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# Age-related differences in head posture between patients with neck pain and pain-free individuals.

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## Introduction

- Neck pain (NP) is common in the general population[1].
- It is claimed that deviations in head posture (HP) are a contributing factor in the development and maintenance of NP[2].
- Deviations in HP are most often associated with forward HP, which is commonly defined as the protrusion of the head in the sagittal plane so that the head is placed anterior to the trunk[3].
- Studies which have compared HP in individuals with and without NP show conflicting results[4,5].
- Evidence suggests that the degree of forward HP increases with age in pain-free individuals[6].

## Aim

- The aim of this study was to compare HP between patients with non-traumatic NP and pain-free individuals, with particular reference to age.

## Methods

**Sample:**

- 40 patients with chronic non-traumatic neck pain (33 to 69 years old) and 40 controls matched for sex and age (Figure 1).
- Criteria for being a control: no current NP and self-report of not having had NP for more than 3 consecutive days at any time during their lives.

**Measurement of Head Posture:**

- Participants were videotaped when standing with a natural HP. 25 frames (1 second) were digitised using Ariel Performance Analyzing Software.
- A physiotherapist who was blind to study group was responsible for digitisation.
- A trigonometric formula was used to calculate:
  A) C7-tragus-horizontal angle which represents forward head posture;
  B) Tragus-eye-horizontal angle which represents head extension;
  C) Right ear-left ear-horizontal angle which represents side-flexion (Figure 2).

**Assessment of Neck Pain:**

- Patients' NP history during the preceding week was taken including average NP intensity (VAS), frequency, duration and localisation.

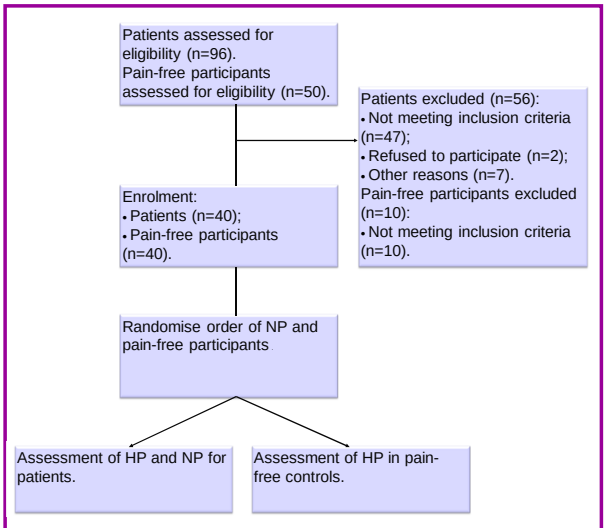


**Figure 1 –** Progression of participants through the study.


**Figure 2 –** The anatomical angles:
A) C7-tragus-horizontal angle,
B) Tragus-eye-horizontal angle and,
C) Right ear-left ear-horizontal angle.

## Results

- Digitisation procedures in the same day and across days within subjects were found to be highly reliable (ICC for the 3 angles varied between 0.98 and 0.99).
- Patients reported having NP from 6 months to 30 years. NP location: 10 patients had central (over the cervical spine) NP, 9 had unilateral NP and 21 had bilateral NP. NP frequency: more than half of NP patients reported more than 3 episodes of NP during the week before data collection. Mean±SD VAS for the preceding week for NP patients was 5.62±2.12 (range 2-10).
- 11 controls had never had NP and 29 had never had NP for more than 3 consecutive days. NP patients had a smaller C7-tragus-horizontal angle than pain-free individuals (p=0.04), suggesting that patients with NP had a more forward HP than pain-free individuals. Dividing the population according to age ( ≤ 50 years and >50 years) revealed a statistically significant difference in the C7-tragus-horizontal for participants aged ≤ 50 years but not for those aged >50 years (p = 0.005). No other differences between the groups for the other angles were found (Table 1).

**Table 1 –** Values for the anatomical head angles measured.

| Angle | Comparison | Patients Mean±SD | Pain-free Mean±SD | P value | Difference [CI] |
|---|---|---|---|---|---|
| A | P (n=40) vs. PF (n=40) | 45.4º±6.8º | 48.6º± 7.1º | 0.04* | 3.2º [0.9-6.3] |
| | P (n=19) vs. PF (n=19) aged > 50 | 44.8º±7.1º | 45.1º± 6.7º | 0.9 | 0.3º [-4.9º-4.2º] |
| | P (n=21) vs. PF (n=21) aged ≤ 50 | 46.1º±6.7º | 51.8º±5.9º | **0.005 | 5.7º [1.8º-9.7º] |
| B | P (n=40) vs. PF (n=40) | 21º±6.4º | 18.8º± 7.7º | 0.2 | 2.2º [-5.4º-0.9º] |
| C | P (n=39) vs. PF (n=39) | 2.3º±1.8º | 1.7º±1.5º | 0.1 | 0.6º [-1.3º-0.2º] |

Legend: A – C7-tragus-horizontal, B – tragus-eye-horizontal, C – right ear-left ear-horizontal, P – participants with neck pain; PF – pain-free participants; *Statistically significant for p< 0.05; **Statistically significant for p< 0.01.

## Discussion

- This study found that NP patients aged less than 50 years have a more forward HP than age and sex-matched pain-free controls. This suggests that age may be critical to the relationship between HP and NP. Wether this statistically significant difference is clinically significant is not known. HP is assessed through observation in clinical practice. It seems unlikely to us that clinicians would be able to detect an average difference of 5.7º.
- There were no differences in head extension and side-flexion between NP patients and age and sex-matched pain-free controls, suggesting that head extension and side-flexion are not related to NP.
- It is claimed that a more forward HP is associated with an increase in head extension[3], but our results do not support this claim as no difference was found in extension between patients with NP and controls.

## Conclusion

- Patients with chronic non-traumatic NP under the age of 50 years had a more 'forward' HP than age-matched pain free participants. However, the difference, while statistically significant was perhaps too small to be clinically meaningful.

**References**
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