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Original Research Article

Neurophysiology of pain education knowledge, pain disability, patient satisfaction and central sensitization in chronic musculoskeletal pain

Thangamani Ramalingam [1,*], Pooja Desai[1], Dhruvi Ghoghari[1], Vidhi Jethva[1], Rushvi Shah[1]

[1] *Dept. of Physiotherapy, Sarvajanik College of Physiotherapy, Surat, Gujarat, India*

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ABSTRACT

Introduction: Chronic musculoskeletal pains are multifaceted, and Central sensitization is a potential pathophysiological mechanism underlying a group of chronic musculoskeletal pain disorders. Neurophysiology of pain education knowledge and patient satisfaction levels of chronic musculoskeletal pain subjects may contribute to central nervous system sensitization. Hence, the aim of the study was to evaluate the impact of neurophysiology of pain education knowledge and patient satisfaction levels on central sensitization in large population of patient with chronic musculoskeletal pain.
Methods Subjects: The study included 200 chronic musculoskeletal pain subjects that persisted more than 3 months with average age of 43.93±13.62.
Study Design and Sampling: A cross-sectional study used non probability sampling.
Outcome Measures: Neurophysiology of pain Questionnaire (NPQ) to know the conceptualization of pain, mood rating scale(MRS) to measure patient's mood fluctuation because of pain, pain disability scale (PDS) for evaluating patients ability to perform certain activity, central sensitization inventory(CSI) to measure nervous system sensitization and patients satisfaction scale(PSS) to understand patient's satisfaction towards the treatment and health care provider were used.
Statistical Analysis: Descriptive and correlation analyses were used for analysis.
Results: The correlation analyses showed that patient disability scale negatively correlated with mood scale and positively correlated with the age, duration of the condition, impact of pain on ADL and central sensitization. And there was a positive correlation between patient satisfaction and impact of pain on ADL.
Conclusion: The age, mood, duration of the condition and pain disability were the factors behind central sensitization in patients with chronic musculoskeletal pain. And the neuro physiology of pain knowledge had impact on pain disability and patient satisfaction.

1. Introduction

Pain, an unpleasant sensory and emotional experience is one of the most burdensome problems of recent time which demands intervention and challenges the health care system.[1,2] In clinical practice, many consider persistent or recurrent pain for ≥3 months to be a useful definition of the musculoskeletal pain.[3] The new international classification of diseases (ICD-11) categorization identifies chronic musculoskeletal pain in two forms (CMP), the primary and secondary. CMP conditions are multifaceted, and approximately 20% of the adult population lives with severe chronic pain with higher prevalence in women and in lower income groups. Chronic pain is influenced by and interacts with physical, emotional, psychological, and social factors, and a bio psychosocial framework is increasingly

* *Corresponding author*.
E-mail address: atramalingam@gmail.com (T. Ramalingam).

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applied in clinical practice[4,5] chronic musculoskeletal pain is the main contributor to increased suffering in daily activities, drug consumption and disability leading to more health cost worldwide.[6–8] Central sensitization is a neurophysiological phenomenon that is adaptive, activity dependent, and dynamic and has recently been recognized as a potential pathophysiological mechanism underlying a group of chronic pain disorders. In addition, the term 'central' may refer to ipsilateral sensitization, segmental sensitization, extraterritorial and generalized widespread sensitization.[9–11] Central sensitization encompasses various related dysfunctions within the central nervous system, all contributing to increased responsiveness to a variety of stimuli including mechanical pressure, chemical substances, light, sound, cold, heat, stress, and electrical stimulation.[12] Pain represents an experience that is influenced not only by sensation, but also by context and prior experience. The experience of pains distinct from nociception describes afferent neural activity transmitting sensory information about stimuli that have the potential to cause tissue damage.[13] Patient satisfaction and preference to be considered important while making the treatment decision along with patient information and involvement in the process.[14] Pain neuroscience education(PNE), is a cognitive intervention intended to modify the inappropriate beliefs and maladaptive behaviours of chronic pain patients to decrease pain and disability.[15] PNE is believed to desensitize the central nervous system and Combining that to therapeutic exercise resulted in significantly better results for participants with chronic pain, with a large effectsize, compared to therapeutic exercise alone.[16] Hence, the aim of the study was to find out the correlation of neurophysiology of pain education level, pain disability, central sensitization and patient satisfaction in patient with chronic musculoskeletal pain.

