

# Relationship between forward head posture and headache related disability in migraine

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## ABSTRACT

**Background.** Migraine is the most common disorder that affects the population extensively and leads to significant disability in employment, domestic work, and social activities. Postural assessment is one of the important constituents of the clinical analysis of patients with musculoskeletal disorders. Incorrect posture can cause stress on the structures of neck and continuous stress that leads to FHP (forward head posture) and headache. The purpose of the study was to find out the relationship between forward head posture and headache related disability in migraine patients.

**Methods.** The prospective correlational study was carried out to explore the relationship between forward head posture and headache related disability in migraine. 55 participants were recruited in this study examined by photographic method. The forward head posture was measured by craniocervical angle. Various photographs were taken from the subjects and were uploaded on the Kinovea 08.15 software to measure the craniocervical angle.

**Results.** The results shows that negative correlation was found between forward head posture and headache related disability. Statistical analysis was done by using Pearson correlation test. Results also showed that lower the CVA (forward head posture), greater the headache related disability either sitting or standing position in migraine patient experienced more headache.

**Conclusion.** FHP with headache related disability in migraine showed moderate to good negative correlation. This study concluded that subjects with migraine headache had more FHP. In migraine patients; CV angle was small as compared to normal subjects. So, CV angle showed negative correlation with migraine.

**Keywords:** Forward head posture, craniocervical angle, migraine, photography

## INTRODUCTION

Migraine is the most common problem among worldwide with considerable morbidity and economic effects. It causes physical, psychological, social & financial loss [1]. Recently, global burden of disease survey considered the migraine as the 3rd most occurring condition and has a prevalence of 14.7% [2]. It is thought to be the 2nd most incapacitating disease across the globe [3]. The socioeconomic costs of migraine are excessive due to its high prevalence rate & disability during attacks [4]. 38 million populations are migraine sufferers in the United States and among them 91% of this population experience migraine related disability [3]. In 1990 majority of migraine sufferers are women of

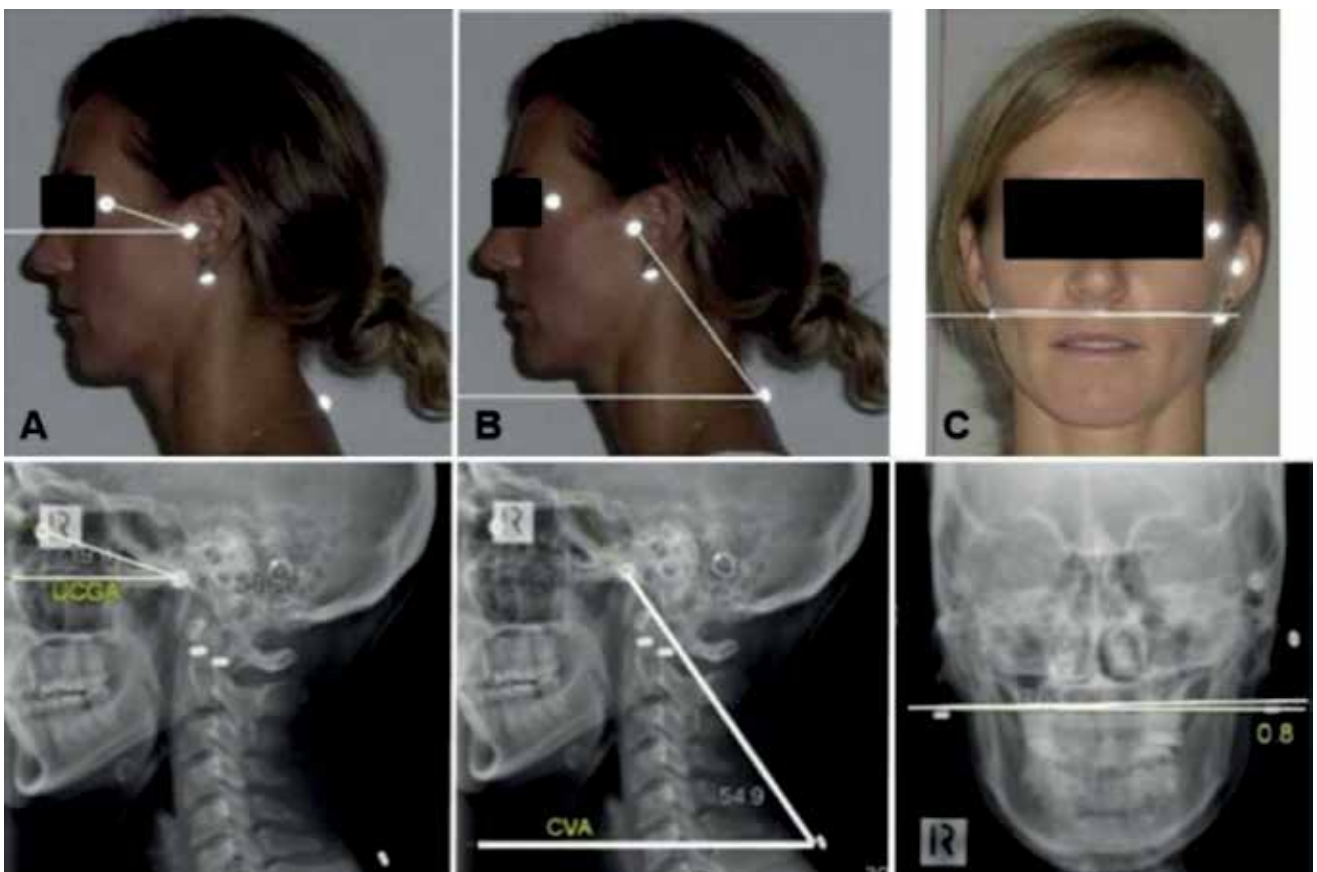
childbearing age as comparative to men [5]. The IHS reported that females are more influenced by migraine i.e., 2 to 4 times than men. Women of childbearing age more commonly undergo migraine because of the underlying hormonal influences. The most common factors like stress, illness, emotions or menstrual cycle that trigger severe migraine attack in females [6]. High prevalence of mental comorbidities like depression, anxiety and painful stress disorders are the most common psychiatric problem associated in migraine patients [7]. Migraine can also result in moderate to severe headache generally unilateral with pulsating and can worsen with photophobia, phonophobia, nausea, vomiting and also preceded by aura [8]. Recurrent

