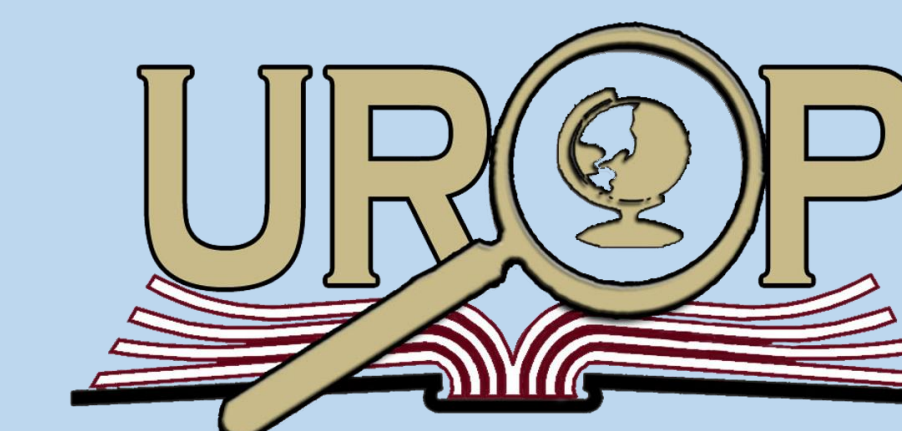




Altered Pain Threshold in Patients with Chronic Low Back Pain

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Introduction

- Pain can occur in many different places in the body but one of the most popular locations where many people experience pain in the back, specifically the lower back (Young et al. 2022)
- Low back pain can occur at any age in one's life and can have a detrimental effect on a person's life (Froud et al. 2014)
- People with low back pain often have a hard time participating in daily activities, moving around, and being able to complete simple at-home and work tasks (Froud et al. 2014)
- Quantitative sensory testing is used to look at the efficiency of the fibers in your body that transport pain signals (Starkweather et al. 2015)
- The most common quantitative sensory testing included mechanical pain threshold (MPT), cold and heat pain threshold (CPT/HPT), and pressure pain threshold (PPT) (Starkweather et al. 2015)
- The researcher will place a tool on the participant's back, where they perceive the most amount of pain, and have the participant indicate when they feel pain (Starkweather et al. 2015)
- By using this type of testing scientists can understand how the fibers in one's body send pain signals in the low back pain which could ultimately lead to a diagnosis or classification of a disease (Pavlovic and Petzke 2010)

Method

- Fliers were posted for recruitment and participants were screened for eligibility
- A total of 106 participants were recruited, 45 with chronic low back pain (25 female, 20 male) and 61 participants were the health controls (31 female, 30 male)
- CPT and HPT were performed separately, with CPT first then HPT after
- A thermode was placed against the participants' forearm and were asked to press the button when they felt the cold or hot sensation
- The thermode was moved to the low back where the participant had the most pain, and were asked to press the button when they could no longer tolerate the cold or hot sensation
- PPT was performed next with an algometer that was placed on the non-dominant forearm so they could feel the sensation
- The algometer was then placed on the low back in the most painful site, with pressure slowly increasing, and the participant would tell the researcher when they could not tolerate it. This was repeated 3 times
- All values are recorded in lab notes and SPSS software was used to analyze and interpret the data



Image of algometer device



Image of thermode device

Results

Table 1 Quantitative Sensory Testing (QST) Measurements (N = 106)

	Chronic low back pain (n = 45)	Healthy controls (n = 61)	p
Control site, Cold detection threshold (CDT), °C	28.03 (2.06)	2.32 (0.90)	0.139
Back, Cold detection threshold (CDT), °C	28.26 (1.36)	28.36 (2.91)	0.058
Control site, Warm detection threshold (WDT), °C	36.06 (2.08)	35.00 (3.55)	0.002
Back, Warm detection threshold (WDT), °C	36.12 (1.90)	35.03 (3.52)	0.001
Control site, Cold pain threshold (CPT), °C	20.55 (8.27)	13.15 (9.57)	< 0.001
Back, Cold pain threshold (CPT), °C	21.21 (8.50)	12.49 (10.99)	< 0.001
Control site, Heat pain threshold (HPT), °C	41.01 (3.49)	40.82 (6.11)	0.494
Back, Heat pain threshold (HPT), °C	39.96 (3.27)	40.06 (6.06)	0.225
Control site, Pressure pain threshold (PPT), kPa	217.95 (156.43)	248.78 (131.18)	0.018
Back, Pressure pain threshold (PPT), kPa	207.50 (155.79)	323.24 (175.10)	< 0.001

Results

- 45 chronic low back pain subjects, mean age = 34.57 (mean = 12.37)
- 61 healthy subjects, mean age = 34.76 (mean = 12.56)
- No differences in age and ethnicity
- The back pain group had higher pain severity and pain sensitivity
- One difference discovered was that the participants with low back pain had an increased CPT (p< 0.001) and that the low back pain participants had a lower PPT (p<0.001)

Discussion

- This study examined whether CPT, HPT, and PPT in low back patients differ from those in a healthy population
- Once the data was analyzed the results showed that there was a significant difference in CPT and PPT in low back subjects than in healthy subjects
- Participants with low back pain had a higher CPT and had a lower PPT, which shows that having pain in low back does affect pain threshold tolerance
- This study showed that using QST is an efficient method to determine a difference in pain threshold
- Limitations include a small sample size that could have caused data to not be generalizable to the whole population and that there was not an even number of females and males which could also affect the data
- The results of this study could be used by researchers to better understand pain thresholds and ways to treat them, such as how to prevent low back pain through different home therapies
- In the future, researchers could look to see if exercise has an impact on different pain thresholds

References

- Froud, R., Patterson, S., Eldridge, S., Seale, C., Pincus, T., Rajendran, D., Fossum, C., & Underwood, M. (2014). A systematic review and meta-synthesis of the impact of low back pain on people's lives. *BMC musculoskeletal disorders*, 15(1), 1-14.
- Pavlovic, G., & Petzke, F. (2010). The role of quantitative sensory testing in the evaluation of musculoskeletal pain conditions. *Current rheumatology reports*, 12, 455-461.
- Starkweather, A. R., Heineman, A., Storey, S., Rubia, G., Lyon, D. E., Greenspan, J., & Dorsey, S. G. (2016). Methods to measure peripheral and central sensitization using quantitative sensory testing: A focus on individuals with low back pain. *Applied Nursing Research*, 29, 237-241.
- Yong, R. J., Mullins, P. M., & Bhattacharyya, N. (2022). Prevalence of chronic pain among adults in the United States. *Pain*, 163(2), 328-332.

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