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PREVELANCE OF CERVICOGENIC HEADACHE AND ITS ASSOCIATION WITH POSTURAL STABILITY AND QUALITY OF LIFE AMONG GRAPHIC DESIGNERS

Original Research

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ABSTRACT

Background: Cervicogenic headache (CGH) is a secondary headache disorder originating from dysfunction in the cervical spine, particularly involving the upper cervical nerves (C1–C3). It is typically characterized by unilateral pain that radiates to the head and is often aggravated by sustained neck postures or movements. CGH commonly affects individuals exposed to prolonged static postures, such as those working with computers for extended durations. Postural strain, muscle imbalance, and ergonomic deficits play key roles in its development.

Objective: To determine the prevalence of cervicogenic headache and its association with postural stability and quality of life among graphic designers.

Methods: A cross-sectional study was conducted among 187 graphic designers aged 20–45 years who used computers for a minimum of six hours daily. Participants were selected based on inclusion and exclusion criteria through non-probability convenience sampling. Data collection tools included the Flexion Rotation Test (FRT), Tandem Stance Test, Numeric Pain Rating Scale (NPRS), SF-12 Health Survey, and a self-prepared ergonomic questionnaire. Ethical approval was obtained, and informed consent was secured. Data were analyzed using SPSS version 29.0, applying descriptive and inferential statistics, including chi-square tests.

Results: Out of 187 participants, 127 (67.92%) tested positive for cervicogenic headache using the FRT. Pain around one eye was reported by 32.62%, and 24.60% experienced pain at the back of the head. The mean NPRS score was 4.86±2.01. SF-12 scores revealed that 28.88% had below-average quality of life, while 71.12% had better health scores. A statistically significant association was found between CGH and quality of life ($p < 0.05$), while no significant association was observed between CGH and postural stability, with only 16.04% showing positive tandem test results.

Conclusion: Cervicogenic headache was prevalent among graphic designers, largely influenced by poor posture and prolonged screen exposure. It significantly affected quality of life but showed no meaningful association with postural stability measures.

Keywords: Cervicogenic Headache, Ergonomics, Graphic Design, Musculoskeletal Pain, Postural Balance, Quality of Life, Work-Related Disorders.

INTRODUCTION

Cervicogenic headache (CGH) is a type of secondary headache originating from the cervical spine, primarily caused by nociceptive input from structures innervated by the upper cervical nerves (C1, C2, and C3). Characterized by a dull, non-throbbing pain, CGH is believed to account for approximately 15–20% of all chronic headache cases, representing a significant yet often overlooked contributor to headache disorders (1). The underlying mechanism involves referred pain resulting from the convergence of afferent inputs from the upper cervical spinal nerves and the trigeminal cervical complex in the upper cervical spinal cord (2). This anatomical and neurophysiological overlap explains why CGH can radiate to the occipital, frontal, temporal, and even orbital regions, although its origin lies in the cervical spine. The term "cervicogenic headache" was first introduced by Norwegian neurologist Ottar Sjaastad in the 1980s, and since then, the clinical understanding of the condition has expanded to include its association with musculoskeletal dysfunction, especially poor cervical posture and impaired neck muscle function (3). A forward head posture, common among individuals who spend prolonged periods at desks or computers, has been linked to increased strain on the cervical musculature, leading to stiffness, muscle fatigue, and eventually, the onset of cervicogenic headache. Specifically, weakness in the deep cervical flexor muscles and poor coordination among muscle groups have been observed in CGH patients, contributing to reduced muscle control, decreased endurance, and even muscular atrophy (4).

