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A Cross-Sectional Study on the Prevalence of Cervicogenic Headache Amongst University Students

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ABSTRACT

Background

The Cervicogenic Headache Society defines CGH as headache pain that radiates to the head's regions and is mostly caused by nociceptors associated with musculoskeletal disorders. A unilateral headache and neck discomfort resulting from dysfunction of the osseous, disc, and soft tissue constituents of the cervical vertebrae are known as a cervicogenic headache (CGH). It frequently comes with neck pain. Through the trigeminocervical nucleus, pain from the neck can be transmitted to the head. It is anatomically and functionally coherent with the posterior gray columns that constitute these spinal segments, and it extends through the canal of the spinal cord to the C3/4 vertebral column. Convergence refers to the possibility that sensory afferents' input—mainly from the upper 3 cervical nerve roots—may be misinterpreted as discomfort in the head.

Aims & Objectives

This study focuses on the prevalence of cervicogenic headache in college students as well as the relationship between headache and tightness or restriction in the neck.

Materials and methods

A cross-sectional study comprising 78 participants between the ages of 18 and 30 was carried out. Of these, 34 males and 44 females were selected from the university, respectively. Cervical range of motion was measured using a fluid inclinometer or goniometer. A cervical flexion rotation test was implemented to look for any neck pain, tightness, or restrictions.

Results

The average mean of age was 20.9872, standard deviation ±2.1651. Out of 78 participants 64 were having headache related problem, with a prevalence of 82.05% and 50 participants were having neck pain associated with headache with a prevalence of 64.10%. Pearson Valueof Correlation is Positive and value is 0.179. The study reveals a positive correlation ($r=0.179$, $p<0.05$) between feeling of headache on one side of your head which is not shifting and Feeling of restriction or tightness in your neck.

Conclusion

The findings revealed an elevated prevalence of cervicogenic headache among university students of various ages. The study also reveals a positive correlation between feeling of headache on one side of the head which is not shifting and Feeling of restriction or tightness in the neck

Keywords: Cervicogenic headache, Cervical flexion rotational test, Range of motion

Introduction

The majority of individuals complain of headaches often, and most have had them at some point in their lives. According to the Cervicogenic Headache Society, CGH is characterized by headache pain that spreads to other parts of the head and is mostly brought on by nociceptors linked to musculoskeletal conditions(Martínez-Merinero et al., 2021). Cervicogenic headache (CGH) is the term for a unilateral headache and neck pain caused by cervical spine dysfunction involving the osseous, disc, or soft tissue components. It is often accompanied with neck ache. Numerous disorders or conditions pertaining to the cervical spine are associated with cervicogenic headaches(Mingels et al., 2022). One typical sign is reduced neck range of motion (ROM). Musculoskeletal dysfunction in the upper three cervical segments is the primary cause of cervicogenic headaches(Govind & Bogduk, 2022). Through the trigeminocervical nucleus, pain from the neck can be transmitted to the head. It is anatomically and functionally coherent with the dorsal gray columns of these spinal segments, and it continues through the spinal canal to the C3/4 vertebral column(Getsoian et al., 2020). Convergence refers to the possibility that sensory afferents' input—mainly from the top three cervical nerve roots—may be misunderstood as discomfort in the head(Fortner et al., 2022). CGH is typified by pain and discomfort in the joints of the upper cervical spine as well as stiffness in the muscles, particularly in the higher posterior soft tissues of the neck region(Shimohata et al., 2017).People who suffer from cervical dysfunction often have weak flexor muscles in their deep necks. Numerous investigations have revealed that all CGH patients have completely reduced neck flexor strength and endurance(Howard et al., 2015). Similar to each other, cervicogenic headache (CGH) and occipital neuralgia (ON) are secondary headache syndromes that present with occipital pain as a primary symptom. Both conditions originate in the neck region(Barmherzig & Kingston, 2019). The orbital, frontal, and parietal lobes of the brain deliver pain signals to those parts of the head through the upper cervical nerves, which are carried by trigeminal afferents. For the CGH research, there have been reports of atrophy, or variations in the thickness or size, of the anterior and posterior deep cervical muscles. The suboccipital and deep neck flexor muscles work in tandem to maintain stability and rotate the upper cervical region in the proper manner(Fleming et al., 2007). Research has demonstrated that CGH affects the muscles. Head/neck trauma in the past or a nontraumatic history (e.g., unease in head placement and chronic postural tension) may be associated with cervicogenic headache. CGH accounts for 15–20% of all chronic headaches. The research suggests that CGH formation may originate from the C1-C2 zygapophyseal joints, while the precise underlying mechanisms remain unknown. In general, women are diagnosed with the ailment more often than men, and its frequency peaks throughout middle age. Cervicogenic headache warning indications include jobs or hobbies that require repetitive neck motions, poor posture, a sedentary lifestyle, a history of neck trauma, and persistent cervical illness(Meng et al., 2023). A special test used to evaluate for CGH is the cervical flexion rotation test, or CFT. The cervical flexion-rotation test (CFRT) can be used to evaluate movement disorders specific to the upper cervical spine by examining the rotation movement of the upper cervical spine independently. With the cervical spine fully flexed throughout the test, it should be able to freely rotate at C1/2, indicating the special capacity to rotate in any cervical posture(Paquin et al., 2022).

