or imaging, which may have introduced misclassification.
- The sample was drawn through a convenience, online-distributed survey and may not be representative of the wider population of device users.
- A relatively large proportion of items had missing responses (approximately 19%), which may have introduced response bias.

Conclusion:-

This study found a high prevalence of cervicogenic headache among computer and mobile phone users, with poor posture, inadequate rest periods, and excessive screen time contributing to its onset. Cervicogenic headache severity was associated with significantly poorer quality of life across the physical, psychological, social, and environmental domains. Incorporation of ergonomic modification, correct positioning, and scheduled rest breaks during device use may help reduce the prevalence and impact of cervicogenic headache on daily living.

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Conflict of Interest:-

The authors declare no conflict of interest.

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