Introduction

Trauma exposure and posttraumatic stress disorder (PTSD) are related to enhanced experiential pain in response to suprathreshold stimuli and are associated with development of chronic pain. However, the mechanisms underlying the relationships between trauma exposure and pain have not been thoroughly explored. One potential mechanism is central sensitization (hyperexcitability of spinal neurons to pain signals). Temporal summation of pain (a laboratory paradigm believed to assess central sensitization. The present study assessed temporal summation of the nociceptive flexion reflex (NFR; a physiological marker of spinal nociception) and temporal summation of the nociceptive flexion reflex (TS; NFR; a physiological marker of spinal nociception) and temporal summation of pain (TS-Pain) in response to repeated, painful electrical stimulations over the ankle in 214 healthy men and women.

Life Events Checklist

One-way ANOVAs and Pearson Chi-square analyses were conducted to examine group differences in characteristics.

Procedure

- Two testing sessions were conducted
- Testing session and test order were counterbalanced
- Informed consent obtained at beginning of first testing session
- Trauma exposure was assessed via the Life Events Checklist (LEC) during the first testing session
- Trauma Rating Day

Evoked potential analysis

- Sensors and stimulating electrode applied
- NFR Threshold assessed by sending electrical stimulations to the left ankle over the sural nerve
- 5 Pulse Threshold assessed by sending electrical stimulations to the left ankle in trains of 3 pulses
- Simultaneous analysis: the TS-NFR task was set 100% of NFR or 100% of pulse threshold, whichever was higher

Measurement of NFR

- NFR Window

- Pain Outcomes

- Temporal summation of NFR: the progressive increase in the NFR magnitude in response to trains of stimuli with short inter-stimulus intervals (3s) with a constant amplitude and trains of stimuli with long inter-stimulus intervals (5s) with a constant amplitude
- 5 Pulse Stimuli: pulses were used to assess temporal summation of NFR magnitude
- The peak stimulation intensity of the third stimulus in each train was monitored by the experimenter to ensure that there was no voluntary movement contaminating NFR measurement
- Temporal summation of pain: the progressive increase in pain rating (0-100) via the VAS

- Visual Analog Scale (VAS): Pain ratings made following each train

Note: All significance values are indicated with an asterisk (*) and represent significance at the p < .05. ** indicates significance at the p < .01. Subscripts for percentages are used to indicate significant group differences following a post-hoc Chi-square analysis.

Results

- Linear mixed models analyses were performed to examine the summation of a standardized measure of NFR magnitude, in Controls' units, and pain rating (0-100) across the three electric stimuli by trauma exposure.
- The group exposed to ≥2 traumas did not show significant TS-NFR.

Conclusions

- The results indicate that those who have been exposed to ≥4 traumas are likely to exhibit enhanced central sensitization. This has been implicated as a possible mechanism in the development of chronic pain conditions.
- Together these data support the hypothesis that there is a dose-response relationship between exposure to potentially traumatic events and enhanced central sensitization.
- Moreover, those who experienced 4 or more traumas rated suprathreshold stimuli as more intense than those who had no trauma history.
- Further study is necessary to understand these factors in the development of both PTSD symptoms as well as chronic pain symptoms in those who are exposed to traumatic events.

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