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## EDITED BY

Karen Søgaard,  
University of Southern Denmark, Denmark

## REVIEWED BY

Leslie Russek,  
Clarkson University, United States  
Bjarne Madsen,  
Danish Headache Center, Rigshospitalet,  
Denmark

## \*CORRESPONDENCE

Gopal Nambi  
✉ physio\_gopal@rediffmail.com

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# Combined and isolated effects of workstation ergonomics and physiotherapy in improving cervicogenic headache and work ability in office workers: a single-blinded, randomized controlled study

Gopal Nambi<sup>1\*</sup>, Mshari Alghadier<sup>1</sup>, Shahul Hameed Pakkir Mohamed<sup>2,3</sup>, Arul Vellaiyan<sup>4</sup>, Elturabi Elsayed Ebrahim<sup>4</sup>, Dena Eltabey Sobeh<sup>4</sup>, Faizan Z. Kashoo<sup>5</sup>, Alaa Jameel A. Albarakati<sup>6</sup>, Naif A. Alshahrani<sup>7</sup> and Vijayamurugan Eswaramoorthi<sup>8</sup>

<sup>1</sup>Department of Health and Rehabilitation Sciences, College of Applied Medical Sciences, Prince Sattam bin Abdulaziz University, Al-Kharj, Saudi Arabia, <sup>2</sup>Department of Health Rehabilitation Sciences, Faculty of Applied Medical Sciences, University of Tabuk, Tabuk, Saudi Arabia, <sup>3</sup>Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences (Deemed to be the University), Chennai, TamilNadu, India, <sup>4</sup>College of Nursing, Prince Sattam bin Abdulaziz University, Al Majmaah, Saudi Arabia, <sup>5</sup>Department of Physical Therapy and Health Rehabilitation, College of Applied Medical Sciences, Majmaah University, Al Majmaah, Saudi Arabia, <sup>6</sup>Department of Surgery, College of Medicine, Umm Al-Qura University, Al-Qunfudah Branch, Makkah, Saudi Arabia, <sup>7</sup>Orthopedic Surgery Department, King Fahad Medical City, Ministry of Health, Riyadh, Saudi Arabia, <sup>8</sup>Department of Physiotherapy, Faculty of Pharmacy and Health Sciences, Royal College of Medicine Perak, Universiti Kuala Lumpur, Ipoh, Malaysia

**Objective:** The objective of the study is to compare and investigate the combined and individual effects of workstation ergonomics, physiotherapy and patient education in improving CgH headaches and work ability in office workers.

**Methods:** 96 eligible CgH participants were divided into the ergonomics modifications group (EMG;  $n = 24$ ), physiotherapy group (PTG;  $n = 24$ ), and ergonomics modifications combined with physiotherapy group (EPG;  $n = 24$ ) and education control group (CNG;  $n = 24$ ), the participants received the respective treatment for 4 weeks. Primary (CgH frequency) and secondary (CgH pain intensity, CgH disability, flexion rotation test (right and left), neck disability index and work ability) scores were measured. The effects of treatment at various intervals were analyzed with a  $4 \times 4$  linear mixed model analysis (LMM) between treatment groups and time intervals.

**Results:** Four weeks following training EPG group showed more significant changes in primary outcome CgH frequency; 4.6 CI 95% 3.63 to 5.56 when compare to control group. The same gradual improvement was noticed at 8 weeks 8.2 CI 95% 7.53 to 8.86 and at 6 months follow up 11.9 CI 95% 11.25 to 12.54 when compare to other groups ( $p = 0.001$ ) which is statistically 52.97% improvement. Similar improvements can be seen in the secondary outcome measures such as CgH pain intensity, CgH disability, flexion rotation test (right and left), neck disability index and work ability in EPG group than the EMG, PTG, and CNG groups ( $p = 0.001$ ) at 4 weeks, 8 weeks and at 6 months' follow-up.

**Conclusion:** This study observed that the workstation ergonomics and physiotherapy group experienced significantly more improvements in cervicogenic headache patients.

