Native Americans have reduced pain sensitivity and reduced temporal summation of spinal nociception: A pilot study

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Introduction

Pain problems are more prevalent in Native Americans than any other U.S. group; yet, there have been few attempts to determine what contributes to these group differences. In fact, currently there are no published studies that have examined reactions to experimentally-induced noxious stimulation in Native Americans. The present study sought to address this deficiency in the literature by assessing pain processing in Native Americans, relative to a white, non-Hispanic control group. Pain processing was assessed from ischemia pain tolerance and temporal summation of pain and the nociceptive flexion reflex (NFR), a physiological measure of spinal nociception.

Objective

To examine pain processing in Native Americans relative to a white, non-Hispanic control group.

Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (yrs) M SD</th>
<th>% Female</th>
<th>Education (yrs) M SD</th>
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<tbody>
<tr>
<td>white, non-Hispanic</td>
<td>35.3 ± 12.2</td>
<td>43%</td>
<td>15.9 ± 3.4</td>
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<tr>
<td>Native American</td>
<td>43.0 ± 16.1</td>
<td>49%</td>
<td>15.6 ± 2.8</td>
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</tbody>
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Exclusion Criteria:
- <18 years of age
- Current acute illness
- Cardiovascular, neurological, and/or circulatory problems
- Chronic pain condition (e.g., back pain)
- Recent use of anxiolytic medication
- Current use of anxiolytic and/or hypnotic medication

Experimental Procedure

- Informed Consent + Questionnaires
- Ischemic Pain Testing
  - Participants completed a set of hand exercises to increase energy demand in the forearm muscles
  - Blood to the forearm was occluded by inflating a blood pressure cuff around their upper arm.
  - Pain tolerance was defined as the time (in seconds) from blood occlusion to the point at which the individual reported they could no longer tolerate the ischemic pain.
- NFR Testing + Pain Threshold/Tolerance Testing
  - Temporal Summation of Pain & NFR:
    - 5 series of 3 suprathreshold electric stimulations (with a 0.5-s interstimulus interval) delivered to the sural nerve of the ankle
    - Pain intensity ratings and NFR magnitudes in response to each stimulus were assessed
    - Temporal summation is defined as the increase in pain/NFR that occurs in response to the 3-stimulus series, which is believed to reflect temporary hyperexcitability of dorsal horn neurons

Results: Temporal Summation of NFR and Pain

- Temporal summation of NFR indicated by progressively larger reflex magnitudes
- Increase in NFR magnitude believed to result from hyperexcitability of dorsal horn neurons (wind-up)

Conclusions

- Together, these findings suggest that Native Americans have dampened pain responsivity that may stem from inhibition of spinal cord dorsal horn neurons
- Although speculative at this time, these differences might lead to an exhaustion of pain modulation resources in Native Americans, thus putting them at risk for chronic pain

Results: Temporal Summation of Pain

- Pain ratings assessed after each train of stimulus on a scale of 0 (no pain) -100 (most intense pain imaginable)
- Temporal summation of pain indicated by higher ratings for each subsequent stimulus