

Comparative analysis of head-tilt and forward head position during laptop use between females with postural induced headache and healthy controls

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Introduction

While maladaptive head posture during sitting is recognized as a possible intrinsic etiological factor for postural induced headache (PHA) (Yoo et al, 2009), only few studies compared head postures of individuals with PHA to asymptomatic controls (Edmondston et al, 2007). Those studies, used cross-sectional designs, resulting in no statistical differences in habitual head posture between individuals with PHA and healthy controls (HC). Since habitual head postures vary considerably between individuals it might be relevant to reference the forward head posture (FHP) to maximal end-range postures (MHP). Further a longitudinal follow up of head posture might provide useful information on dynamic postural behavior.

Methodology

Design. A longitudinal study was set up to measure baseline differences in head posture, estimated by manually induced MHP, head tilt (HT) and FHP, between a PHA-group and HC in sitting. Next, HT and FHP were compared within and between groups during a 30 min laptop task.

Subjects. Twelve female students (21 ± 0.90 y) with PHA and 12 matched HC (21.5 ± 1.92 y) were recruited according to the ICHD-II.

Measurements. Lateral digital pictures of MHP, HT and FHP were taken. From these pictures angles ($^{\circ}$) were automatically calculated (COACH 5 version 2.1).

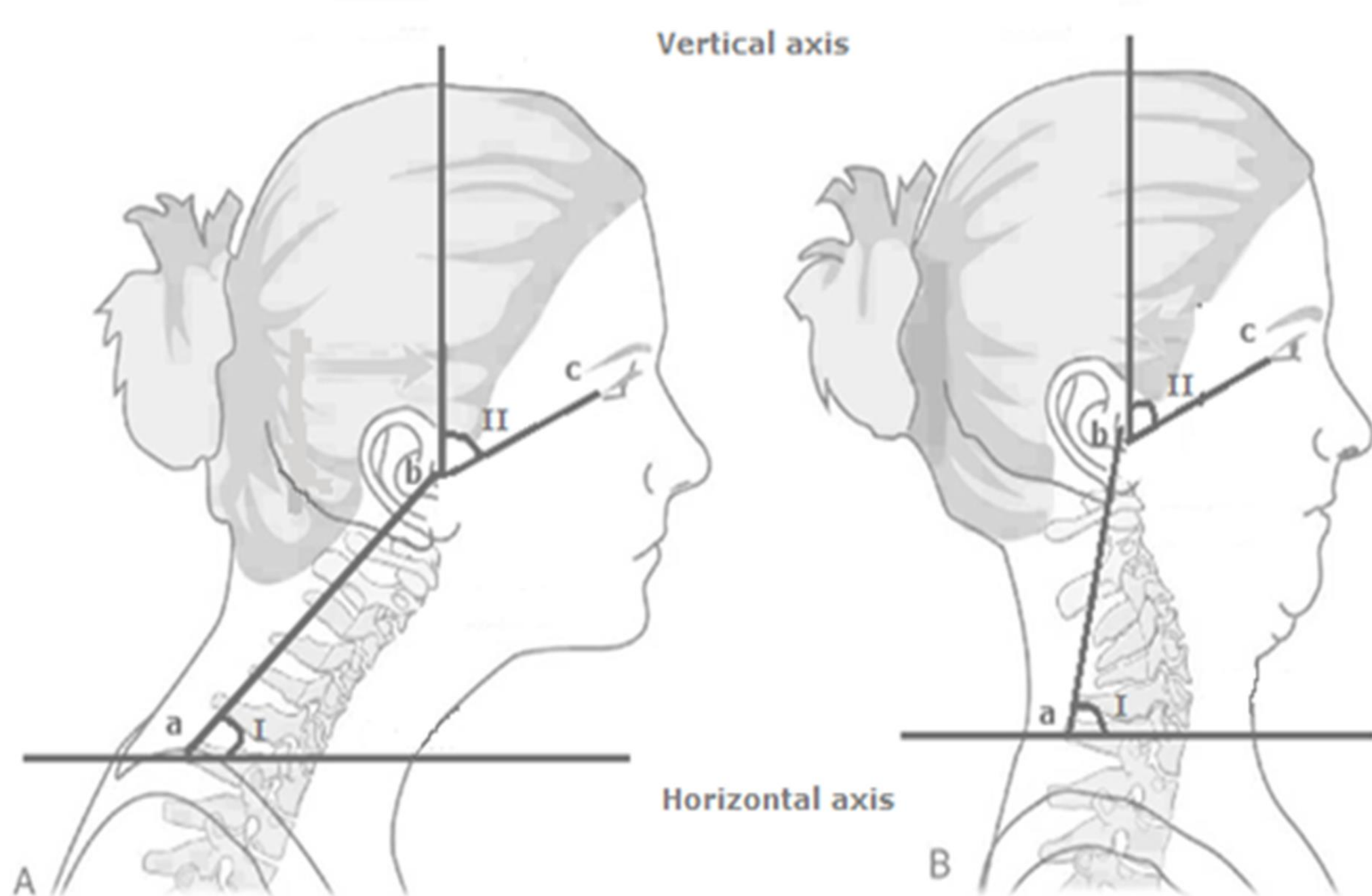


Figure 1. Angle calculation of MHP, HT and FHP (With permission of Neumann, 2010) (a = processus spinosus C7, b = tragus, c = lateral orbital margin, I = angle for MHP, FHP = cervical and II = angle for HT =high-cervical).

Results

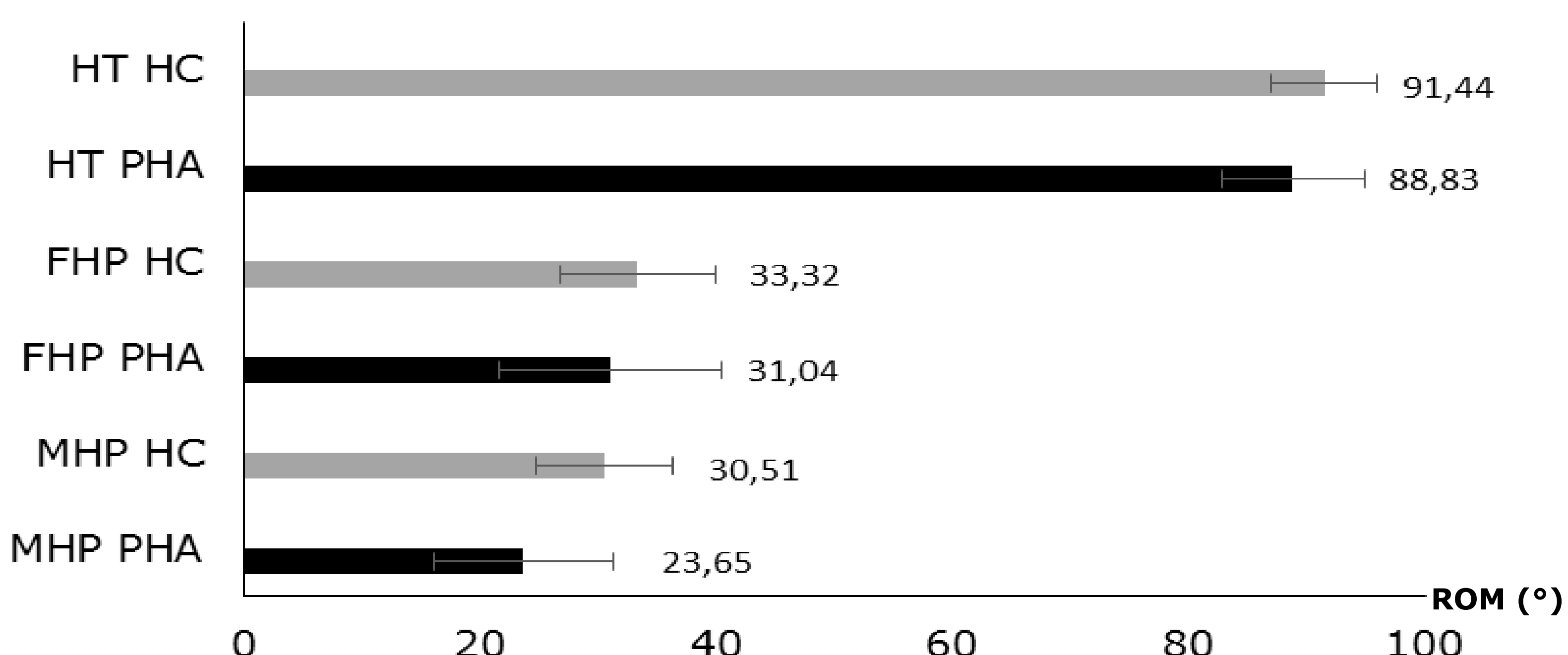


Figure 2. Baseline comparison of the mean HT, FHP, and MHP between PHA and HC.

Table 1. Baseline differences between PHA and HC (* = significant; $p < 0.05$).

