

## Effect of Training in Mechanism-Based Classification on Clinical Decision-Making of Pain by Physical Therapy Post-Graduate Students - A Qualitative Study

Nisha Rani Jamwal\*, Senthil P. Kumar\*\*, Ketaki C. Joshi\*\*\*

### Abstract

Mechanism-based clinical reasoning was shown to be the recommended strategy for clinical decision making for physical therapy management of musculoskeletal pain. The five mechanisms proposed were central sensitization, peripheral sensitization, and sympathetically mediated pain, cognitive-affective and nociceptive. Earlier study found that there was prevalence of all mechanisms among patients with MSK pain. The objective of this study was to assess the immediate effects of a 2-weeks training session on the clinical decision-making among post-graduate physical therapy students. The training session comprised of two contact lecture sessions, online study material for duration of two weeks. Pre and post assessment was done qualitatively using a pre-provided case example and objective structured evaluation. Additionally, the participants also answered seven-point Likert scaling for their attitudes and opinions towards the mechanism-based clinical reasoning of pain. Overall, the responses were favorable and there were observable changes recorded post-training compared to pre-training. Thus training on mechanism-based classification of pain improved clinical decision-making skills of post-graduate physical therapy students.

**Keywords:** Education; Training; Pain Sciences; Clinical Reasoning.

### Introduction

Musculoskeletal (MSK) pain ranked as the second common complaint next only to common cold among patients visiting a general medical practitioner [1]. Non-pharmacological treatments for MSK pain such as physical therapy have its range of treatment options whose effects not only involve symptom control but also towards improving quality of life in patients receiving pain rehabilitation and palliative care [27]. Various pain models like the ' Medical/disease model' and classification systems proposed by World Health Organization (WHO) and

International Classification of Diseases (ICD) were developed for treating pain but were lacking in explaining various clinical presentations of pain. The main cause of treatment failure of pain was attributable to difficulties in identifying the pain mechanisms. It is important to differentiate etiological factors or diseases/causative factors from pain mechanisms as etiological factors. The pain mechanisms are responsible for producing the pain symptoms. Thus, mechanism based classification was proposed. Mechanism-based classification also known as 'pain analysis' refers to the classification of pain according to the underlying neurophysiological mechanisms responsible for its generation and/or maintenance. Mechanism-based classification was originally put forth by Clifford J Wolf and explained by Mark A Jone, in his hypothetico- deductive model of clinical reasoning. Mechanism-based classifications may facilitate effective decision making by directing the therapeutic intervention towards the predominant pain mechanism 1. Recent studies by Smart and Doody [3] and Smart and Doody [4] using qualitative methodology found that expert musculoskeletal physiotherapists used mechanism-based classification in their clinical reasoning process of

**Author Affiliation:** \*Post-graduate student, \*\* Professor and Principal, M.M Institute of Physiotherapy and Rehabilitation, M.M University, Mullana-Ambala, Haryana, India. \*\*\* Physiotherapist, Thakar's Physiotherapy Clinic; 16, Gurudev basement- A, Suryodaya chs, near NIIT, opp Railway station, Ambarnath (E), Pin- 421 501, Thane district, Maharashtra.

**Reprint Request:** Senthil P. Kumar, Professor and Principal, M.M Institute of Physiotherapy and Rehabilitation, M.M University, Mullana-Ambala, Haryana, India.

E-mail: [senthil.p.kumar@mmumullana.org](mailto:senthil.p.kumar@mmumullana.org)

evaluation of pain in their patients. Mechanism-based treatments for MSK pain are most likely to succeed compared to symptomatic treatments or diagnosis-based treatments.

Various methods of mechanism based classification were proposed but were lacking in description of reliable and empirically validated clinical criteria to distinguish the different categories of pain mechanism from each other. Smart et al [5] thus proposed MBC which was later profoundly explained by Kumar and Saha [6]. It involved five mechanisms that operate to initiate, process and produce the 'pain' as a combination of stimulus-response inter-relationship, experience and its associated emotional expression. The five mechanisms were as follows:

*Central sensitization/ central neurogenic mechanism/ central nociceptive mechanism*

*Peripheral sensitization/ peripheral neurogenic mechanism*

*Peripheral nociceptive mechanism*

*Sympathetically maintained pain/ sympathetically dependent pain mechanism*

*Cognitive-affective (psychosocial) mechanism*

The readers are referred to the earlier article by Kumar [8] for an overview of these mechanisms. Single symptom may be produced by different mechanisms or single mechanism can elicit different symptoms. Kumar [8] found that patients with MSK pain exhibited a combination of all mechanisms in their clinical presentation. A list of clinical indicators of 'nociceptive', 'peripheral neuropathic', and 'central' mechanisms of musculoskeletal pain was derived to provide some indication of criteria upon which clinicians may base such mechanistic classifications. Further, preliminary discriminative validity was identified for 'nociceptive', 'peripheral neuropathic', and 'central' mechanisms of musculoskeletal pain. Improved understanding of the mechanisms would thus enhance clinical interpretation of patient symptoms in clinical practice. Previous study by Kumar et al [9] found positive benefits on knowledge, attitudes, beliefs and experiences among under-graduate physical therapy students following a palliative care training program. The objective of this paper was to study the effectiveness of an educational session on mechanism-based classification on clinical decision-making of musculoskeletal pain by post-graduate physical therapy students and to evaluate their attitudes and

experiences with using the MBC on assessing pain amongst patients with musculoskeletal pain..