2. Materials and Methods

2.1. Participants

A cross-sectional study was done using non probability sampling of 200 patients with chronic neck, back, shoulder, knee pain, pain more than 3 months and individuals who gave their consent only included.

2.2. Outcome measures

1. The Central Sensitization Inventory (CSI)**:** The CSI consists of 25 questions and may be self-administered. Each question may be answered as follows: Never (0 points), rarely (1 point), Sometimes (2 points), Often (3 points), or Always (4 points). Total points reflect the severity of the central sensitization phenomenon.[17]
2. The Neurophysiology Pain Questionnaire(NPQ): Neurophysiology of pain education was devised to assess how an individual conceptualizes the biological mechanisms that underpin his or her pain and scores ranging between 0(poor knowledge) to13(good knowledge).[18]
3. Pain Disability Questionnaire(PDQ): The items of the questionnaire are assessed on a 0–10 numeric rating scale in which 0 means no disability and 10 is maximum disability. The sum of the seven items equals the total score of the PDI, which ranges from 0 to 70, with higher scores reflecting higher interference of pain with daily activities.[19]
4. Short Assessment of Patient Satisfaction Scale (SAPS)**:** It is a generic measure of care quality and patient satisfaction with 7 items on a five point Likert's scale, scores ranging from 0 (extremely dis satisfied) to 28 (extremely satisfied).[20]

2.3. Procedure

Consent was taken and the objectives of the study were explained to the subjects and instructions were given before filling the questionnaire and the data collection sheets.

3. Statistical Analysis

The categorical variables presented in percentages and numerical variables in terms of mean and standard deviations for the demographical and clinical outcomes. Descriptive and correlation analyses were used for analysis. Data were analyzed using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Statistical significance was set at $p<0.05$ (Two tailed).

4. Results

The present study included 200 subjects with chronic musculoskeletal pain (with mean age 43.94±13.63) in the analysis in which 72 males and 128 females with pain duration of more than three months. The clinical characteristics data of all subjects along with descriptive statistics of the outcome measure are shown in the Table 1 &2. The correlation between the outcome measures and biopsychosocial factors are shown in the Table 3 &4.

5. Disscussion

The present study included 200 patients with chronic musculoskeletal pain to find out the impact of neurophysiology of pain education, pain disability and patient satisfaction levels on central sensitization in chronic musculoskeletal pain. Patient satisfaction and Neurophysiology of pain education knowledge did not have any significant impact on central sensitization. But they are more significantly impacted by the perceived impact of activity of daily living in patients with chronic musculoskeletal pain disorders and further more age had low level of neurophysiology of pain knowledge in patients

Table 1: Bio psychosocial factors of participants (N=200)

Subject Characteristics	N	Percentage
Pain medication		
Yes	59	44.5
No	111	55.5
Onset of pain		
Sudden	39	19.5
Gradual	158	79.0
None	3	1.5
Mostly used posture		
Sitting	90	45
Standing	60	30
Walking	5	2.5
Sitting, Standing	40	20
All	5	2.5
Exercise per week		
1-2 days per week	51	25.5
3-4 days per wee	71	35.5
5 or more days	77	38.5
None	1	0.5
Coping mechanism		
Hot pack	40	20
Medicine	23	11.5
Rest	29	14.5
Cold pack	10	5
Other	98	49.5
Mood		
Very sad	15	7.5
Somewhat sad	77	38.5
Neutral	75	37..5
Somewhat happy	30	15
Very happy	3	1.5

Table 2: Descriptive statistics of outcome measures

Outcome measures	Mean± Standard Deviation
Duration of condition(in Months)	27.79±26.88
Work duration(in hours)	38.35±17.20
Impact of pain on ADL (0-10 point scale)	6.49±1.87
Neurophysiology of pain knowledge(NPQ)	4.44±1.79
Patient satisfaction(SAPS)	16.12±2.32
Central nervous system sensitization(CSI)	58.37±13.58
Pain disability(PDS)	69.37±25.70

with chronic musculoskeletal pain disorders.