Anatomy associated with cervicogenic headache.

The cervical spine includes the seven cervical vertebrae (C1–C7) in the neck region. Cervicogenic headaches sometimes cause these vertebrae to become inflamed or dysfunctional. Anomalies in the cervical spine, which supports the head and allows for a range of motions, can cause headaches.

Herniated discs, postural errors, muscle imbalances, and degenerative alterations can all alter the neck's biomechanics and lead to cervicogenic headaches. Referred pain is the result of misdiagnosing neck discomfort as a headache when something goes wrong in this region. Although cervicogenic headaches are recognized as a distinct kind of headache, they are frequently misdiagnosed or ignored due to their shared symptoms with other headache diseases. The following variables are linked to cervicogenic headaches: Although incorrect posture, misaligned muscles, and neck injuries are commonly associated with CGH, a recent study suggests that additional factors may also be at play. Degenerative diseases of the cervical spine, such as osteoarthritis, are among them. The trigeminocervical nucleus's bidirectionality and integration of cervical and trigeminal afferents may be the cause of migraineurs' reported neck pain(Delen & İlter, 2023). The pathophysiological understanding.A complex condition, cervicogenic headache involves complex relationships between peripheral and central sensitization, pain processing pathways, and cervical spine components. Numerous causes can lead to the development and persistence of cervicogenic headaches, including: Nociceptive Input: When the facet joints, intervertebral discs, ligaments, muscles, or other components of the cervical spine are injured or malfunction, nociceptive signals may be generated(Hua et al., 2023). The brain interprets these signals as headache pain as they pass via sensory nerves. Peripheral sensitization: Persistent nociceptive input from cervical structures can cause this syndrome, which is characterized by an increased sensitivity of peripheral neurons to unpleasant stimuli. This heightened sensitivity may result in more acute pain perception that radiates beyond the cervical spine(Ylinen et al., 2010). . Amplification of pain signals, extension of pain regions, and greater sensitivity to non-nociceptive stimuli (allodynia) are possible outcomes of central sensitization. Diagnostic Standards: The International Headache Society (IHS) has set precise criteria for the diagnosis of cervicogenic headache. The following characteristics, as per the IHS criteria, need to be met in order to diagnose cervicogenic headache: Pain that is restricted to the occipital, periocular, or neck regions; it is frequently unilateral but can also be bilateral exertion of pressure over the cervical vertebrae, prolonged abnormal head placement, or neck movement that provokes a headache(Núñez-Cabaleiro & Leirós-Rodríguez, 2022).