## Materials and Methods

### *Study design*

A pre-post single-group quasi-experimental study using a focus group methodology, under a qualitative (grounded theory) approach.

### *Sample size*

Six post-graduate physical therapy students specializing in Musculoskeletal Physical Therapy, Dept of Physiotherapy, Kasturba Medical College (Manipal University), Mangalore participated in this study.

### *Procedure*

The instructor obtained written informed consent from the participants and then performed the pre-participation evaluation using a structured form as shown in appendix-1. The evaluation form consisted of an illustrative case example [10], with clinical decision-making queries, followed by participant's rating of the usefulness of the example and their level of interest to learn mechanism-based classification (MBC).

The training period was for two-week duration that included an initial lecture session for two hours, and relevant articles were e-mailed to the participants as leisure-time study material. During this period, the participants were also provided with evaluation forms which they were instructed to classify five cases of their interest. The post-participation evaluation involved the one similar to the pre-evaluation, with the same case example and questions. In addition, the post-participation evaluation included questions on participants' feedback on their experiences with using this classification on patients with musculoskeletal pain and their attitudes and beliefs henceforth towards MBC. The later part allowed an in-depth program evaluation from the participants' perspective.

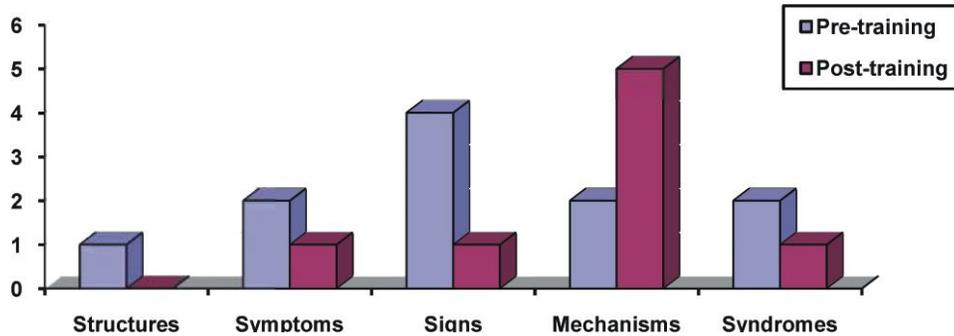
## Data Analysis and Results

Descriptive analysis was done for all the findings of comparison between pre- and post-participation evaluation response categories. The following

categories were used operationally for summarizing participant responses: causes for patient symptoms, problem list, therapeutic goals, treatment selection, treatment techniques, opinion about recovery, and predicted duration of recovery. Categories related to the case example were overall impression, similarity

with routine clinical practice, overall learning experience and rating of study material provided. Post-instruction evaluation included positive and negative experiences, attitudes towards positive, neutral and negative statements associated with MBC.

**Fig.1:** Pre-post comparison of clinical reasoning for cause of patient symptoms

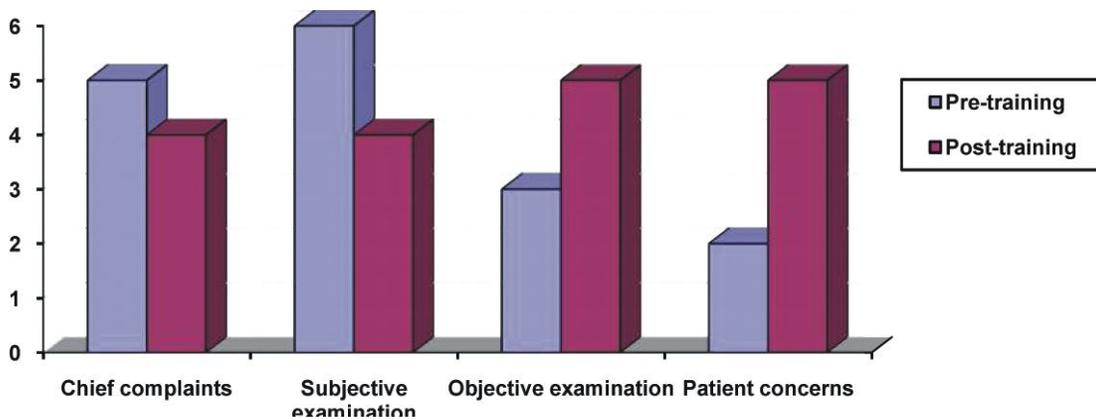


**Results**

The perceived cause for patient symptoms was initially based upon structural and symptoms and

