

# Determining muscle fatigue from reading a smartphone with the cervical extensor fatigue test

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## Background

- Smartphone use has led to pain and injuries associated with neck flexion while looking down.
- It is important to identify exactly how neck flexion during smartphone use leads to neck pain and muscle fatigue.

## Hypotheses

- Neck endurance will be greater before 30 minutes of smartphone use.
- Neck endurance will decrease in those who develop neck pain during smartphone use.

## Methods

- 43 participants (17 male and 26 female)
- Neck endurance (right) was tested by the cervical extensor fatigue test before and after 30 minutes of smartphone use.
- Participants had no previous neck pain or injuries.
- A visual analog scale (VAS) was completed by participants before smartphone use and after each smartphone task (each was 10 minutes).
- Pain developers (PD) were defined by a VAS score of 12 mm or higher.
- A two-way ANOVA was used with a within factor of time (pre/post-test duration) and between factor of pain group (PD/non-PD).

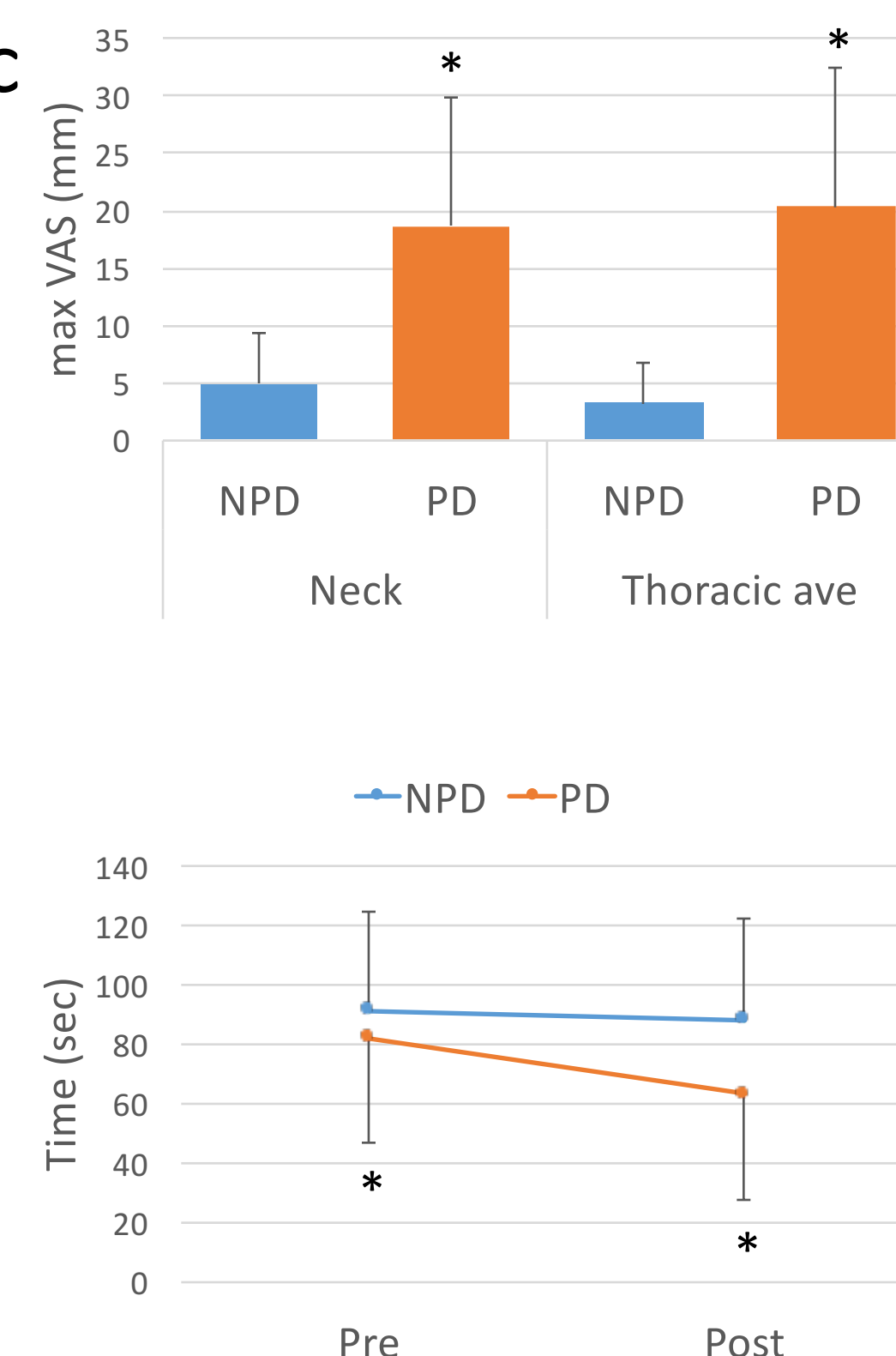


## Purpose

- To measure the effects of neck flexion on neck endurance during smartphone use.

## Results

- Max VAS scores for pain developers of the neck ( $p < .0001$ ) and thoracic ( $p < .0001$ ) regions were 13.78 and 17.17 mm greater than non-pain developers for the neck and thoracic regions.
- Scores reported by pain developers in the neck and thoracic regions were 18.63 mm (11.31 mm) and 20.33 mm (12.24 mm).
- Significant difference ( $p < .001$ ) between pre- and post-comparisons for PDs during cervical extensor fatigue test, but not non-PDs.
- Average decrease in time for PD of 18.91 seconds compared to 3.29 seconds for non-PD.



## Discussion

- There was a decrease in neck endurance in individuals who are classified as pain developers.
- A neck flexion may increase muscle length and stretch the passive tissues in the neck, which could cause pain and decrease muscle strength.

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