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frequency of migraine attacks significantly impairs the quality of life and creates a disturbance in normal functioning. There are two forms of migraine presenting with aura and migraine that present without aura. Before the onset of the headache, a neurological disturbance of vision, sensory or speech function is called aura. About a one third of people suffering from migraine which is associated with an aura. Headache with specific features are considered as migraine without aura. In migraine without aura headache comes with vomiting, nausea, photophobia, phonophobia and aggravated by physical activity. Recurrent attacks lasting 10-30 minutes, fully aura symptoms within 60 minutes and associated features present in migraine with aura [9]. Migraine is concerned with a burden, functional disability, reduced quality of life and increased rate of medical and mental illness [10]. Migraine is directly relevant to the intensity of pain and disability, and increase critically with the prescription drugs. Migraineurs regularly miss work or have reduced efficiency at work [6]. Postural assessment is one of the important constituents of the clinical analysis of patients with musculoskeletal disorders. Now a day's forward head posture is more prevalent and epidemic disease [11]. Forward head posture (FHP) is a highly anterior position of the head, with the extension of the upper cervical spine

and the flexibility of the lower cervical spine [12]. In FHP, head moves in extreme forward direction, the center of gravity is shifted forward; the upper body moves backwards and the shoulders come forward so that the head can be placed anteriorly of the trunk [13]. Several factors such as head elevated too high in sleeping position, use of computers in incorrect position, lack of the developed back muscle strength, causes forward head posture [13]. The posture of the head on the front side mainly alters the twist and deformities of the neck, weakness in the neck muscles poorly defective posture and the activity of the muscles of the protraction and retraction of the neck [10]. The muscles include pectoral, upper trapezius, levator scapulae, sternocleidomastoid, sub occipital, subscapularis, latissimus dorsi and arm flexors become tight and convenient and the muscles that become weak and obstructed include the longus capitis, longus coli, hyoids, serratus anterior, rhomboids, lower trapezius, posterior rotator cuffs and arm extensors. Forward Head posture can be assessed by the measurement of craniocervical (CV) angle, the angle formed by the horizontal line, a line connected from the tragus of external auditory meatus to the C7 spinous process (Figure 1). These measurements signify that smaller the CV angle, the greater will be the forward head posture [11].



**FIGURE 1.** Craniocervical angle

**Headache disability index:** Headache disability index is defined as the mean of the headache severity scores, measures the disability scores per interval. Headache disability data were obtained from headache disability index questionnaire (HDI). The HDI has high internal consistency reliability and good content validity.

The rationale of the study was carried out to explore the relationship between forward head posture and headache related disability in migraine patients.