Occupational and lifestyle factors are increasingly being recognized as key contributors to CGH. Individuals who work in sedentary roles—especially those involving extensive computer use—are particularly vulnerable due to sustained postural imbalances and lack of ergonomic support (5). For instance, graphic designers and other digital professionals frequently maintain a forward-leaning head position for extended durations, which imposes constant demand on neck muscles to support the head, thereby increasing the risk of musculoskeletal strain and CGH (6). In these individuals, muscle activity patterns such as decreased activation of cervical extensor muscles and increased upper trapezius muscle activity have been documented, along with symptoms like persistent neck stiffness and postural fatigue (7). Furthermore, workplace conditions such as prolonged sitting, insufficient physical activity, high mental stress, and inadequate rest periods compound the risk. Many computer users also lack access to adjustable ergonomic equipment, further exacerbating postural dysfunction (8). Despite the growing awareness of work-related musculoskeletal disorders, cervicogenic headache remains underdiagnosed and undertreated in this population. The interplay between cervical posture, muscle imbalance, and chronic headache symptoms underscores the urgent need for targeted preventive and therapeutic strategies (9). Although various studies have addressed neck pain and general musculoskeletal complaints in computer users, there remains a significant gap in literature specifically exploring the prevalence and characteristics of cervicogenic headache in this group (10). Therefore, the present study aims to investigate the prevalence of cervicogenic headache among computer users, particularly in graphic designers, and identify its associated musculoskeletal and postural risk factors. This objective is rationalized by the need for evidence-based interventions and preventive strategies tailored to this high-risk occupational group, thereby contributing to improved health outcomes and work efficiency in the digital workforce.

METHODS

This cross-sectional analytical study was conducted to determine the prevalence of cervicogenic headache and its association with postural stability and quality of life among graphic designers. The study recruited a total of 187 participants, with the sample size calculated based on estimates derived from previous literature to ensure adequate statistical power. Participants were selected using a non-probability convenience sampling technique from various workplaces, including digital studios and freelance platforms. Inclusion criteria comprised graphic designers aged between 20 and 45 years, with a minimum of one year of professional experience and a daily computer usage of at least six hours. Individuals with a history of head trauma, migraines, vestibular disorders, neurological conditions, or cervical spine surgery were excluded to eliminate potential confounding variables (3,11). Data collection was carried out through a structured and validated questionnaire, which included sections on demographic characteristics, headache-related symptoms, and quality of life indicators. Postural stability was assessed using the Tandem Stance Test, while the Flexion-Rotation Test (FRT) was employed as a clinical diagnostic tool to identify the presence of cervicogenic headache. Pain intensity was evaluated using the Numeric Pain Rating

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Scale (NPRS), and quality of life was measured using the standardized 12-Item Short Form Health Survey (SF-12). Participants also completed a self-prepared questionnaire addressing ergonomic habits, perceived musculoskeletal discomfort, and work-related factors. Ethical approval for the study was obtained from the Institutional Review Board prior to data collection, and informed consent was secured from all participants in accordance with ethical research practices. Data were anonymized to ensure confidentiality and integrity. Statistical analysis was performed using SPSS version 29.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Associations between the Flexion-Rotation Test and variables such as postural stability, pain levels, ergonomic practices, and quality of life measures were analyzed using Pearson's chi-square test, likelihood ratios, and linear-by-linear association tests to determine statistical significance. Data visualization was carried out through pie charts and bar graphs to facilitate interpretation and presentation of findings.

RESULTS

The analysis included 187 graphic designers with a mean age of 24.80 years and a standard deviation of 3.56. The average working hours per day were 4.72 with a standard deviation of 1.12. Among the participants, the most frequently reported pain location was around one eye (32.62%), followed by pain at the back of the head (24.60%), temples or ahead of the ears (17.11%), squeezing pain around the crown of the head (12.30%), pain at the cheekbones above the eyes (11.76%), and throbbing pain (1.60%). The flexion rotation test showed 44.39% of participants were positive on the left side, 23.53% were positive on the right side, while 32.09% had a negative result. In terms of postural stability, the tandem stance test revealed that 16.04% of the participants tested positive, whereas 83.96% tested negative. Pain intensity measured through the Numeric Pain Rating Scale (NPRS) yielded a mean of 4.86 with a standard deviation of 2.01, indicating a moderate level of perceived pain. The self-prepared questionnaire assessing ergonomic and work-related musculoskeletal concerns resulted in an average score of 46.69 with a standard deviation of 11.23. In the SF-12 quality of life assessment, 28.88% of participants fell into the below-average health category, while 71.12% reported better health status.