*Causes for symptoms*

**Fig. 2:** Pre-post comparison of clinical reasoning for problem list of patient

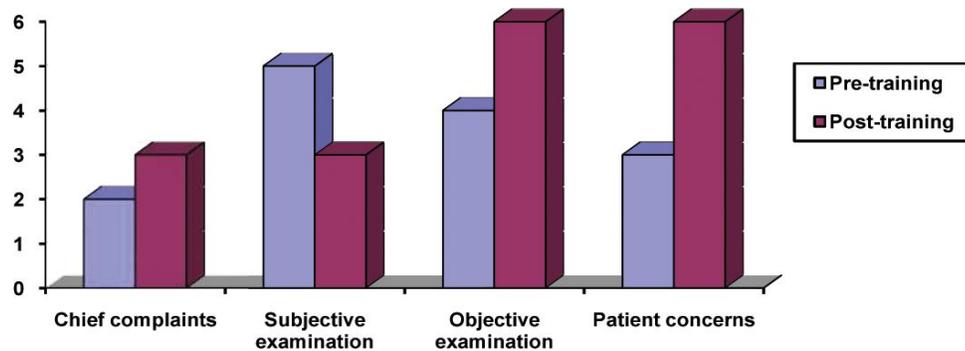


signs, and later it was based on mechanisms of pain (figure-1).

The participants framed the patient’s problem list based upon chief complaints and subjective examination pre-training when compared to based

*Problem-listing*

**Fig. 3:** Pre-post comparison of clinical reasoning for setting therapeutic goals.

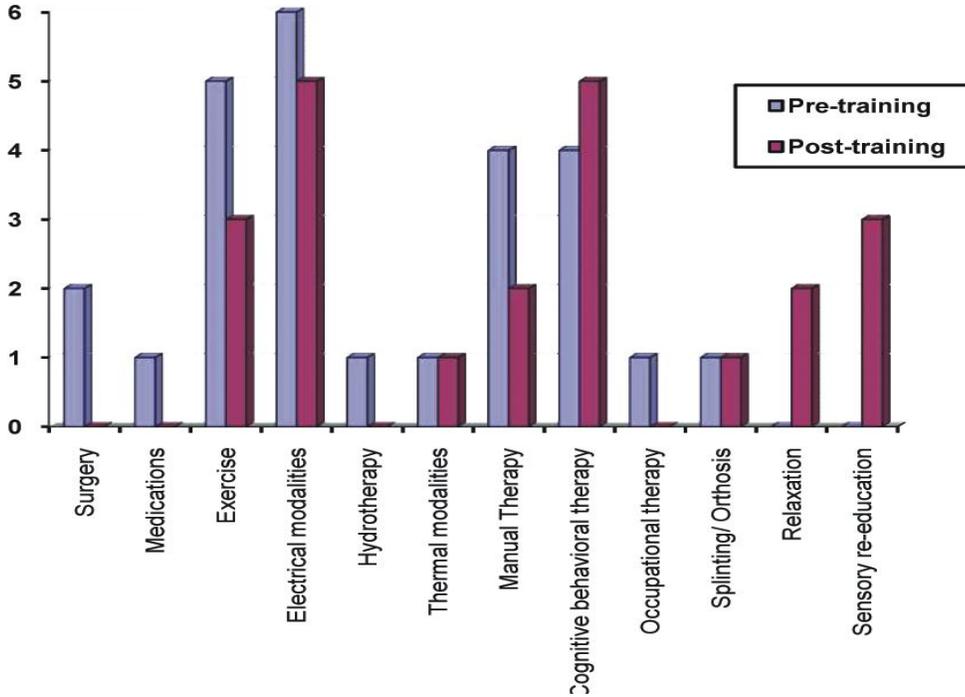


upon objective examination and patient concerns post-training (figure-2).

The participants decided their therapeutic goals

*Therapeutic goal setting*

**Fig. 4:** Pre-post comparison of clinical reasoning for therapeutic selection.

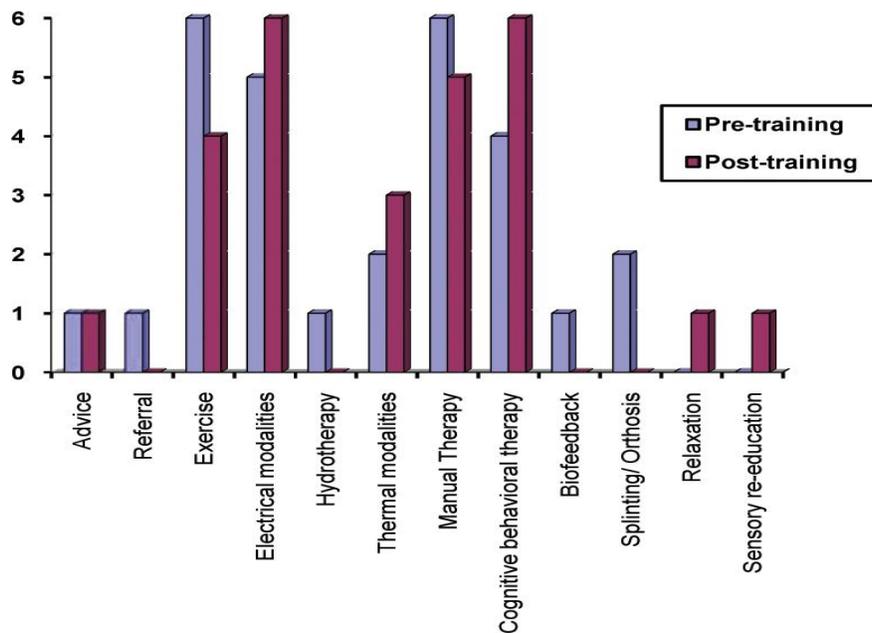


based upon subjective examination and based upon objective examination and patient concerns post-training (figure-3).