Additionally, indirect expenses related to disability, absenteeism, and lost productivity increase the socioeconomic effect of cervicogenic headache(Verma et al., 2021). Diagnostic standards for cervicogenic headaches Principal requirements:

Signs and symptoms of neck involvement; at least one of the phenomena 1a through 1c must be evident.

Ia) Consolidation of headache pain that resembles the regular headache:
Ia1) Unnatural head posture and/or prolonged neck movement, and/or:
Ia2) By applying external pressure to the affected side's upper cervical or occipital area.
Ib) Limitation of the neck's range of motion (ROM).
Ic) Ipsilateral pain in the arm, shoulder, or neck that is a little nebulous and non-radicular, or occasionally arm discomfort that is radicular.
II. Diagnostic anaesthetic obstructions providing corroborated information.
III. Head discomfort that is unilateral and does not move to one side of head.
IV. Non-throbbing, moderate-to-severe discomfort that typically begins in the neck.

There are no studies in the literature that seek for the prevalence of cervicogenic headache amongst university students. Therefore, we proposed a study featuring that cervicogenic headache is prevalent amongst university students.

Review of literature

A cross- sectional study was conducted (Martínez-Merinero et al., 2021) with an objective to determine whether pain severity and/or impairment in individuals with CGH influenced the association between tissues mechanosensitivity and cranio-cervical angle (CCA). A convenience sample comprising 102 participants was enlisted. Using a postural evaluation program, the CCA was quantified using photos. The Northwick Park Questionnaire was used to quantify impairment, and a visual analogue scale (VAS) was used to measure pain intensity. The upper trapezius and splenius capitis muscles, the median nerve, and the spinous process of C2 were the sites where the pressure pain threshold (PPT) was assessed. Multiple regression analyses with basic moderation were created. PPT tested between the muscle fibers and median nerve showed a nonsignificant association, however PPT recorded at C2 and CCA showed a positive link. Not disability, but pain intensity ($R2 = 0.17$; $R2$ change $= 0.06$; $p < 0.05$) regulated the outcome of PPT at C2 over CCA. A 4.66 cm VAS cut-off point for statistical significance was found via the Johnson-Neyman analysis. In participants with CGH, there appears to be a positive correlation between PPT at C2 and CCA, and is enhanced by pain severity. Dysfunction connected to the neck, nevertheless, does not appear to have a moderating influence.

Another randomized controlled trial study was conducted (Ylinen et al., 2010) to evaluate the effects of three 12-month intervention courses on upper extremity pain and headache in patients with persistent neck discomfort. Three groups comprising 180 female employees with generalized, persistent neck discomfort were randomly divided. Stretching, dynamic, and isometric exercises were done by the strength group. The endurance group engaged in stretching and dynamic muscle exercises. The control group warmed up with stretches. A VAS was used to measure pain. Three subgroups were created for each group based on the severity of their headaches. In comparison to baseline, headache had gone down in the strength group by 69%, the endurance group by 58%, and the control group by 37% at the 12-month follow-up. The strength group having the most significant headaches experienced the greatest reduction in neck discomfort ($p < 0.001$). According to the dosage analysis, a 0.6-mm reduction in headaches using the VAS was explained by one metabolic equivalent for every hour of exercise per week. The strength group saw a decline of 58% in upper extremity pain, the endurance group observed a 70% decrease, and the control group observed a 21% decrease. Every training technique reduced headaches. Stretching, which is frequently advised for patients, was found to be more beneficial when paired with strength and muscle endurance training. When suggesting a course of action for patients experiencing severe cervicogenic headaches, caution must be used.