Chi-square analysis indicated a statistically significant association between the flexion rotation test and NPRS scores ($p = 0.019$), suggesting a correlation between cervicogenic dysfunction and pain severity. A highly significant association was also observed between the flexion rotation test and the self-prepared questionnaire scores ($p < 0.001$), supporting its utility in evaluating work-related postural and ergonomic factors contributing to cervicogenic headache. Furthermore, there was a significant association between the flexion rotation test and the SF-12 categories ($p = 0.024$), indicating that cervicogenic headache can adversely impact overall health, including physical, mental, and social domains. While the overall SF-12 score also showed statistical relevance in association with the flexion rotation test ($p < 0.001$ based on linear-by-linear association), the association between the flexion rotation test and tandem test was not statistically significant ($p = 0.073$). The analysis revealed significant associations between the flexion rotation test and several clinical and self-reported outcome measures. A statistically significant relationship was observed between the flexion rotation test and NPRS scores ($p = 0.019$), indicating that individuals with positive flexion rotation test findings reported higher pain intensity levels. Furthermore, a highly significant association was found between the flexion rotation test and the self-prepared questionnaire assessing work-related musculoskeletal factors ($p < 0.001$), suggesting strong alignment between clinical findings and perceived ergonomic strain. The association between flexion rotation test and the SF-12 total health score also showed significance through linear-by-linear association ($p < 0.001$), implying that cervicogenic headache symptoms may adversely impact overall quality of life. Similarly, SF-12 categorical health outcomes were significantly related to flexion test results ($p = 0.024$), reinforcing the relevance of CGH in both physical and psychosocial domains of health. However, the flexion rotation test did not show a statistically significant association with the tandem stance test ($p = 0.073$), suggesting limited correlation between cervical dysfunction and broader postural control in this sample. Further analysis was conducted to assess the relationship between working hours, specific pain locations, and the flexion rotation test outcomes to align more closely with the study's objective. A significant association was found between pain located around one eye and the flexion rotation test ($p = 0.015$), indicating that this localized pain distribution may serve as a potential clinical marker of cervicogenic headache. Pain at the back of the head demonstrated a trend toward significance ($p = 0.057$), suggesting a possible relationship that warrants further exploration in larger samples. In contrast, pain located at the temples, crown of the head, and working hours did not show statistically significant associations with flexion rotation test outcomes (p-values = 0.086, 0.210, and 0.184 respectively). These findings suggest that while certain pain locations may reflect underlying cervical dysfunction, work duration alone may not be a direct predictor of clinical cervical involvement in this cohort.

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Table 1 Flexion rotation test across tandem test

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.232[a]	2	.073
Likelihood Ratio	5.233	2	.073
Linear-by-Linear Association	.177	1	.674
N of Valid Cases	187		

Table 2 Flexion rotation test across NPRS

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.921[a]	16	.042
Likelihood Ratio	29.373	16	.022
Linear-by-Linear Association	5.498	1	.019
N of Valid Cases	187		

Table 3 Flexion rotation test across SELFPREPARED:

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	169.826[a]	42	<.001
Likelihood Ratio	198.741	42	<.001
Linear-by-Linear Association	51.466	1	<.001
N of Valid Cases	187		

Table 4 Flexion rotation test across SF12 CATERGORIES

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.438[a]	2	.066
Likelihood Ratio	5.802	2	.055
Linear-by-Linear Association	5.084	1	.024
N of Valid Cases	187		

Table 5 Flexion rotation test across SF12:

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)

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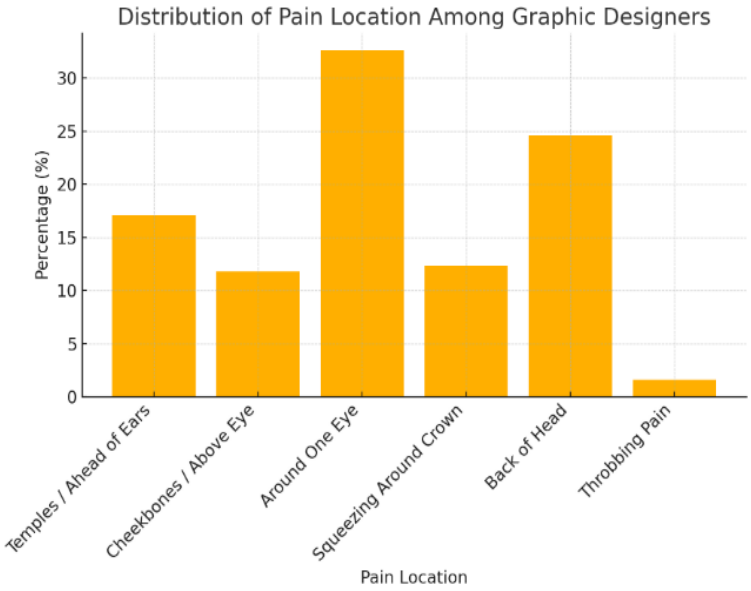
Pearson Chi-Square	133.933[a]	110	.060
Likelihood Ratio	154.098	110	.004
Linear-by-Linear Association	20.223	1	<.001
N of Valid Cases	187		