Most of the responses pre-training were towards selection of exercises, electrical modalities and

*Therapeutic selection*

**Fig. 5:** Pre-post comparison of clinical reasoning for therapeutic techniques.

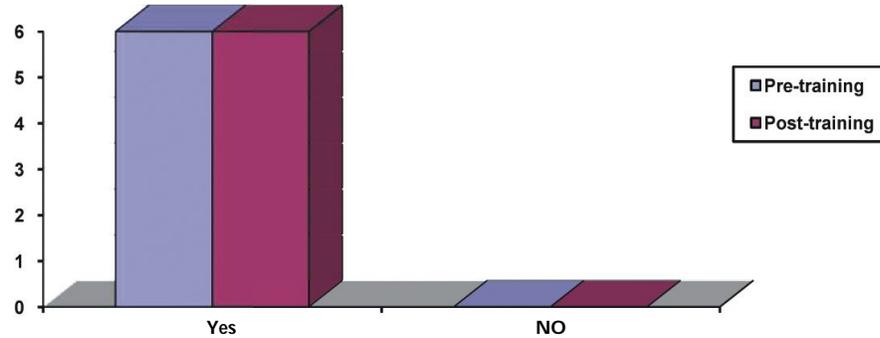


manual therapy while post-training responses were more towards cognitive-behavioral therapy, relaxation and sensory re-education (figure-4).

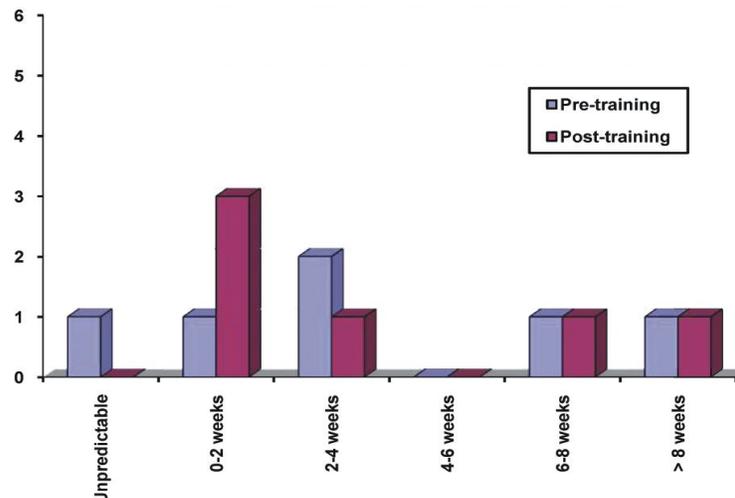
*Therapeutic techniques*

The participants' chosen therapeutic techniques were exercises and manual therapy pre-training and electrical modalities and cognitive-behavioral therapy post-training (figure-5).

**Fig.6:** Pre-post comparison of clinical reasoning for opinion on positive prognosis.



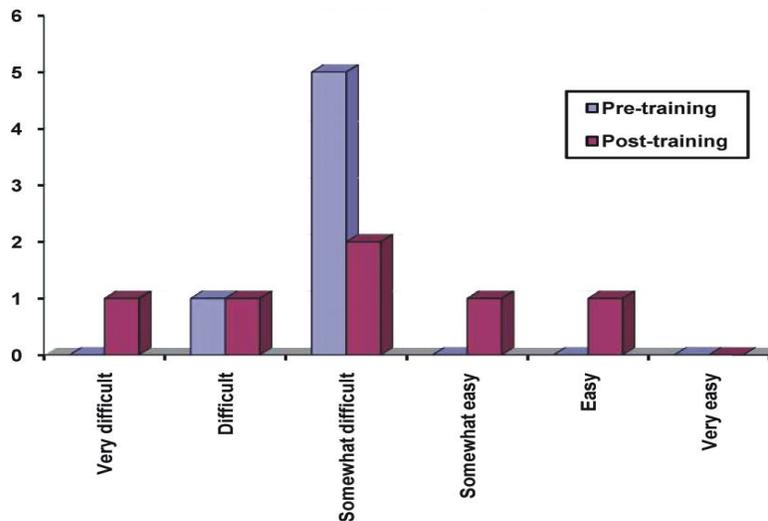
**Fig.7:** Pre-post comparison of participant responses for duration of patient recovery.



*Opinion about recovery*

There was not such an observable change in the participants' opinion about recovery when compared