The factors such as age, duration of pain, Mood and perceived impact of activity of daily living had a significant impact on central sensitization in patients with chronic musculoskeletal pain disorders which is similar to a study result from India. According to Lall D et al., central sensitization showed a significant association with pain discomfort, mood, and sleep [21] Pain disability had a significant association with central sensitization in patients with chronic musculoskeletal pain . According to Dennis C. Turk research study, the prevalence of depression as a comorbid psychological condition in chronic pain.[21] and Tomoko Fujii study found high somatising tendency and higher pain ratings were associated with greater disability due to chronic musculoskeletal pain in different age groups.[22,23]

Neurophysiology of pain education knowledge did not have any significant impact on central sensitization. But significantly impacted by the perceived impact of activity of daily living and age in patients with chronic musculoskeletal pain. Recently in 2021, Kasper Bulow's research showed that the effects of Neurophysiology of pain education were moderate and statistically significant on pain intensity and psychological distress.[24,25] Perceived impact on activity of

Table 3: Correlation between the outcome measures

Outcome Measures	NPQ	SAPS	PDS	CSI
NPQ				
r:	1	-.175	-.215	.018
p:		.013	.002	.797
SAPS				
r:		1	0.129	-.110
p:			.068	.122
PDS				
r:			1	.418
p:				<.001
CSI				
r:				1
p:				

[r- Correlation; p-significance]

Table 4: Significant correlation between the outcome measures and bio psychosocial factors

Outcome Measures	Age	Imapct of Pain on ADL	Duration of The Condition	Mood
r:	.215	.232	.211	-.291
CSI				
p:	.002	.001	.003	<.001
r:	-.181	-.212	—	—
NPQ				
p:	.010	.003	—	—
r:	—	.221	–	—
SAPS				
p:	—	.002	—	—
r:	.244	.560	—	-.262
PDS				
p:	.001	<.001	—-	<.001

[r- Correlation; p-significance]

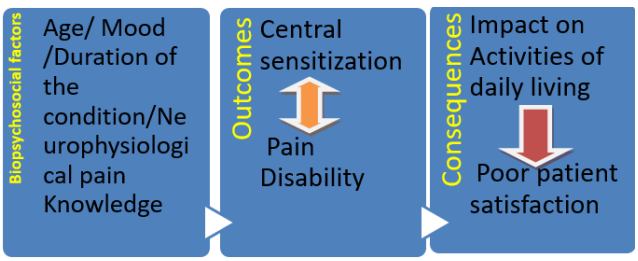

Fig. 1: Schematic hypothetical model conclusion of the study findings

daily living by the patients with chronic musculoskeletal pain had significant association with central sensitization, Neurophysiology of pain education knowledge, Pain disability and Patient satisfaction which is similar to the results of a study in older patients.[26,27]

The findings of the present study paved a way to the researchers to speculate a hypothetical model (Figure 1)to understand the relationships of Biopsychosocial factors, Neurophysiology of pain education knowledge, pain disability, patient satisfaction and central sensitization in chronic musculoskeletal pain.

A limitation of this study is the relatively small size of the chronic musculoskeletal pain group and some sort of clinical trials could have helped to understand the study in more detailed manner with correlations between two sets of groups.

6. Conclusion

The age, mood, duration of the condition and pain disability levels were the factors behind central sensitization in patients with chronic musculoskeletal pain. And Levels of neuro physiological pain knowledge had impact on pain disability and patient satisfaction.

7. Source of Funding

None.

8. Conflict of Interest

The authors declare that there is no conflict of interest.

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Author biography

Thangamani Ramalingam, Faculty/Lecturer https://orcid.org/0000-0001-7429-1718

Pooja Desai, Physiotherapy Graduates

Dhruvi Ghoghari, Physiotherapy Graduates

Vidhi Jethva, Physiotherapy Graduates

Rushvi Shah, Physiotherapy Graduates

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