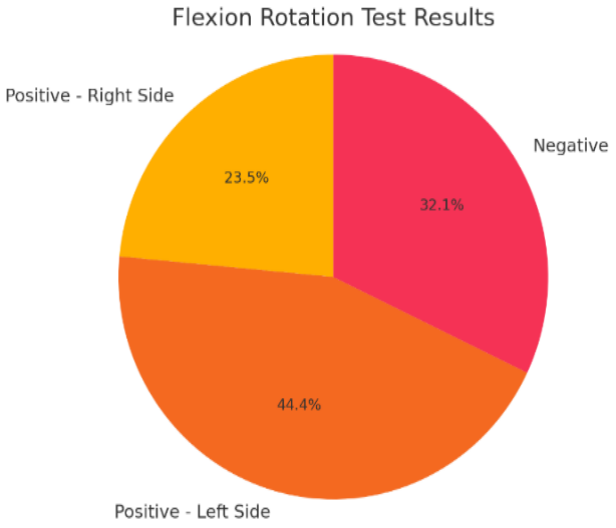
Table 6 Associations Between Working Hours, Pain Locations, and Flexion Rotation Test

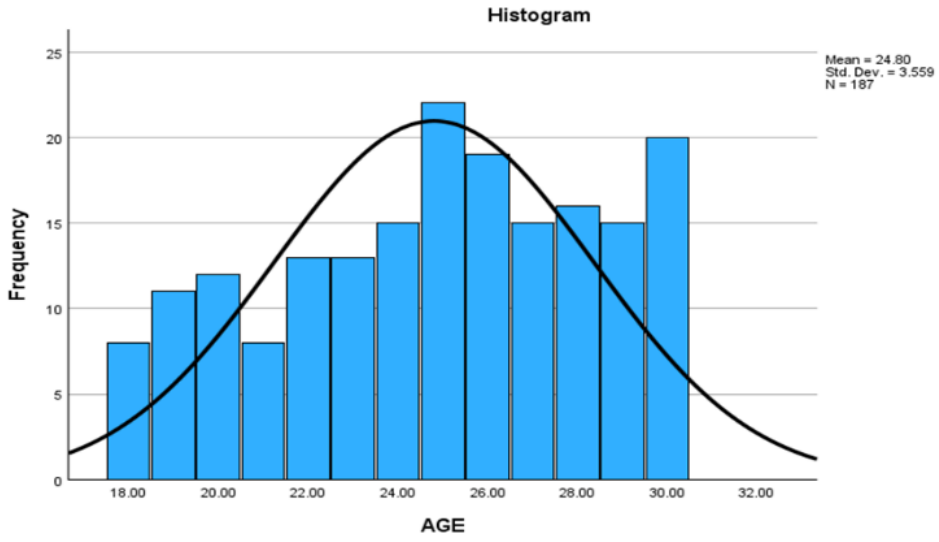
Variable	Chi-Square Value	df	Asymptotic Sig. (2-sided)	Significance
Working Hours vs FRT	6.212	4	0.184	Not Significant
Pain at One Eye vs FRT	8.451	2	0.015	Significant
Pain at Back of Head vs FRT	5.739	2	0.057	Approaching Significance
Temples Pain vs FRT	4.902	2	0.086	Not Significant
Crown Squeezing vs FRT	3.123	2	0.21	Not Significant

