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Research Article

Effectiveness Of Proprioceptive Neuromuscular Facilitation Training Improves Pain Related Fear of Movement Outcome in Working Age Patients with Non-Specific Chronic Low Back Pain.

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ABSTRACT

BACKGROUND:
Proprioceptive neuromuscular facilitation training and general trunk exercises have been applied to treat non-specific chronic low back pain patients. However, there is currently little study to support the use of one treated intervention over the other to improve clinical outcomes and feat of movement.

STUDY DESIGN: A Randomized Control Trial

AIM: To find out the effectiveness of proprioceptive neuromuscular facilitation training for pain related fear of movement in working age patient with non-specific low back

OBJECTIVE: To determine effectiveness of proprioceptive neuromuscular facilitation training for pain related fear of movement in working age patient with non-specific low back

METHOD: Forty-two chronic low back pain participants, divided in two groups, experimental group A & control group B, aged 30–50 years were randomized either to three-week proprioceptive neuromuscular facilitation training or to a control group receiving general trunk exercises. Pain related fear of movement was measured before and after the three-week intervention.

RESULT: The proprioceptive neuromuscular facilitation training intervention showed a statistically significantly greater reduction in pain related fear of movement. The comparison between experimental and Control group of RMDQ and TAMPA in pretest and post test scores of all 21 subjects, experimental group of 't' value is 15.0771 'p' value is <0.0001 This difference is considered to be statistically extremely significant and Control group of 't' value is 0.0000, 'p' value is 1.0000 and 0.2234 'p' value is 1.2566. This difference is considered to be not statistically significant in respectively.

CONCLUSION: This study was supporting the effectiveness of PNF training of the experimental group to managing chronic low back pain and decreasing fear of movement among participants than the control group, general trunk exercises for working-age individuals with chronic low back pain but the effects do not reach the clinical meaningful level.

INTRODUCTION

Low back pain (LBP) is a prevalent, difficult medical and socioeconomic issue among working-age adults. LBP is a major contributor to years lived with disability, absenteeism at work, and significant compensation costs in contemporary society. While most LBP sufferers recover in six weeks without medical intervention, nearly 20% of these instances develop into chronic conditions. Over 90% of chronic low back pain (CLBP) patients seen in primary care exhibit nonspecific LBP [(1)].

Chronic low back pain is characterized by symptoms lasting longer than 12 weeks. Both mechanical and non-mechanical disorders may show symptoms that persist for months or even years. Each type of disorder (such

as spinal stenosis, infection, and tumor) can be identified through historical, physical, and laboratory indicators distinctive to each category[2].
Previous research indicated three frequently utilized PNF techniques for CLBP, specifically, rhythmic stabilization (RS), combination of isotonics (COI), and 'chop and lift' (CL) as previously detailed. Numerous authors have suggested the efficacy of PNF training in relation to pain-related outcomes, trunk muscle activity, and range of motion for managing CLBP. Nonetheless, studies that support the impact of PNF training on balance abilities in CLBP are limited. To the authors' knowledge, only Young et al. have documented that PNF training enhanced the balance of individuals with CLBP. Although the authors employed the CoP measurement device, which is regarded as an ideal outcome for postural balance, they did not assess other possible disorders, such as vestibular and visual disorders or lower extremity strength, which might influence the balance of CLBP patients. Moreover, the blinding technique to mitigate measurement bias was not mentioned. Additionally, they explored the effects of PNF training on individuals with CLBP, but the results could not be extended to other age demographics, particularly working-age adults [1].
According to findings from recent studies, fear of movement/(re)injury plays a role in maintaining chronic pain disability in CLBP. It commences with an injury occurring during the acute phase. Painful experiences that are exacerbated during movement will provoke catastrophizing thoughts in some individuals while eliciting more adaptive thoughts in others. Patients who engage in catastrophizing are more prone to developing fear. Fear of movement/(re)injury subsequently results in heightened avoidance and, over time, leads to disuse, depression, and increased disability [3].

This study will contribute to the existing body of knowledge on the management of non-specific low back pain, particularly in working-age patients. The findings will provide valuable insights into the effectiveness of PNF training in addressing pain-related fear of movement, which is a critical factor in the development and maintenance of chronic low back pain.