**Clinical trial registration:** Identifier NCT05827185

#### KEYWORDS

cervicogenic headache, ergonomics, workstation, physiotherapy, office workers

## 1 Introduction

According to the Global Burden of Disease (GBD) survey, headache disorders affect approximately 66% of the general population aged between 20 and 85 years. In addition, 44.4% of men and 57.8% of women report experiencing headaches at least once in their lifetime (1). Cervicogenic headache (CgH) is a distinct form of headache and accounts for 15–20% of all headaches, with a prevalence rate ranging from 0.4 to 20% (2). The prevalence of CgH is 0.21% in females and 0.13% in males, with office workers being more affected than other occupations (3). The International Classification of Headache Disorders, 3rd edition (ICHD-3), is a globally recognized system used to classify and diagnose headaches. It categorizes headaches into three main types: primary headaches, secondary headaches, and other headache disorders. The ICHD-3 diagnostic criteria for cervicogenic headache identify it as a headache originating from a disorder of the cervical spine or neck tissues. Diagnosis requires evidence of a cervical lesion that explains the headache, along with at least two of the following: onset in relation to the cervical disorder, improvement after treatment of the cervical disorder, or provocation by neck movements or pressure. Additionally, the headache must not be better explained by any other headache disorder (4). Poor workstations and bad posture during work are generally the main causes of cervicogenic headache. The cause of CgH is located in the neck region, and the pain worsens with asymmetrical movements of the head and neck (5). The most accepted mechanism of CgH involves the interaction between the trigeminal nerve and the C1–C3 nerves in the trigeminal-cervical nucleus (6). CgH usually arises from musculoskeletal structures such as the cervical vertebrae, intervertebral discs, or paravertebral muscles. The clinical features of CgH include unilateral headache, limited range of motion (ROM) in the neck, and referred pain to the head or face (7).

Cervicogenic headache (CgH) is generally diagnosed based on a detailed history and clinical assessment (8). Clinical examinations typically reveal pain in the cervical region, including neck pain (NP), decreased neck movements, upper-quarter muscle tightness, and loss of muscle function (9). The flexion-rotation test (FRT) is a valid and reliable method for assessing neck movements and is recognized as a diagnostic tool for CgH (10).

The management of CgH involves both pharmacological and non-pharmacological methods, with pharmacological approaches often associated with many side effects (11). There are several non-pharmacological treatment options available, such as ergonomic modifications and guidance, physiotherapy, acupuncture, massage, dry needling, and patient education (12, 13).

The Guide to Health and Safety in the Office handbook by the Commonwealth of Australia (14) suggests ergonomic guidance and interventions for preventing and treating musculoskeletal disorder (MSD) injuries in office workers. To date, there is no scientific evidence from randomized control trials specifically examining the application of these interventions for preventing and treating cervicogenic headache

in office workers. Also, studies exploring the effects of ergonomic interventions on neck pain have produced mixed results. Tsang et al. (15) and Lee et al. (16) provide strong evidence supporting the effects of integrated ergonomic interventions and motor control exercises on muscle activity and kinematics in people with work-related neck and shoulder pain. Van Eerd et al. found moderate evidence for the effectiveness of job stress management training and office workstation adjustments in reducing upper extremity MSD and its symptoms (17). Hoe et al. conducted a systematic review and meta-analysis on CgH and found inconsistent evidence for the use of ergonomic modifications to reduce the incidence of neck or shoulder pain (18).

It is estimated that 34% of US citizens receive some form of physiotherapy for cervicogenic headache (CgH) each year (19). In physiotherapy, physical modalities such as infrared radiation (IRR), shortwave diathermy (SWD), transcutaneous electrical nerve stimulation (TENS), interferential therapy (IFT), and hydro collar application, along with muscle strengthening exercises, joint mobilization and manipulation techniques, and postural correction exercises, are commonly used to treat CgH patients (20). In addition, during patient education, therapists spend time with patients to improve their overall health. The educator considers each patient's abilities and needs, and interacts with them accordingly. This approach enhances patients' self-efficacy, self-health management, health knowledge, health awareness, and overall well-being (21).

Till date, no studies have compared and investigated the combined and individual effects of workstation ergonomics, physiotherapy, and patient education on improving cervicogenic headache (CgH) and work ability in office workers. Moreover, current studies do not address the shortcomings and gaps in the existing literature on managing CgH in office workers, such as the lack of comparisons between intervention procedures, inadequate trial designs, poor study methods, and small sample sizes. Therefore, our study aims to compare and investigate the combined and individual effects of workstation ergonomics, physiotherapy, and patient education in improving primary (CgH frequency) and secondary outcomes (CgH pain intensity, CgH disability, flexion rotation, and work ability) in office workers with cervicogenic headache. This randomized clinical trial hypothesizes that there is a difference in primary (CgH frequency) and secondary (CgH pain intensity, CgH disability, flexion rotation, and work ability) outcome measures between workstation ergonomics, physiotherapy, and patient education in office workers with cervicogenic headache.

## 2 Methods

### 2.1 Study design

The trial was a prospective, single-blinded, parallel-group, randomized controlled trial. The required participants were screened