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Letter to the Editor

Pressure pain threshold encode hyperalgesia or antinociception in fibromyalgia patients?

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Dear Editor,

Fibromyalgia is a musculoskeletal chronic pain syndrome with involvement of various neurological problems. There are 19 specific tender points having characteristic hyperalgesia and allodynia, which may serve as a diagnostic tool for fibromyalgia [1]. Pain sensitivity of fibromyalgia patients is significantly altered and the exact pathophysiology of disease is still elusive.

Quantitative sensory testing is a psychosomatic tool to assess pain using 13 different modalities; pressure pain thresholds among them are delivering a digitalized mechanical force to assess pain perception semi-objectively before and after medical interventions. Till date there is plenty of literature which has shown direct benefits of tonic pressure stimulation therapy in other musculoskeletal diseases; but there is a paucity of scientific evidence which suggest that pressure pain parameters can trigger anti-tenderness or analgesic effect in the fibromyalgia patients [2].

We have designed a cross sectional study to assess pressure pain parameters in both male and female fibromyalgia patients of age group 18~65 years, diagnosed according to American College of Rheumatology (ACR) criteria, 2010. Data was analyzed using GraphPad Prsim 5.1 (GraphPad Software Inc., San Diego, CA, USA). The study was approved by Institute Ethics Committee, All India Institute of Medical Sciences, New Delhi, India (Approval No. IECPG-611/28.10.2021). Written informed consents for participation in the study were taken from all the patients.

In contrary to the typical findings in chronic pain patients where pressure pain thresholds assess hyperalgesia; in our study when fibromyalgia patients (n=62) having mean visual analog scale score=6.95, were assessed for tenderness (left trapezius: mean pressure pain threshold=139.91 KPa, standard deviation [SD]=57.72 KPa; right trapezius: mean pressure pain threshold=132.87 KPa, SD=55.24 KPa; lower back: mean pressure pain threshold=158.80 KPa, SD=63.64 KPa); we observed that pressure delivered to nearly 21% patients (n=13) imparted antinociception and momentary pain relief at both the trapezius muscles (left trapezius: mean pressure pain threshold=218.17 KPa, SD=71.54 KPa; right trapezius: mean pressure pain threshold=207.02 KPa, SD=68.65 KPa; lower back: mean pressure pain threshold=261.40 KPa, SD=103.42 KPa) (Table 1). Those patients were having extraordinarily higher thresholds than the remaining 79% patients (n=49) on both the sides (left trapezius: mean pressure pain threshold=89.23 KPa, SD=13.05 KPa; right trapezius: mean pressure pain threshold=92.19 KPa, SD=17.86 KPa; lower back: mean pressure pain threshold=102.97 KPa, SD=25.59 KPa) (Table 1). When we compared these two groups of patients, we found a highly significant difference between them at both the regions overlying the affected muscle groups ($p<0.001$; effect size>0.65) as given in Table 1 and Figure 1.

Our result suggest that while validating efficacy of any therapeutic or lifestyle intervention in fibromyalgia patients, assessor

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Table 1. Baseline characteristics of fibromyalgia patients of different cohorts

Fibromyalgia patient	Cohort 1 (n=62)	Cohort 2 (n=13)	Cohort 3 (n=49)	p-value
Proportion of patients	1.00	0.21	0.79	-
Visual analog scale score	6.95±0.93	6.92±0.78	6.98±0.89	>0.08
Pressure pain threshold (KPa)				
Left trapezius	139.91±57.72	218.17±71.54	89.23±13.05	<0.0001
Right trapezius	132.87±55.24	207.02±68.65	92.19±17.86	<0.0001
Lower back	158.80±63.64	261.40±103.42	102.97±25.59	<0.001
Characteristics	General population	Anti-nociception	Hyperalgesia	-

Values are presented as mean±standard deviation. KPa: kilopascals of pressure applied at the test site, –: not available. p-value represents the significance level for the comparison between Cohort 2 and Cohort 3.

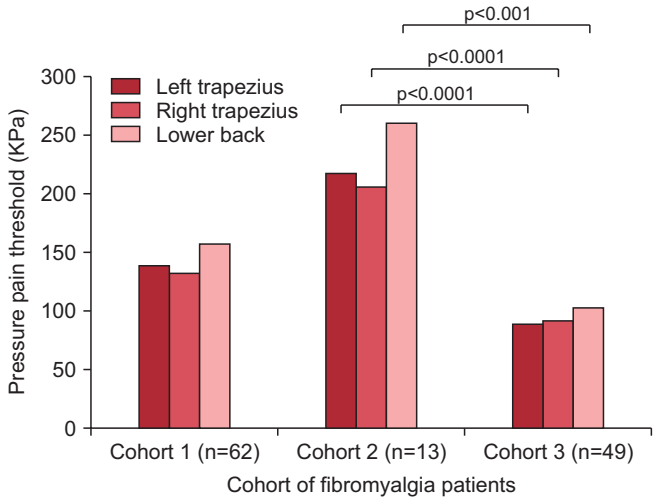

Figure 1. Pressure pain threshold of fibromyalgia patients of different characteristics. Denote sample size of fibromyalgia patients behaving differently toward quantitative sensory testing. First cohort of fibromyalgia patients (n=62) is the observed mean threshold patients. Second cohort of fibromyalgia patients (n=13) showed atypical (drastically high) values of pressure pain threshold indicating reinforcement of antinociception using pressure. Third, cohort of patients (n=49) comprised of a bigger proportion and showed hyperalgesia and pain sensitivity at the test site; which is usual findings in the literatures.

should choose more than one objective tool (like nociceptive flexion reflex, thermodes, etc) to quantify pain, apart from pressure parameters which is a semi-objective recording. While most of the researchers prefer to choose pressure pain threshold as one of the primary outcome measures, it can render significant variations as two cohorts behave differently toward pressure pain stimulus. Though pain perception is a subjective experience and processing of nociceptive signals in the dorsal horn of spinal cord becomes vital, involvement of higher center and associated sensitization is also very significant in pain modulation in fibromyalgia patients. Pain matrix is a complex circuit in the brain which integrates emotional, social and physical insults of pain to impose nociception on different functional brain areas in fibromyalgia patients [3]. Descending pain inhibitory pathways from the brain stem, utilizing neurotransmitters, have been shown to be deficient in patients with chronic pain. This reduced inhibition of pain in combination with the increased input of pain signals are considered to cause the hyperalgesia found in fibromyalgia. Though Aδ fibers are conducting nociceptive signals but gate control mediated by Aβ fibers cannot be neglected especially in fibromyalgia patients while assessing pain using pressure modality.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

AUTHOR CONTRIBUTIONS

A.K. performed the experiment, collected, saved and analysed data, manuscript writing and editing. A.S. helped in data analysis, manuscript writing and data collection. U.K. diagnosis,

recruitment and screening of patients. R.B. supervised the study, manuscript preparation, manuscript review and planning of the study.

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