Measurement ($^{\circ}$)	Clinical profile of PHA
HT	Less high-cervical extension
FHP	Larger cervical flexion
MHP	Larger maximal cervical flexion
Ratio FHP/MHP	FHP further positioned from endrange (*)

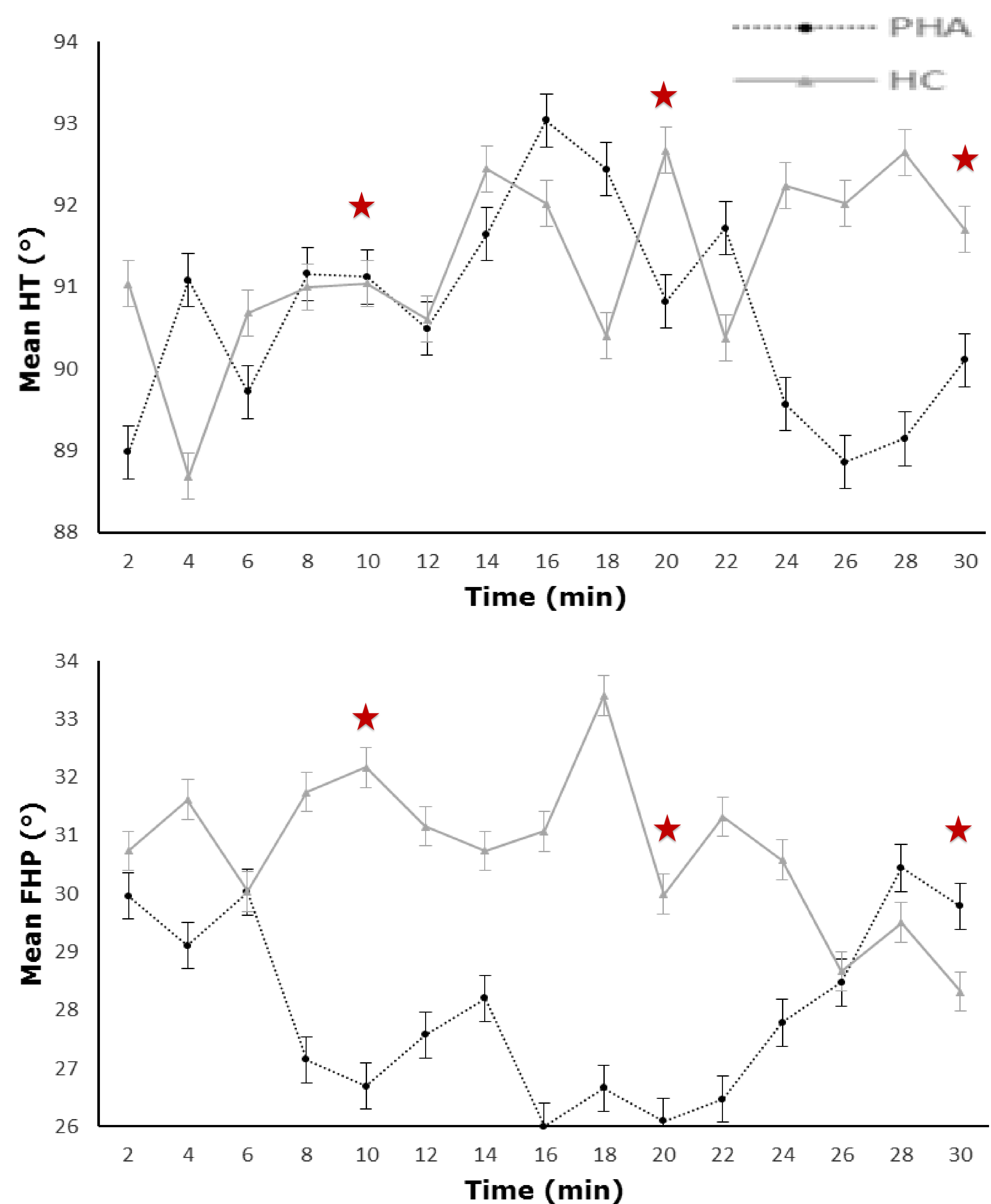


Figure 3. Evolution of the mean HT and FHP during the laptop task. FHP and HT are strongly negatively correlated for both groups ($p < 0.05$) ($^{\circ}$ = angle in degrees; * = significant difference between PHA and HC).

Table 2. Evolution HT and FHP during a laptop task for the PHA-group (* = significant; $p < 0.05$)

Measurement ($^{\circ}$)	Clinical profile of PHA
HT and FHP	Biphasic evolution • High-cervical: from extension \rightarrow flexion • Cervical: from flexion \rightarrow extension » Evolution differs significantly between groups (*)
Fluctuation	• Larger high-cervical fluctuation (*) • Less cervical fluctuation (*)

Conclusion

PHA-group cervical posture pattern:

- Significant larger manual induced MHP, while the habitual FHP was further located from the end range
- During the laptop task FHP and HT behaved in a biphasic way resulting in a posture of cervical extension and high-cervical flexion
- More fluctuation in the high-cervical spine combined with a static cervical spine
- Pronounced cervical flexion correlates with stronger high-cervical extension during a laptop task

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