METHODLOGY

This study was reviewed, discussed and approved by the Santosh Occupational Therapy institutional ethical committee. A total of 42 participants included in the study through randomization according to the random sampling divided in to 2 groups experimental group and control group. In experimental group PNF training was given to the participants for duration of 3 weeks, 3 sessions in a week for 30 minutes. In control group general trunk exercises was given to the participants for duration of 3 weeks, 3 sessions in a week for 30 minutes. Participants were recruited from Doctor's Wing-HARC Noida.
As per inclusion criteria, age between 30-50 years, both male and female, Individual with non-specific chronic low back pain. The pain intensity at least two points of the 0-10 numerical rating scale (NRS), and duration of pain last at least 3 months. The patients were excluded if they presented any of the following criteria: history of lumbo-pelvic surgery, specific LBP (e.g., disc herniation, spondylolisthesis and sacroiliac joint dysfunction) cancer, autoimmune diseases, neurologic deficits, lower limb arthritis, vestibular and visual disorders, pregnancy, cardiopulmonary disorders or having exercise contraindications population and hearing and vision impairment population in respectively. All the eligible participants signed an informed consent form before participation. The participants were assigned to experimental & control group by random sampling method.
The Experimental group received PNF training for 30 minutes,3 times a week over 3 weeks and the Control group received General trunk exercise for 30 minutes,3 times a week over 3 weeks. The outcomes of the intervention were assessed using Numerical rating scale (NRS), Roland- Morris Disability Questionnaire (RMDQ) and Tampa Scale for Kinesio phobia (TSK).

TREATMENT PROTOCOL

PNF training group (Experimental group)

For week 1, the participants were train in alternate isometric contractions of the trunk flexors and extensors against maximum force. The training will provide by the therapist for 10 s in a sitting position.
For week 2, the participants were trained in alternate isometric concentric & eccentric contractions of the trunk flexors in the return to trunk neutral position and a 5s hold resisted isometric contraction of the trunk muscle in a neutral position (3 sets of 15 repetitions).
For week 3, the participants were focus on training the upper extremities by alternately performing the chop and lift movement patterns in diagonal and spiral directions for 10s.[1]

General trunk exercise group (control group)

The general trunk exercise programme was consisted of trunk curl-up, diagonal trunk curl and single legged extension.
The participants were attended three exercises lasting for about 30 mins three times a week over three weeks. All exercises were performed in three sets of 10 repetitions, with a 30s rest between repetitions and a 60 s rest between sets. [1]

OUTCOME MEASURES:

Numerical rating scale

Primary outcome measure was pain intensity, which was estimated using the 10-point NRS, with scores ranging from 0 (no pain) to 10 (very severe pain). It showed high reliability (r = 0.95---0.96) and validity (r =0.86---0.95). The participants circled the numerical value on the segmented scale to indicate pain level. Time of administration and time of scoring in 15 to 20 minutes. (4)

Roland-Morris Disability Questionnaire (RMDQ)

The Thai version of the Roland- Morris Disability Questionnaire (RMDQ) was employed to assess disability. The questionnaire consists of 24 items to assess disability specific to LBP. The participants put a tick on the blank in front of each item if they had such disability on the evaluation day.The total score ranged from 0 (no disability) to 24 (maximum disability).The Thai RMDQ showed high reliability (K =0.71---0.93).Time of administration and time of scoring in 10- 30minutes.(5)

Tampa scale of kinesiophobia(TSK)

The Tampa Scale for Kinesio phobia (TSK) was developed in order to assess fear of movement/(re)injury. The TSK consists of 17 items intended to assess fear of movement and fear of (re)injury. Respondents are asked to indicate to what extent the items are a true description of the assumed association between movements and (re)injury on a four-point Likert scale, ranging from strongly disagree to strongly agree. Four items (i.e., items 4, 8, 12 and 16) are inversely phrased. (6)

DATA COLLECTION:

A total of 42 participants included in the study through randomization according to the random sampling divided in to 2 groups, experimental group and control group. Both male and female both are included.

DATA ANALYSIS

After completion of all (pre-intervention and post-intervention) evaluation, results were collected and data were put in the master chart. All the statistical tests were performed using statistical package for social sciences (SPSS) version 21 or graph pad insta software version 3.1 respectively.
The pre-test and post-test for scoring of experimental and control group were analyzed through parametric test, t-test and p test were used.

RESULT

The results from Group A, which underwent an experimental intervention aimed at assessing pain, fear of movement, reveal significant improvements. The data shows experimental group of RMDQ pretest and post test scores of all 21 subjects, mean values are 12.57 and 7.62 respectively, standard deviation 2.18 and 1.32 respectively sample size 21 respectively, standard error of mean 0.48 and 0.29 respectively, 95% confidence interval 4.42 and 5.48 in respectively. TAMPA pretest and posttest scores of all 21 subjects, mean values are 48.71 and 39.1 respectively, standard deviation 3.65 and 5.07 respectively, sample size 21 respectively, standard error of mean 0.8 and 1.11 respectively, 95% confidence interval 8.29 and 10.95 respectively. The Control group of RMDQ pretest and post test scores of all 21 subjects, mean values are 13.52 and 13.52 respectively, standard deviation 2.04 and 1.69 respectively, sample size 21 respectively, standard error of mean 0.45 and 0.37 respectively, 95% confidence interval – 0.56 and + 0.56 respectively. The data shows Control group TAMPA pretest and posttest scores of all 21 subjects, mean values are 45.71 and 46.71 respectively, standard deviation 5.46 and 5.35 respectively sample size 21 respectively, standard error of mean 1.19 and 1.17 respectively, 95% confidence interval – 2.66 and + 0.66 respectively.