A bibliometric analysis of academic writings on cervicogenic headache within the previous forty years was done (Xu et al., 2023). As part of the bibliometric analysis approach, topics linked to cervicogenic headaches were searched through the Web of Science database. Only articles met the inclusion requirements reviews of cervicogenic headache studies that were written between 1982 and 2022. 1,499 distinct author keywords were generated from the analysis of 866 publications, comprising 2,688 authors that appeared between 1982 and 2022. The main focus was neuroscience and neurology, and participation came from 47 nations, with the United States leading the way with the most connections (n = 29), citations (n = 5,238), and published papers (n = 207). The University of Queensland received the highest number of citations (n = 876) in the 602 institutions involved in the cervicogenic headache study, while Cephalalgia was the journal with the highest number of published articles, the highest growth (n = 36), and the most local citations (n = 82).Papers on cervicogenic headaches have been published in 259 journals. Researchers looking into cervicogenic headaches include. This study provided a thorough

summary of the most recent findings on cervicogenic headache using bibliometric analysis. The results point to a number of promising areas for future research, such as the need for additional studies on the causes and treatments of cervicogenic headaches, the influence of lifestyle factors on the condition, and the creation of novel interventions to enhance patient outcomes.

A second cross-sectional single-blind comparison study was carried out (Mingels&Granitzer, 2020) comparing women with persistent cervicogenic headaches to matched controls in order to examine the potential involvement of autonomic dysfunction in the progression of the headache's fleeting discomfort into persistent pain. In a comparison with 17 asymptomatic controls (26.8±11.9 years) that were matched for age, gender, and socioeconomic status, the autonomous activity of 17 females (26.6±11.6 years) with recurrent cervicogenic headache was examined. Autonomic activity was compared before, during, and after cognitive stress induction using repeated measures of dermal sweat gland activity, bilateral upper trapezius electrical activity, and peripheral circulation (%). The control group's autonomic measures showed the expected behavior, however the headache group's subjects showed the following: 1) a significant reduction in the activity of the dermal sweat gland (-2.57±0.40 vs. -3.29±0.84 μmho, $P<0.0001$), no recuperation of the left ($P=0.83$) and right ($P=0.99$) upper trapezius; and a more substantial vasodilatation (-5.56±1.45% vs. -5.61±1.85%, $P=0.03$); a significant decrease in the activity of the left upper trapezius (0.21±0.44 vs. 0.89±0.59 μV, $P=0.03$); a significant decrease in the dermal sweat gland activity (-2.57±0.40 vs. -3.29±0.84 μmho, $P<0.0001$); and a significant negative correlation ($\rho=0.69$, $P=0.04$) between dermal sweat gland and right upper trapezius activity. Females with recurrent cervicogenic headache reacted less when cognitive stress was applied. After pushing like that, there was no coming back. Further research is needed to connect autonomous reactions to a possible less transient pain changing into persistent pain process.

A retrospective study was conducted (Fleming et al., 2007) to look for the Influential Variables Associated with Cervicogenic Headache Patient's Outcome. Physical and functional deficits were seen in all 50 patients, indicating the need to discover patient-specific characteristics associated with treatment prognosis in order to increase therapy success. Out of the 62 charts that were considered for inclusion, 44 were included in the analysis. Of the 44 patients, 28 reported a reduction in headache frequency that was clinically significant, and 36 reported a reduction that was only marginally clinically significant. The intensity of headache pain varies. The level of headache discomfort ranges in intensity. Following a conventional physical therapy regimen involving spinal mobilization and manipulation as well as a home exercise program, enhanced physical and functional outcomes were associated with increased age, provoking or comfort of headache with movement, employment status, and possibly duration of symptoms. These results add to the body of knowledge now available and call for future studies on the effects of physical therapy treatment for CGH in order to deliver more effective, evidence-based care.