**Fig. 8:** Pre-post comparison for overall impression about training / case example.

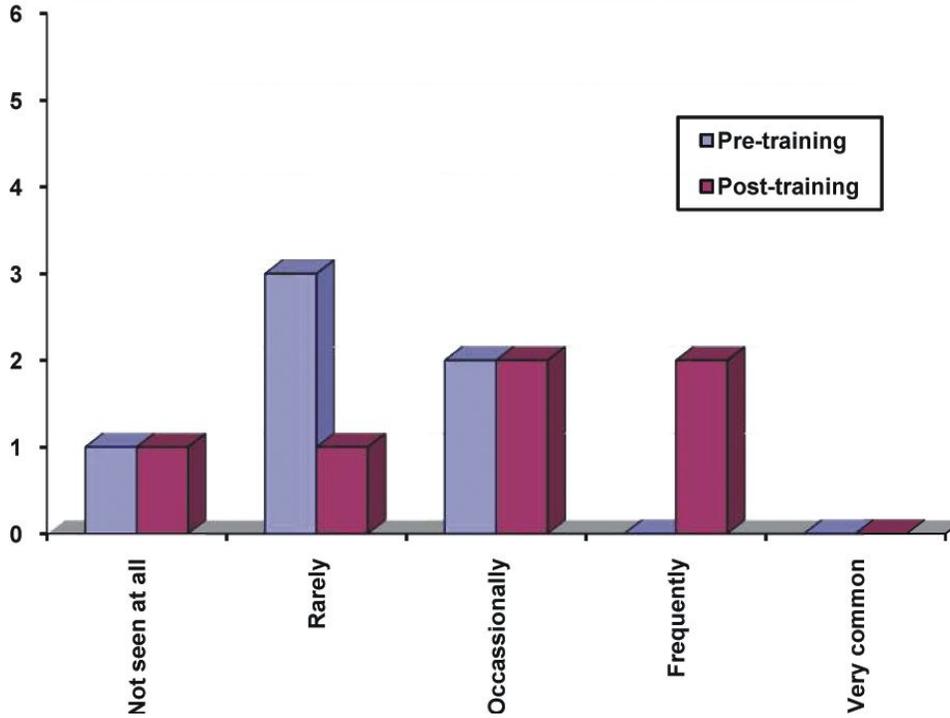


pre-post training (figure-6).

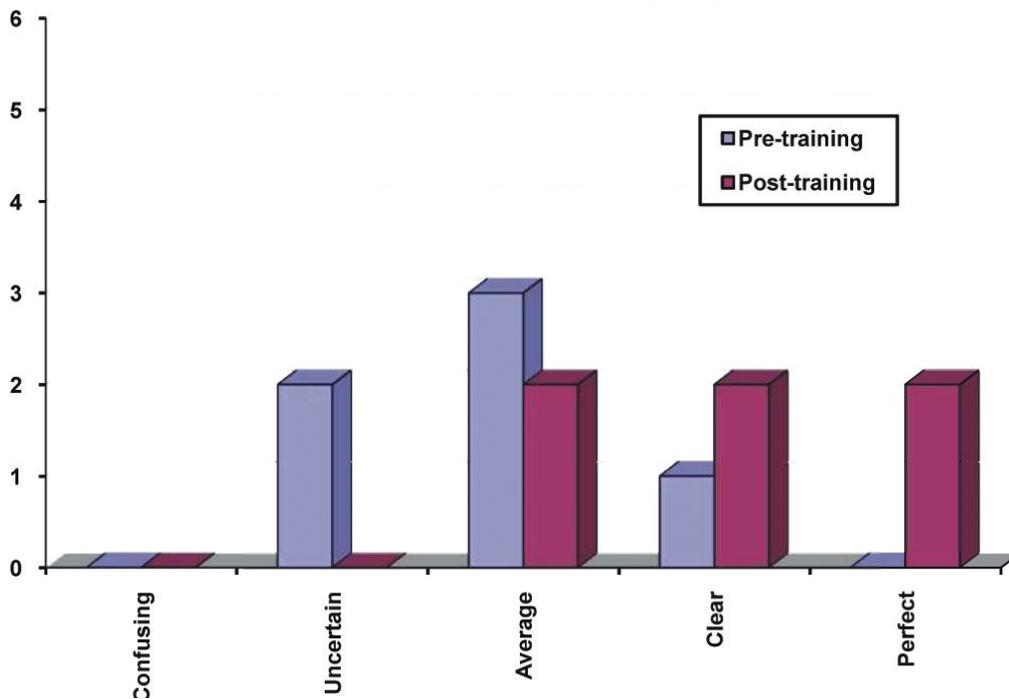
*Predicted duration of recovery*

The participants reported shorter duration of recovery in the patient post-training compared to pre-training (figure-7).