Table 1: 't' test between experimental group RMDQ pretest and posttest & TAMPA pretest and post.

S. No.	Variable 1	Variable 2	P value	t value	Level of Significance
1	RMDQ pretest	RMDQ posttest	<0.0001	19.5497	Extremely Significant
2	TAMPA Pretest	TAMPA posttest	<0.0001	15.0771	Extremely Significant

Table 2 : 't' test between Control group RMDQ pretest and post test & TAMPA pretest and posttest.

S. No.	Variable 1	Variable 2	P value	t value	Level of Significance
1	RMDQ pretest	RMDQ posttest	1.0000	0.0000	Not statistically Significant
2	TAMPA Pretest	TAMPA posttest	0.2234	1.2566	Not statistically significant

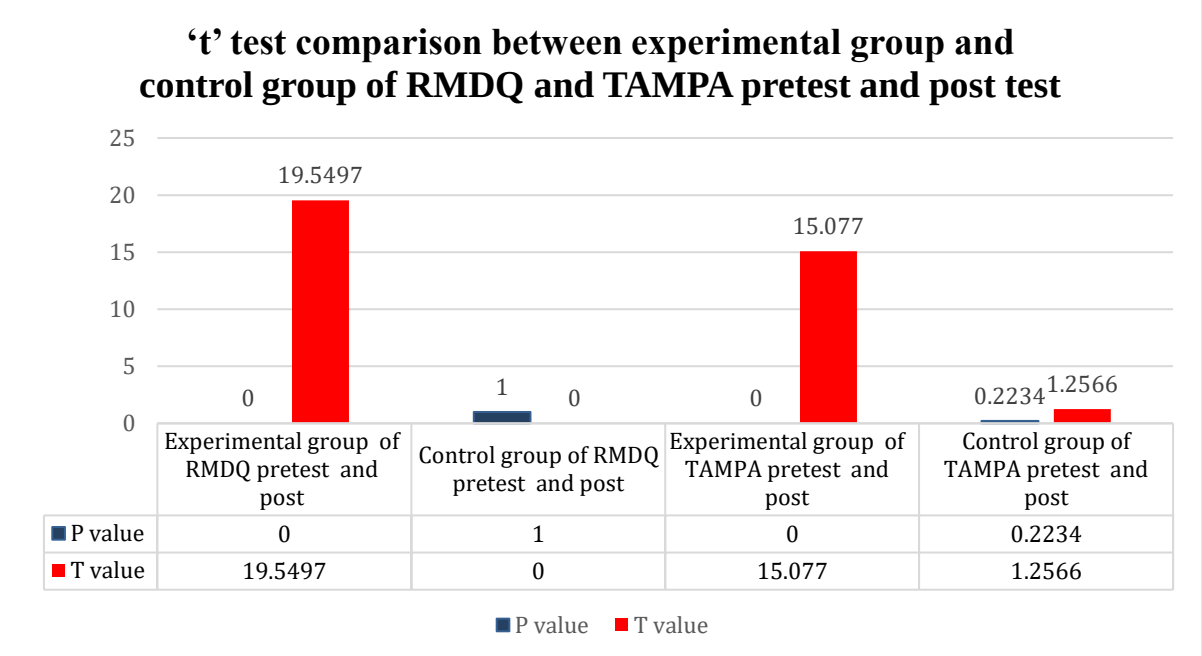
Table 3 : 't' test comparison between experimental group and control group RMDQ pretest and post test

S. No.	Variable 1	Variable 2	P value	t value	Level of Significance
1	Experimental group of RMDQ pretest	Experimental group of RMDQ posttest	<0.0001	19.5497	Extremely Significant
2	Control group of RMDQ pretest	Control group of RMDQ posttest	1.0000	0.0000	Not statistically Significant

Table 4: 't' test comparison between experimental group and control group of TAMPA pretest and post test

S. No.	Variable 1	Variable 2	P value	T Value	Level of Significance
1	Experimental group of TAMPA Pretest	Experimental group of TAMPA posttest	<0.0001	15.0771	Extremely Significant
2	Control group of TAMPA Pretest	Control group of TAMPA posttest	0.2234	1.2566	Not statistically significant

Graph 1: 't' test comparison between experimental group and control group of RMDQ and TAMPA pretest and post test



The comparison between experimental and Control group of RMDQ in pretest and post test scores of all 21 subjects, experimental group of 't' value is 15.0771 'p' value is <0.0001 This difference is considered to be statistically extremely significant and Control group of 't' value is 0.0000, 'p' value is 1.0000 This difference is considered to be not statistically significant in respectively and comparison between experimental and Control group of TAMPA in pretest and post test scores of all 21 subjects, experimental group of 't' value is 15.0771 'p'

value is <0.0001 This difference is considered to be statistically extremely significant and control group of 't' value is 0.2234 'p' value is 1.2566 This difference is considered to be not statistically significant respectively.