A cross-sectional study was conducted (Aabroo et al., 2022) with an aim to assess the prevalence of cervicogenic headaches caused by excessive use of smart devices. Total 200 participants were assigned using a convenient sampling technique. There were 43 men and 157 women. The study included 60 participants aged 18-21, 122 aged 22-25, and 18 between 26-30 years old. 21% strongly disagreed with the claim that using smart devices is addictive, while 30% strongly agreed. The cervical flexion rotation test showed that 112 out of 200 participants were positive and 88 were negative. Female university students were more likely than males to experience cervicogenic headaches, which are caused by poor posture and excessive usage of smart phones.

Another cross-sectional study was conducted (Evlice et al., 2023) aimed to investigate the prevalence and features of secondary headaches in various geographical areas, such as Turkey, the Middle East, Asia, and Africa. The investigation was conducted in two stages. In the first phase, data on secondary headaches was compared between the regions. The secondary headache sub-diagnoses were only looked at in Turkey during the second phase. Out of 3722 people, 1249 (33.4%) had secondary headaches; these people were from Turkey [n=1039], the Middle East [n=80], Asia [n=51], and Africa [n=79]. The prevalence of secondary headaches in Turkey (33.6%), Africa (30.1%), the Middle East (35.5%), and Asia (35.4%) did not significantly differ from one location to another ($p>0.05$). Headaches associated with substance use or withdrawal constituted the most common type of secondary headaches in all research regions. The majority of people in every region were women, however Africa's share was lower than Turkey's. The study's findings show that headaches associated with substance use or abstinence were the most common subcategory of secondary headaches in all of the regions that were looked at. In contrast to Turkey; secondary headaches were less common in women in Africa. There were notable regional differences in the density and intensity of headaches; patients from Africa reported less severe headaches.

A case study was done (Oakland University et al., 2018) to investigate the impact of therapeutic exercise and prearranged upper cervical traction mobilization on cervicogenic headache. 15% to 20% in all recurrent and chronic headaches are caused by CGH. The patient in this study, who is 28 years old, has occipital and upper cervical (UC) discomfort that improved with solely one manual intervention method. Pre-positioned traction mobilization has been shown to increase cervical rotation without compromising vertebral artery blow flow, as this case study demonstrates. Additionally, individuals who have CGH should be viewed as candidates for the same secure and perhaps advantageous manual intervention.

Another non-experimental observational study was conducted (Kanniappan et al., 2022) with an objective to determine the frequency of cervicogenic headache in the younger population. A total of 272 participants were enrolled, and 26 of them (10.4% of the samples) had cervicogenic headache proneness. There were 276 responses, including 176 female responses and 96 male responses. Ninety-one out of 276 respondents said they had headaches frequently. There were sixteen questions on the survey, with an acceptable score of 34 and a minimal score of 5. Cervicogenic headache is indicated by a score of 22 or higher. The questionnaire for this study was created using the cervicogenic headache diagnostic criteria. According to the study's findings, cervicogenic headaches are 10.4% prevalent and more likely to occur in young people. This condition may be brought on by neck strain from using smart phones and laptops or from different endeavors like studying and playing.

A study was conducted (Govind &Bogduk, 2022) to evaluate the effectiveness of supervised diagnostic blocks in individuals who had a likely cervicogenic headache by identifying the frequency of pain origins in the cervical spine's both upper and lower synovial joints. 166 consecutive individuals who clinically showed characteristics compatible with a diagnosis of suspected cervicogenic headache underwent controlled diagnostic blocks. Data on the frequency of identifying a specific cause of pain and the frequency of positive yields from certain diagnostic blocks were gathered. Seventy-five percent of patients whose primary complaint was headache were successfully diagnosed with the cause of their discomfort by diagnostic blocks. Pain was reported in the C2-3 joint in 62% of cases, the C1-2 in 7% and the C3-4 in 6%. Sixty-seven percent of patients with headaches that was less serious than neck pain had successful blocks. 42% of patients reported pain in the C2-3 joint, 18% in the lower cervical joints, and 7% in the C3-4 joint. Most patients presenting with possible cervicogenic headache can have the

source of pain identified using controlled diagnostic blocks; the most common source is C2-3. Investigative diagnostic algorithms should start at C2-3, based on pretest probability. Depending on whether a headache is the predominant or nondominant complaint, the algorithm's second and third steps should be different.