## MATERIALS AND METHODS

### Design

Prospective correlational study design was used to explore the relationship between forward head posture and headache related disability in migraine. All methods were performed in accordance with ethical guidelines. Each participant was interviewed and evaluated. Patients suffering from migraine with age group 18-55 years and have CV angle less than 50 degree were included in this trial. Patients with headache other than migraine, congenital deformity of vertebral column, recent surgery or fracture of cervical spine, spinal radiculopathy, depression, uncooperative patients, osteoporosis and pregnancy were excluded from the study.

### Participants

The present study was approved from ethical committee of the Institute, via letter no. PTY/2021/42 dated 05.03.21. The procedure was explained to all participants and signed informed consent. Detailed history was taken and patients were questioned about their age, gender and duration of Headache and its related disability. All participants were diagnosed with migraine according to ICHD (International Classification of Headache Disorders). A detailed subjective data was taken from all the participants.

### Procedure

Before examination, the purpose and procedures of the study were explained to all subjects. Subjects who later voluntarily agreed to participate in this study, they were asked to sign written informed consent before participating in the study. The subjects were asked to fill HDI questionnaire. This Data was used to measure CV angle and headache related disability. Lateral photograph was taken to measure the craniovertebral angle. Instructions were given to all the subjects to expose the area from the head to upper thoracic spine. Subject's privacy was kept during postural assessment. The patient was asked to sit on a chair in a relaxed position and making



**FIGURE 2.** Craniovertebral angle was measured by Kinovea software

cervical spine to be relaxed. All participants were instructed, to flex and extend the head three times and then rest it in a comfortable position. The base of the camera was set at the height of the subject's shoulder as lateral photographs were taken. Lateral views were taken to measure the craniovertebral angle. Then C7 spinous process was identified by palpation with active flexion and extension and tragus of ear marked with black marker. During analysis two points were marked with the black marker, one was on 7<sup>th</sup> cervical spine and second was on tragus of external auditory meatus in order to find the points in the photos.

Clear photograph of the subject's was taken and uploaded on the software to be analyzed. In this study Craniovertebral angle was used to measure by Kinovea 08.15 software (Figure 2). Data analysis was performed by the Statistical Package for the Social Sciences (SPSS) software version 16. A Pearson correlation test was to be used to explore the relationship between variable craniovertebral angle and headache-related disability. Correlation was significant at the 0.01 level. Mean values of CV angle and HDI were also calculated.

## RESULTS

### Patient characteristics

A total of 61 subjects were examined during data collection. 6 subjects were excluded for the following reason: Other headaches, depression and not interested to participate in the study. Here in, total 55 subjects were included in this study without an aura of migraine. According to our results, forward head posture was negatively correlated ( $r=-0.9$  and  $p=.000$ ) with headache related disability that is lower the CVA (forward head posture), greater the headache related disability either sitting or standing po-

sition in migraine patient experienced more headache (Table 1 and Figure 3).

**TABLE 1.** Shows the values of craniocervical angle and headache disability index of 55 subjects

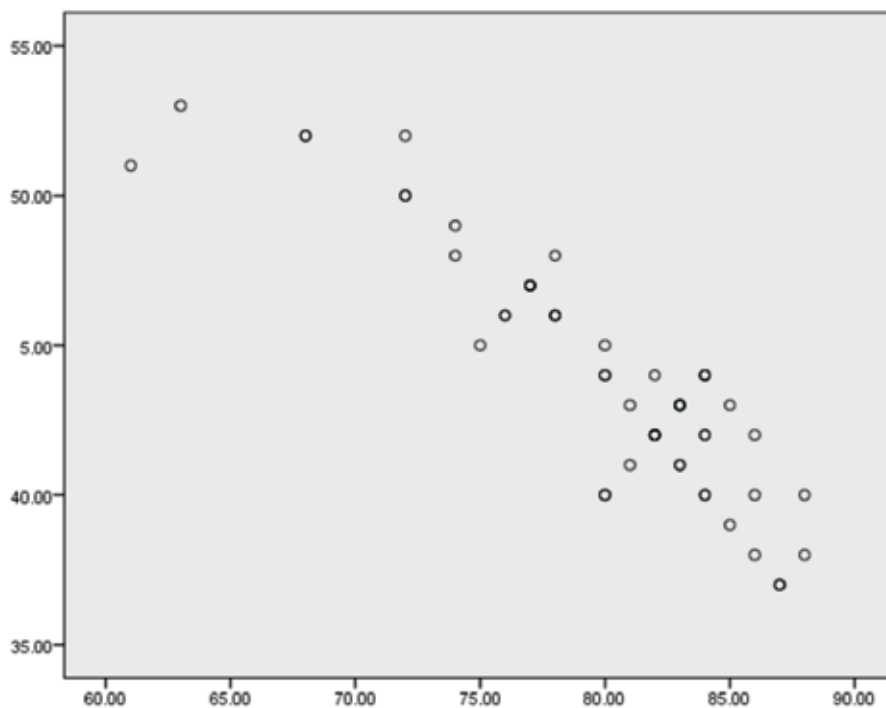
Correlation	FHP	HDI
Pearson Correlation	1	-.901**
Sig. (2-tailed)		.000
N	55	55
Pearson Correlation	-.901**	1
Sig. (2-tailed)	.000	
N	55	55