**Fig. 9:** Pre-post training comparison for opinion of frequency of similar case exposure in clinical practice.



**Fig. 10:** Comparison of pre-post training participants' opinion about case example.



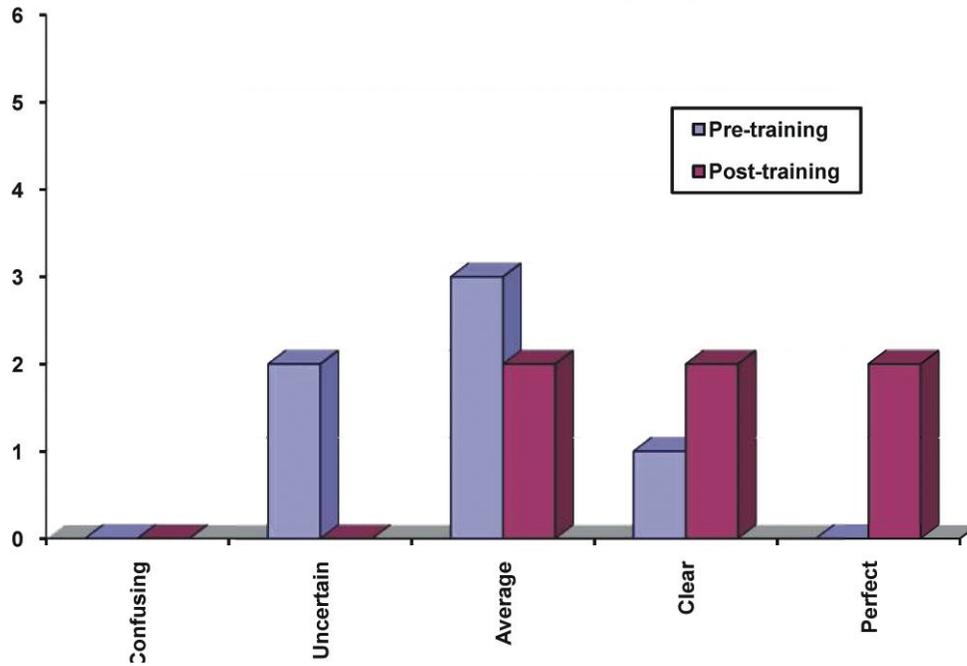
*Overall impression*

Majority of participants said 'somewhat difficult'

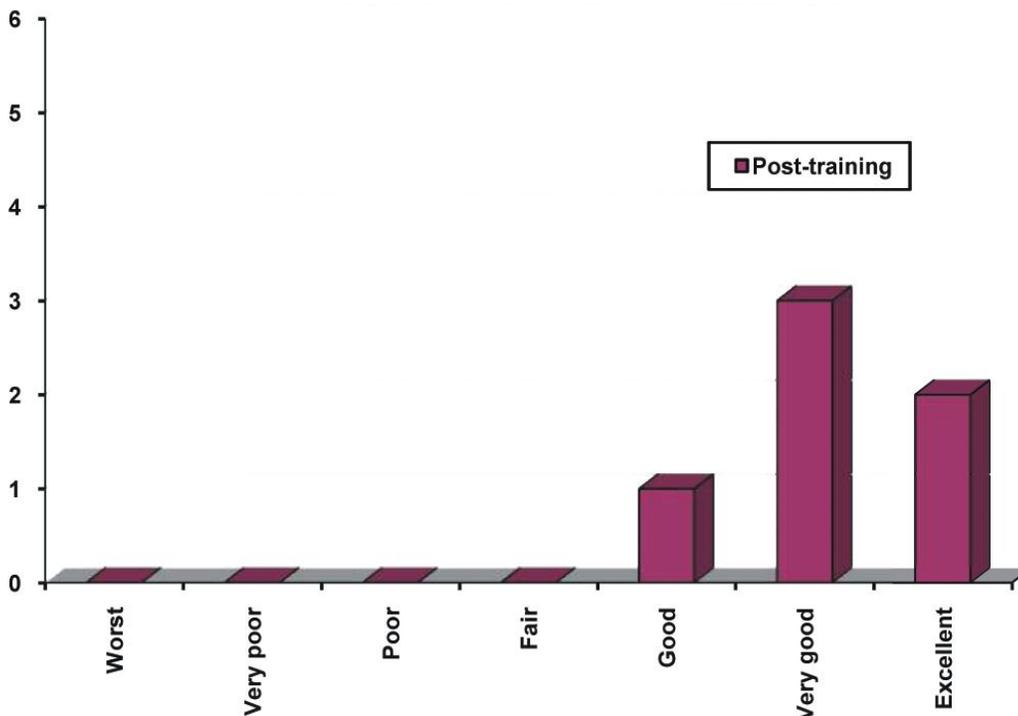
pre-training and post-training, about half of the participants felt 'somewhat easy' or 'easy' (figure-8).

*Frequency of similar case exposure*

**Fig. 11:** Pre-post comparison of participants' rating of overall learning experience from the case example.



**Fig. 12:** Participants' overall rating of study material.



The participants started recognizing similar case situations in their routine practice, which was evident in their post-training responses (figure-9).

*Overall rating of simulated case example*

Majority of the participants rated the case example as 'clear' and 'perfect' following training (figure-10).

*Overall learning experience from case example*

All the participants rated their overall learning experience from the case example as 'good', 'very good' and 'excellent' (figure-11).

Fig. 13: Participants' rating for positive statements about MBC.

