



Offset Analgesia Is Elicited in Chronic Whiplash-Associated Disorders and Is Not Attenuated by Nociception: A Pre-Test/Post-Test Study

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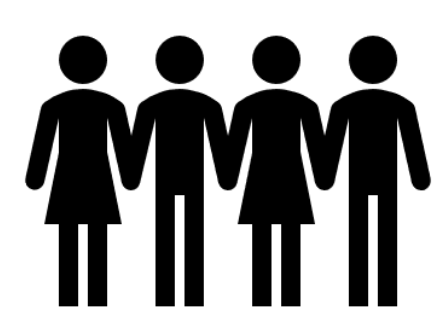
Background

- People with chronic whiplash-associated disorders (WAD) may present with clinical features suggestive of central sensitization (CS)¹
- Central Sensitization may result from impaired descending pain modulation², which has been shown in chronic WAD³
- The mechanisms underlying CS are largely unknown, although it has been demonstrated that CS can be attenuated following reduction of nociception⁴
- Offset analgesia (OffA) is a testing regime that evaluates descending pain modulation, demonstrating a disproportionate reduction in reported pain intensity following a small reduction in evoked noxious stimulus⁵
- This has not previously been tested in chronic WAD.
- It is not known if OffA can be attenuated following reduction of nociception.

Objectives

- The aims of this study were to determine:
 - (1) If reduction of nociception was significantly associated with improved descending pain modulation, as measured with the OffA regime, and
 - (2) If OffA was associated with clinical manifestations of chronic WAD.

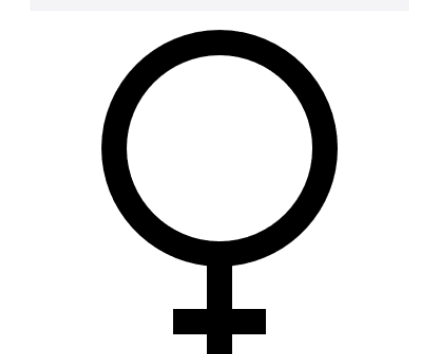
Sample



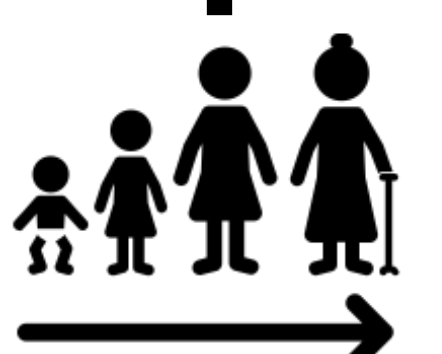
Chronic WAD Grade II (demonstrable cervical musculoskeletal signs and symptoms without neurological compromise or cervical fracture)



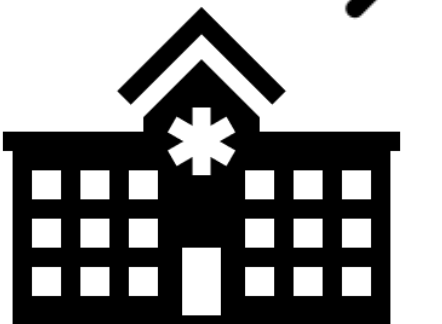
Mean duration (\pm SD) = 23.4 (\pm 9.8) mths



N = 19/14 females (74%)
17 employed; 14 university educated



Mean (\pm SD) = 41.0 (\pm 9.3) yrs
BMI = 26.1 (\pm 4.4) kg/m²



Private Musculoskeletal Chronic Pain Centre
Ethics ID#: University of Calgary Conjoint Health Research Ethics Board – REB18-0766

Study Design

- Eligible to participate if demonstrated > 80% relief of index pain following a single round of diagnostic medial branch blocks (MBBs) of putative cervical facet joint(s)
- Offset analgesia was tested prior to and following diagnostic cervical MBBs (Pre-test/Post-test study design)

Outcome Measures

- A 'standard-OffA' paradigm was applied to the left lateral forearm (Fig. 1) at a predetermined heat pain threshold reflecting evoked pain of 60/100 (t1 = HPT₆₀; t2 = +1°C; t3 = HPT₆₀; Fig. 2). Pain Intensity reported at t1, t2 & t3.
- A constant stimulus of HPT₆₀ was applied as control (pre- and post-MBBs; Fig. 3) for the evoked pain intensity at t1, t2 & t3.
- OffA calculated the percentage difference in (t3-t2)/t2 pain intensity ratios between the control and testing paradigms.