A significant correlation was observed between craniocervical angle and headache related disability in migraine.

## DISCUSSION

The primary objective of this study was carried out to explore the relationship between forward head posture and headache related disability in migraine. The selected patients were both male and female aged 18-65 years and have CV angle less than 55 degree. Nowadays the terminals of computers and mobile phones are used in almost all homes and organizations. Excessive use of these terminals leads to musculoskeletal disorders such as forward head posture and migraine headache. By the symptoms of both upper cervical extension and lower cervical flexion, forward head posture is identified. These changes in the cervical region may lead to upper crossed syndrome. Patients with forward head position also complain the neck and shoulder pain.

This pain may reduce the proprioception or joint sense and balance [14]. The literature suggested that women with migraine were more likely to have major cardiovascular disease than those without migraine. Migraine with aura was strongly connected to the major cardiovascular disease, obesity, high systolic blood pressure & cholesterol level. Migraine was strongly associated with myocardial infarction, ischemic stroke and hemorrhagic stroke. In other studies migraine without aura was associated with heart disease but its effects were smaller than migraine with aura [15]. Depression and anxiety are also interconnected with migraine. The prevalence rate of migraine with depression is up to 47% and with anxiety is up to 5%. Migraine can affect the psychological parameters that reduce the quality of life and increased the burden and disability [16]. FHP is most commonly occurring in sedentary life style. In this study photographic method was used for determination of forward head posture. FHP increases in individuals during work, including the highly anterior position of the head with respect to the theoretical plumb line perpendicular to the center of gravity. FHP can also occur due to sprains, strains, poor posture and weakness in neck muscles [17]. The results suggested that there were statistically significant associations between forward head posture and headache-related disability. Reduce the CVA (forward head posture), the more headache-related disability. FHP results in shortening of cervical extensors such as the splenius, upper trapezius, and sternocleidomastoid muscle, and consequently the cervical flexors are lengthened and shortened, weakened. Headaches have also been investigated



**FIGURE 3.** Shows the correlation between craniocervical angle and HDI

about their association with forward head posture, including cervicogenic, post-subsidized, and chronic stress-type headaches [11]. Sprain and musculoskeletal pain around neck and tension headache may be caused by FHP. It can also lead to limitation of neck movements and shoulder pain. FHP posture may cause contraction of suboccipital muscles. Forward head posture is mainly due to muscle imbalance due to the weakness of the small deep cervical flexors, rhomboids, serratus anterior, middle and lower trapezius and stiffness of the cervical extensor and pectoral [18]. A non-invasive photographic based technique was used to estimate the forward head posture. In 2008, the prevalence of forward head position was reported to more than 25%. Forward head posture is more common in females as compared to males. But the present this study did not show any difference in men and women in term of FHP prevalence. In this study only photography measurements were used to evaluate forward head posture. In this study negative relationship is found between forward head posture and headache related disability. CVA is the most commonly used measuring instrument for FHP, due to muscle imbalance, pain, fatigue, and limited movement of the cervical spine. The lower CVA leads to a higher frequency of migraine headache disability and suggest no certain

angle range to identify FHP [19]. It was found that forward head posture and headache related disability had a moderate to good negative relationship. Migraine can be strongly associated with headache related disability and forward head posture with musculoskeletal disorders. The results showed that there was moderate degree of relationship between forward head posture with disabilities. The smaller the CVA, higher the headache related disability and vice versa. The present study establishes the relation between FHP and headache related disability in migraine. This can be of eminence clinical significance. Further can be decrease the effect of FHP by increasing CV angle and reduces the disability. The present study also showed some limitations i.e. small sample size and samples were taken from a particular location in and around Hisar.

## CONCLUSION

FHP with headache related disability in migraine show a moderate to good negative correlation. In patients with migraine; CV angle is small as compared to normal subjects. So CV angle show negative correlation with migraine. The good negative correlation between CV angles was measured by Kinovea software revealed from photographs.

*Conflict of interest:* none declared

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