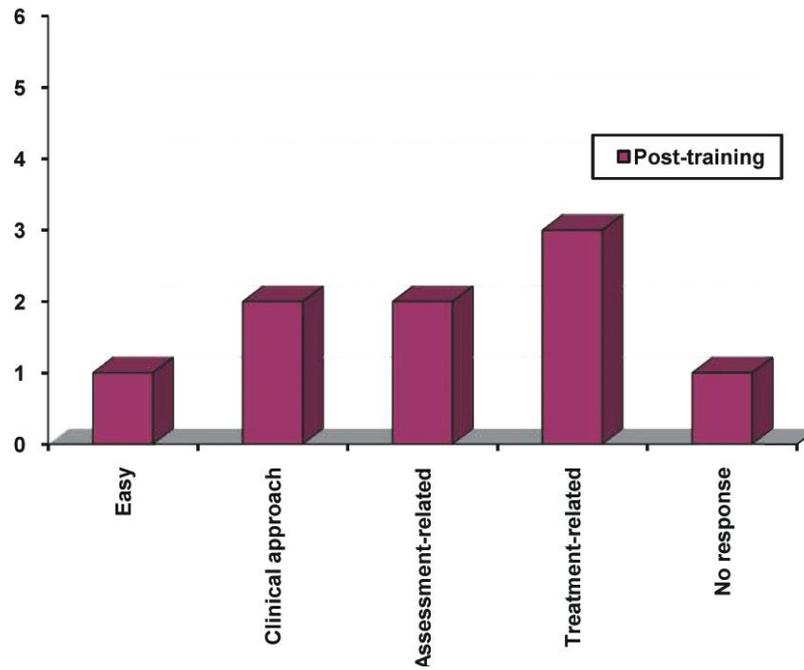
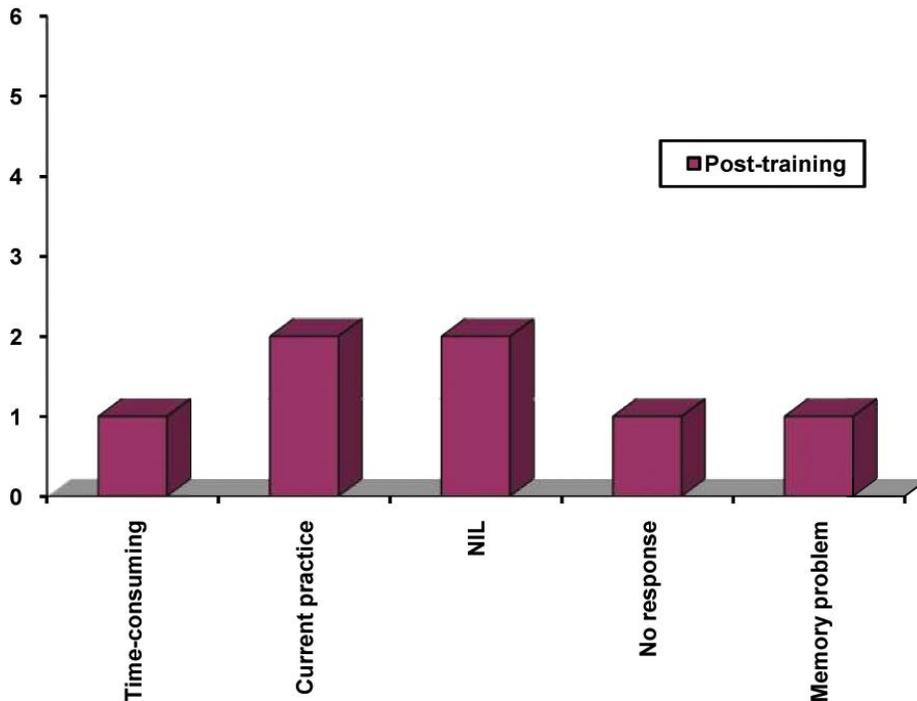


Fig. 14: Participants' opinions towards negative statements about MBC.



*Overall rating of study material*

All participants rated the study material as either 'good,' 'very good,' or 'excellent' (figure-12).

*Did you evaluate patients using the provided evaluation form?*

Yes (6)/ No

If yes; how many patients were evaluated (the completed forms have to be handed over to the instructor)? (5, 5, 5, 4, 3, 5)

*What were your positive experiences (state at least two; if none, state NIL) while using mechanism-based classification of patients with pain?*

About a half of the participants felt that MBC was related directly to treatment decision-making (figure-13).

*What were your negative experiences (state at least two; if none, state NIL) while using mechanism-based classification of patients with pain?*

Few participants felt that MBC was not reflecting current clinical practice (figure-14).