DISCUSSION

This study was allocated to randomized controlled trial that investigated whether an experimental group for population in additional to traditional method of PNF (proprioceptive neuromuscular facilitation training) would result in better outcomes for population with chronic low back pain. This study aimed to investigate to improve pain related fear of movement in working age individual with chronic low back pain. This study was supported our hypothesis that provide positive, enables and engage in relevant occupations individuals with CLBP. One key finding of the study related to the participants beliefs their own ability after the intervention using the PNF (proprioceptive neuromuscular facilitation training) a belief which had given them the courage to perform activities in new or every situation that they had previously not thought themselves capable of handling. This study identified that 42 subjects to improve pain related fear of movement outcome in working age population with chronic low back pain. In "traditional" PNF (proprioceptive neuromuscular facilitation training) there are total 9 sessions allocated with each working age individual with chronic low back pain. The participation was attended each individual one-on-one intervention training session long lasting for approximately 30 minutes in three time in week with adaptations have included more or less sessions, group delivery, and telehealth delivery for working age with non-specific CLBP.The data shows experimental group of RMDQ pretest and post test scores of all 21 subjects, mean values are 12.57 and 7.62 respectively, standard deviation 2.18 and 1.32 respectively sample size 21 respectively, standard error of mean 0.48 and 0.29 respectively, 95% confidence interval 4.42 and 5.48 in respectively. The comparison between experimental group of RMDQ in pretest and post test scores of all 21 subjects, 't' value is 19.5497 'p' value is <0.0001 this difference is considered to be statistically extremely significant in respectively. The above finding supported through **Fabio Luciano, et al.** Proprioceptive neuromuscular facilitation training reduces pain and disability in individuals with chronic low back pain their effects in patients with low back pain (LBP) remain unclear. This study aimed to investigate the efficacy of PNF training for pain and disability in patients with LBP. Three comparisons were performed: PNF versus control, PNF versus core strengthening, and PNF versus conventional physical therapy. PNF training also yielded a greater benefit for pain reduction and improving disability in patients with LBP[7]. **Kumar A. et al Proprioceptive Neuromuscular Facilitation Training on Chronic Low Back Pain improving functional performance in patients with chronic low back pain** subjects were assessed on measures of trunk muscle endurance, lumbar mobility prior to and after 4- weeks of intervention. the results of the study suggest that the PNF programs are appropriate for improving trunk muscle endurance, trunk mobility, pain and functional ability in people with CLBP. Regarding the CLBP related fear of movement in working age individual with chronic low back pain assessed with the TAMPA the result showed marked improvement of both group of population[8]. **Pattanasin Areeudomwonget et -al** Proprioceptive neuromuscular facilitation (PNF) training and general trunk exercises have been applied to treat chronic low back pain (CLBP) patients. The PNF training intervention showed a statistically significantly greater reduction in pain intensity and improved functional disability with non-specific CLBP and also had statistically better parameters of static balance ability than the control group [1]

CONCLUSION

In conclusion, this study was supporting the effectiveness of the experimental intervention to managing chronic low back pain and decreasing fear of movement among participants in Group A. The significant reductions in the (RMDQ) scores and the marked improvements in Tampa scale of Kinesio phobia highlight the intervention's success in alleviating pain and fear of movement. The results indicate that Group A experienced substantial improvements. which were significantly more pronounced compared to the modest gains observed in the control group. These findings not only underscore the efficacy of the intervention but also suggest valuable implications for clinical practice, Overall, the study contributes important insights in to effective pain management strategies and underscores the need for continued research in this area, paving the way for improved clinical outcomes for patients suffering from the chronic low back pain.

LIMITATIONS

- This study carried out on particular population area of people.
- The PNF training program was relies on self-reported measures of pain-related fear of movement, which can be subjective and prone to biases.
- The study didn't have a sufficient follow-up period to assess the long-term effects of PNF training.

FUTURE RECOMMENDATIONS

- Compare the effectiveness of PNF training with other interventions (e.g., cognitive-behavioral therapy, exercise programs) for reducing pain-related fear of movement.

- This study recommended to perform different area population to identify the effectiveness PNF training among individual with CLBP.

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