Another observational study was conducted (Malavde& Salunkhe, 2020) with an to determine the frequency of cervicogenic headache among dentists and raise their knowledge of the condition. The study comprised 81 dentists in the age range of 30 to 60 years, with 48% of the dentists being male and 52% being female. Based on the Neck Disability Index, out of 81 dentists, 11% have intense pain,9% struggle with personal care, 12% lift heavy objects, 13% struggle with reading,15% have headaches, 8% have trouble focusing, 6% struggle at work,10% struggle with driving, and 8% have trouble sleeping.Cervical Flexion-Rotation test results showed that 26% of men and 15% of women had good results, whereas 20% of men and 39% of women had negative results. Cervicogenic headaches affect 26.73% of dentists.

Methodology

Study participants

The population of interest for this study was university students of age group 18-30 years.

Sampling design

Convenient sampling

Sample size estimation

The sample size was determined by Cochran's formula:

$n=Z\alpha^2 \times p\ (1-p)/e^2$

$e = 0.1$

$Z\alpha = 1.96$

$p = 7.2$

n=78

Selection criteria

Inclusion criteria

- 18-30 years.
- Patients diagnosed according to diagnostic criteria for CGH
- Chronic, unilateral neck pain >3 months, referring to ipsilateral fronto-temporal region.
- Less than 32^0 of cervical rotation in cervical flexion rotation test
- Reduced cervical ROM especially upper cervical rotation performed with cervical goniometer or fluid goniometer.
- Provocation of pain on pressure and palpation on cervical spine

Exclusion criteria

- Individuals with primary headaches, such as tension-type headaches, cluster headaches, trigeminal neuralgia, chronic paroxysmal hemicranies, and hemicranies continua.
- Mixed diagnosed headache.
- Temporomandibular disorder [Ankylosing spondylitis,internal derangement of joint].
- Neurological disorders [Parkinson disease, stroke].
- Individuals with history of head or neck trauma [whiplash injury].

- Diagnosed cervical pathology [Disc prolapsed,cervical spine stenosis,instability,peripheral nerve entrapment, fibromyalgia,cervicalkyphosis,torticolis].
- Previous cervical surgery.
- Cognitive disturbances.
- Patient suffered from head and neck trauma within past 6 months.

Study duration

The duration of a study will be 1 year including formulation of the research question, application, data collection, analysis and reporting

Materials used

- Notepad
- Pen
- Data collection form
- Consent form
- Assessment form
- Cervical goniometer