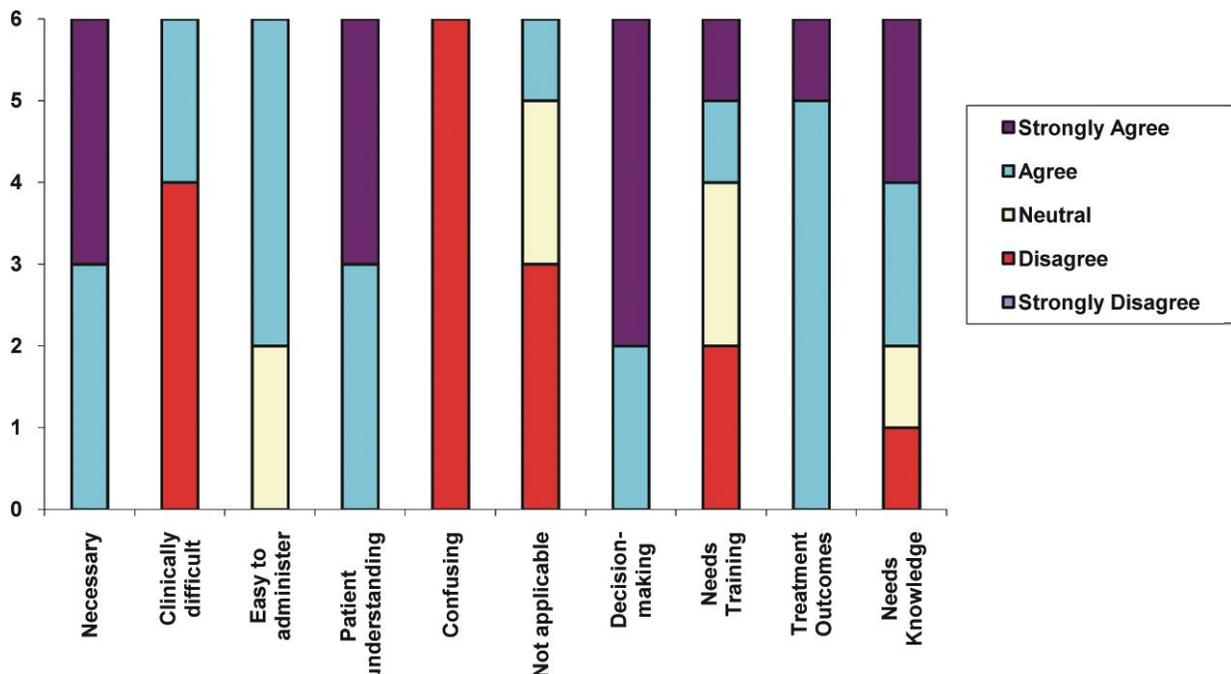
*Attitudes*

Of the total ten statements, five were positive, three were negative and two were neutral.

*Positive statements*

All the participants felt MBC is necessary in musculoskeletal physical therapy practice. All participants also felt that MBC improved their

**Fig. 15:** showing post-participation overall participants' attitude responses towards mechanism-based classification.



understanding about patients, clinical decision-making and treatment outcomes. Most of them felt that MBC was easy to administer while some answered neutral.

*Negative statements*

While all participants refused that MBC were confusing, most of them refused statements of MBC being confusing and MBC was being clinically difficult.

*Neutral statements*

All participants opined in a mixed manner that using MBC on patients with musculoskeletal pain required additional knowledge and expert training

Overall attitudes of all participants towards MBC was given in figure-15.

**Discussion**

As we witness a professional (r)evolution over the past 100 years, into autonomy and direct access physical therapy services [11], the continuous growth in research evidence and enablement of evidence-based practice (EBP) [12] which later transformed itself into evidence-informed paradigm [13]. An evidence-informed paradigm currently warrants the use of MBC for assessment and treatment of patients with MSK pain.

Though previous reports emphasized inadequacies in physical therapists’ clinical decision-making in treatment of patients with MSK pain, this study is the first of its kind on an educational intervention. The strengths of the study- being a qualitative design, was able to capture the subjective attributes of physical therapy students. We evaluated three categories: participants’ responses regarding evaluation form, the case example, and participants attitude towards MBC. It was evident from our study that the perceived cause for symptoms was based on the pain mechanisms post training. Also the goal setting and therapeutic selection was based on objective examination post training. Thus, our results suggests that the clinical decision making was not dependent on the structure or tissue damaged

but on the mechanism causing the damage. The mechanism based classification recognized the importance of neurophysiological basis of the cognitive- affective mechanisms of pain and their influence on other pain mechanisms in modulation and processing of pain. Thus, training in mechanism based classification may improve the understanding regarding the link between psychological and physiological factors in pain modulation which was evident from our results where participants selected cognitive behavioral therapy as one of the treatment technique post training.

The overall impression, learning experience and rating about the case example improved post training suggesting that the training improved the understanding about the case example. Also, the mechanism based classification was directly related to clinical decision making according to half of the participants. Along with the improved clinical decision making post training among the participants, they all had positive attitude towards mechanism based classification. According to the results of our study, mechanism based classification is necessary in musculoskeletal physical therapy practice and is easy to administer. It also improved understanding about patients and clinical decision- making. Thus, training in mechanism based classification improved clinical decision making among the post graduate physical

Statements	SD 1	D 2	N 3	A 4	SA 5
Mechanism-based classification is necessary in musculoskeletal physical therapy practice					
Mechanism- based classification is difficult in a busy clinical situation					
Mechanism-based classification is easy to administer					
Mechanism-based classification is useful to understand patients’ clinical presentation					
Mechanism-based classification is confusing and ambiguous.					
Mechanism-based classification is not applicable for all patient types					
Mechanism-based classification is useful to improve clinical decision-making					
Mechanism-based classification is not possible without explicit training					
Mechanism-based classification is useful to improve treatment outcomes					
Mechanism-based classification is not possible without an in-depth knowledge of the subject					

therapy students. However, the study has its own limitations- smaller sample size, limited external validity due to differences that may exist in post-graduate curriculum across India [14]. Physical therapists need to be aware of their role in a multidisciplinary rehabilitation team to keep thinking ‘out of the box [15].’

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None identified and/or declared.

*Appendix*

Answer the following (tick only one option per statement)- there are no right or wrong answers:

SD- Strongly disagree (1); D- Disagree (2); N- Neutral (3); A- Agree (4); SA- Strongly agree (5).

**Conclusion**

The focus group training program produced better positive effects on clinical decision making process among post-graduate physical therapy students in this

study. Overall, the participants responded positively and there were observable changes in their clinical decision-making in favor of mechanism-based reasoning.

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