Fig. 1

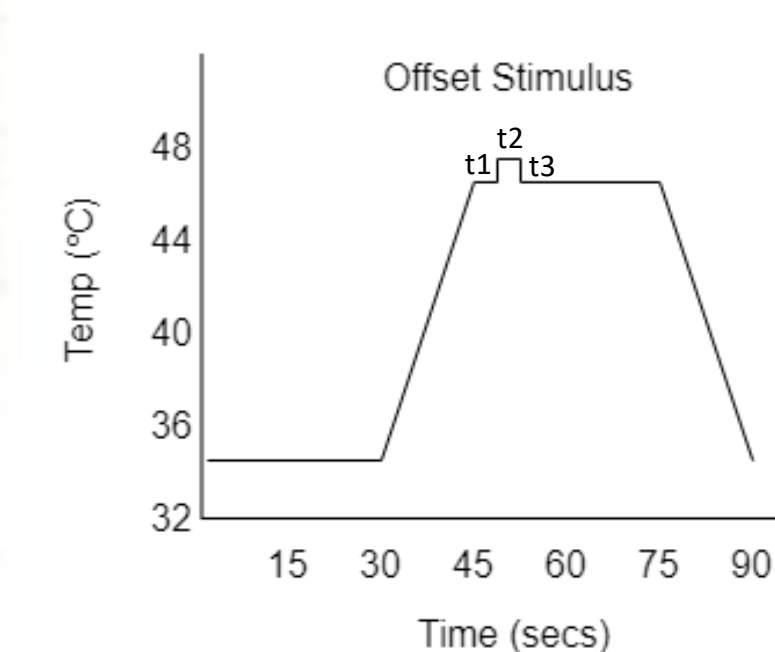


Fig. 2

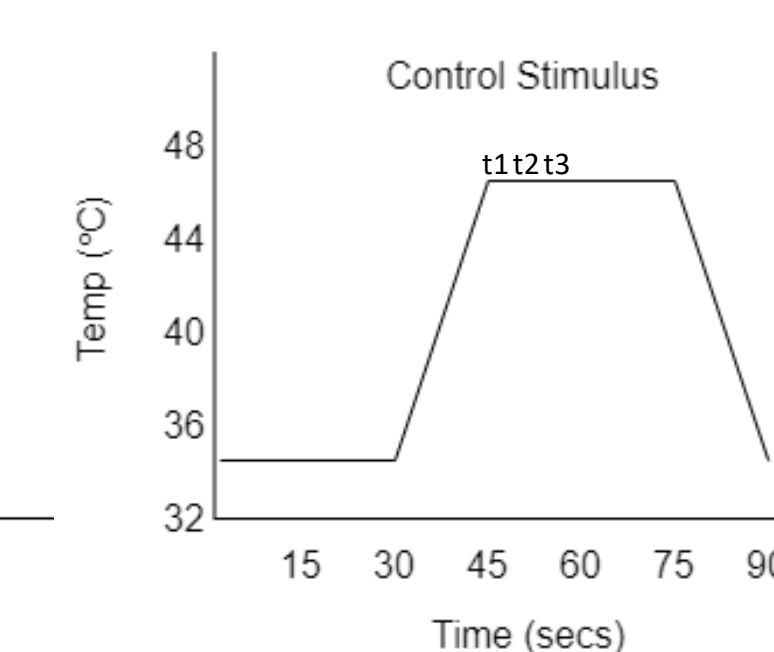
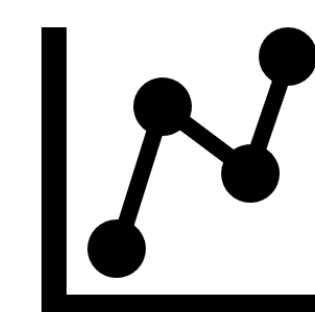


Fig. 3



Pain Intensity – Numerical Pain Rating Scale (NPRS)
Disability – Neck Disability Index (NDI)
Physical Activity Levels – International Physical Activity Questionnaire (IPAQ) Long Form
Quality of Life – 12-item Short Form Health Survey (SF-12)



Paired t-tests: Pre- vs Post-MBB OffA
Pearson's correlations: OffA x Clinical Measures

Clinical Manifestations Characteristics



NPRS (Avg Weekly) = Mean (\pm SD) = 5.6 (\pm 1.8)
Neck Disability Index = 42% (\pm 12%)
SF-12 physical = 38 (\pm 6)
SF-12 mental = 46 (\pm 12)



47% moderate levels of PA
47% high levels of PA

Results

	Pre-MBB Mean (\pm SD)	Post-MBB Mean (\pm SD)
Cx NRS (/10)	4.6 (1.2)	0.13 (0.28)
HPT – Forearm (°C)	46.2 (3.5)	46.7 (3.7)
HPT – Neck (°C)	46.1 (3.7)	46.9 (3.7)
HPT – Tib Ant (°C)	47.4 (2.5)	47.5 (3.0)
Control Stimulus		
NRS – t ₁ (/100)	59 (17)	58 (25)
NRS – t ₂ (/100)	57 (22)	49 (29)
NRS – t ₃ (/100)	57 (24)	45 (31)
t ₃ – t ₂ (% change)	-0.84 (21.0)	-6.8 (30.8)
Offset Stimulus		
NRS – t ₁ (/100)	55 (17)	50 (17)
NRS – t ₂ (/100)	71 (23)	66 (26)
NRS – t ₃ (/100)	42 (25)	33 (29)
t ₃ – t ₂ (% change)	-36% (42%)	-53% (34%)
OffA	-36% (43%)	-46% (52%)

Table: Numerical Pain Ratings (NRS) Prior- and Post-MBB for Neck Pain; Evoked Suprathreshold Elbow Pain During Control and Offset Analgesia (OffA) Heat Pain Threshold (HPT) Stimuli

- OffA was effectively elicited in people with chronic WAD.
- There was no significant difference in OffA efficacy when nociception was effectively abolished (t₁₈ = -0.79; p = 0.44).
- When people were experiencing moderate-to-severe levels of neck pain (pre-MBB), efficacious OffA was associated with lower levels of mental health (r = -0.51, p = 0.045) and higher levels of disability (r = 0.49, p = 0.032). Alternatively, higher levels of mental health and lower levels of disability were associated with less efficacious OffA.
- Following MBB, when clinical pain was abolished, OffA was not associated with any clinical manifestations.

Conclusions

- Results suggest that clinical features of a person's pain experience not associated with peripheral nociception are more likely underpinning the OffA testing paradigm.
- Further research, including comparative healthy cohort data is also warranted to investigate the mechanisms underlying OffA.
- Other testing regimes of CS, including temporal summation and conditioned pain modulation are recommended to fully evaluate a person's pain modulation pain profile.

Contact Information

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