Outcome variables

Dependent variables

- Neck pain
- Neck ROM(range of motion)
- Muscle tightness

Independent variables

- Poor posture
- Muscle imbalances
- Neck injuries

Procedure

Methods of data collection

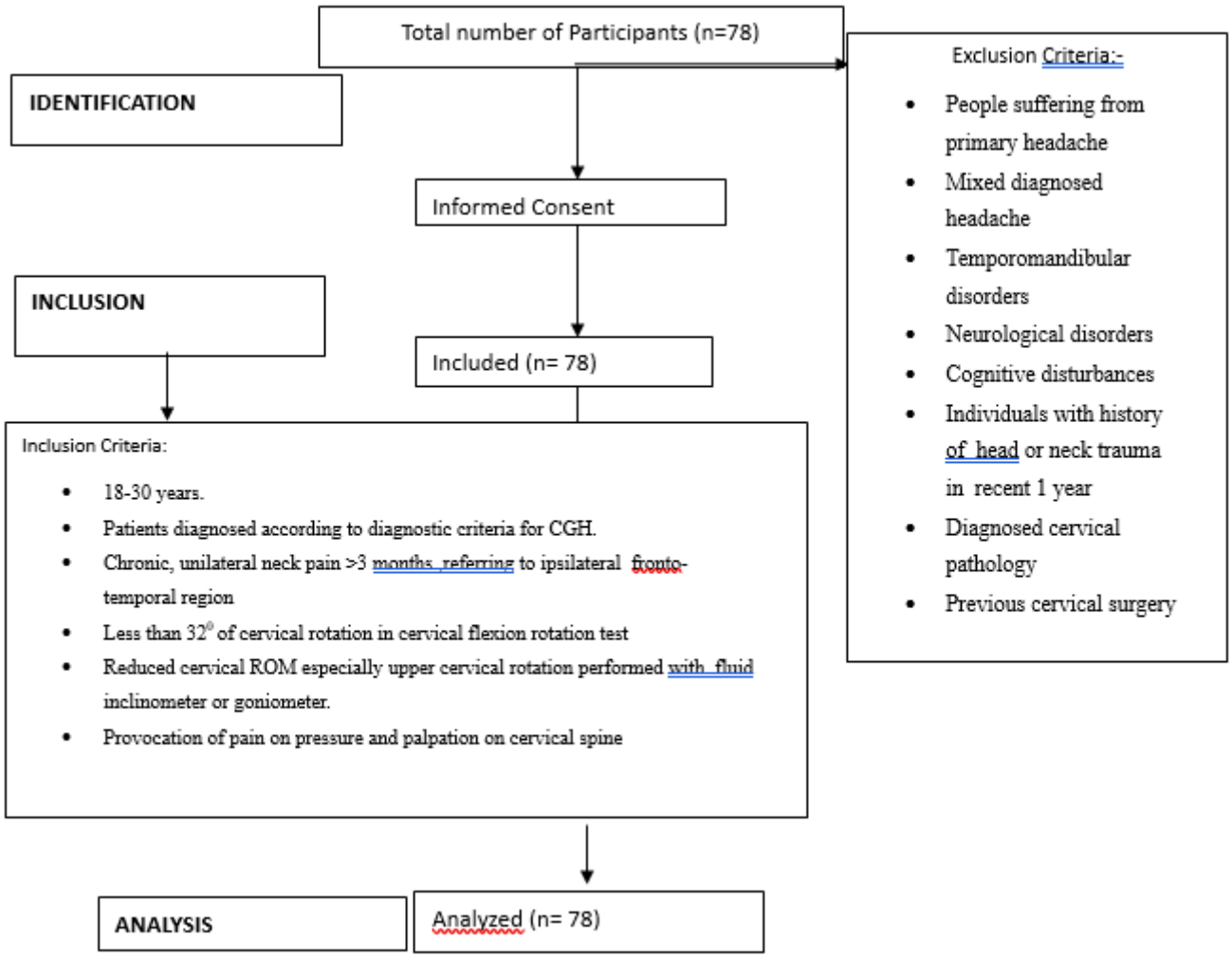
Convenient sampling

Data Analysis

Using SPSS version

Significance: 0.05

STROBE FLOWCHART



Conclusion

The present research provided a significant knowledge into headache, neck pain, or neck tightness associated with CGH in this demographic. The prevalence of headache was investigated with 64 out of 78 participants, yielding an 82.64% prevalence rate. The prevalence of neck pain was investigated in 50 of 78 participants, with a prevalence rate of 64.10%. The assessment was conducted using the CGH diagnostic criteria, and the methodology included a cervical rotation flexion test for evaluation. The range of motion of the cervical region was measured using a tool known as a fluid inclinometer or goniometer. Furthermore, the study explored into the correlation of neck tightness and an experience of headache that was not shifting; the Pearson value of correlation was positive, with a value of 0.179.

The findings revealed an elevated prevalence of cervicogenic headache among university students of various ages. Further, future research can be focused on determining the prevalence of CGH in a large population using a substantial sample size and identifying associated factors and triggers that cause CGH.

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