Table 7 Association Between Flexion Rotation Test and Related Variables

Variable	Pearson Chi-Square	df	Asymptotic Sig. (2-sided)	Likelihood Ratio	Linear-by-Linear Association	p-value (Linear-by-Linear)
Tandem Test	5.232	2	0.073	5.233	0.177	0.674
NPRS	26.921	16	0.042	29.373	5.498	0.019
Self-Prepared Questionnaire	169.826	42	<0.001	198.741	51.466	<0.001
SF-12 Categories	5.438	2	0.066	5.802	5.084	0.024
SF-12 Total Score	133.933	110	0.06	154.098	20.223	<0.001







DISCUSSION

Cervicogenic headache (CGH) is classified as a secondary headache due to its origin from structural or functional disturbances within the cervical spine, particularly the upper cervical segments. It is estimated to contribute to approximately 15–20% of chronic headache cases, highlighting its clinical relevance in populations frequently exposed to cervical strain (12). The current study focused on graphic designers, a group inherently prone to prolonged computer use and suboptimal ergonomic postures, which positions them at increased risk for developing cervicogenic headache (13). The findings contribute valuable insights into the prevalence of CGH in this professional group and its association with postural stability and overall quality of life. The study revealed a substantial prevalence of positive flexion rotation test results, with a notable proportion of participants also experiencing moderate pain intensity and reduced scores in physical and mental health domains as measured by the SF-12 (14). The significant associations between flexion rotation test outcomes and pain severity, self-reported ergonomic factors, and quality of life underscore the multifactorial nature of cervicogenic headache in computer users. These findings are consistent with previous research suggesting that strain due to sustained static postures, particularly forward head positioning, can contribute to cervical dysfunction and CGH symptoms (15). Studies involving controlled diagnostic blocks have demonstrated that the C2–3 segment is the most common pain generator in CGH, further supporting the neurological basis of the condition through convergence of cervical and trigeminal afferents (16).

Comparison with other population groups suggests occupational posture plays a critical role in the manifestation of CGH. In prior cross-sectional studies comparing housewives and working women, higher rates of CGH were observed among the working population, likely due to prolonged hours of desk-based activity and associated muscular fatigue (17). This pattern aligns with the present findings where graphic designers, due to continuous screen exposure and limited physical movement, experienced similar musculoskeletal symptoms linked to CGH. These results reinforce the need for workplace ergonomics and preventative strategies, particularly in occupations that require extended screen time and minimal neck mobility (18,19). The present study offers a unique perspective by targeting a specific professional group that has not been widely studied in relation to CGH. Its strengths include the incorporation of both clinical assessments (e.g., flexion rotation test) and standardized self-reported tools (e.g., NPRS, SF-12), which collectively enhance the reliability of the findings (20). However, several limitations must be acknowledged. The cross-sectional design precludes causality inference, and the non-random convenience sampling limits generalizability to broader populations. The absence of detailed regression analyses also limits the understanding of interactions between multiple contributing factors. Additionally, while some pain locations such as periorbital and occipital areas showed relevance, associations between work hours and CGH were not statistically significant, warranting more nuanced assessment in future research.

Future studies should explore longitudinal designs to better understand the temporal evolution of cervicogenic headache in high-risk occupations. Multivariate analysis could uncover complex interactions between ergonomic risk factors, musculoskeletal impairments, and quality of life outcomes. Interventions focusing on postural correction, workstation modification, and targeted physiotherapy should be evaluated to develop evidence-based recommendations for CGH prevention and management in digital professionals. In conclusion,

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this study confirms the clinical significance of cervicogenic headache in graphic designers and emphasizes the need for occupational health measures aimed at mitigating cervical spine strain and enhancing the well-being of computer-based workers.

CONCLUSION

This study concludes that cervicogenic headache is prevalent among graphic designers, primarily due to prolonged poor postural habits associated with extended computer use. The findings highlight a clear impact of cervicogenic headache on quality of life, reflecting both physical discomfort and reduced functional well-being in affected individuals. Although postural stability did not show a statistically significant association, the overall evidence supports the role of cervical strain and ergonomic factors in the development of CGH. These insights underscore the importance of integrating ergonomic awareness, preventive strategies, and targeted interventions within computer-based professions to enhance spinal health and improve life quality in this at-risk population.

Author Contribution

Author	Contribution
Nida Shahzad	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Faizan Ahmad	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Neelam Javed	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Dania Junaid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
M Behzad Ali*	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sana Muneeb	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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