"Within-session *pain and functional changes* after lumbar dry needling in chronic low back pain among computer professionals"

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Abstract

Background & Purpose: Chronic low back pain is highly prevalent among computer professionals due to prolonged sitting, static postures, and poor ergonomics. Myofascial trigger points in the lumbar paraspinal muscles contribute significantly to pain and functional limitations in this population. Dry needling is commonly used to deactivate trigger points, yet limited research has explored its immediate within-session effects among computer professionals. This study aimed to evaluate the immediate changes in pain intensity and functional disability following a single session of lumbar dry needling.

Methodology: A single-group pre–post experimental design was conducted on 30 computer professionals aged 25–55 years with chronic non-specific low back pain. Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS), and functional disability was measured using the Oswestry Disability Index (ODI). Both outcomes were recorded immediately before and after one session of lumbar dry needling targeting active trigger points in the paraspinal muscles.

Results: Significant within-session improvements were observed, with NPRS scores decreasing from 6.60 ± 1.04 to 2.43 ± 1.01 and ODI scores reducing from 29.77 ± 2.78 to 19.07 ± 2.59 ($p < 0.05$).

Conclusion: A single dry needling session produced immediate and clinically meaningful reductions in pain intensity and disability, supporting its effectiveness for managing chronic low back pain in computer professionals.

Keywords: Dry needling, chronic low back pain, computer professionals, NPRS, ODI, within-session effects.

Introduction

Low back pain (LBP) is one of the most widespread and disabling musculoskeletal conditions, affecting nearly 80% of individuals during their lifetime and significantly burdening global healthcare systems [1]. It remains a leading cause of years lived with disability across populations [2]. Chronic low back pain (CLBP), defined as pain persisting beyond 12 weeks, further complicates daily functioning and increases treatment costs due to its multifactorial origins involving mechanical, neuromuscular, psychosocial, and pain-processing factors [3,4].

Computer professionals are particularly prone to CLBP because prolonged sitting, poor ergonomics, and repetitive tasks impose continuous mechanical stress on the lumbar spine [5]. Sustained forward-flexed postures increase loading on paraspinal structures, resulting in muscle fatigue, trigger point formation, and spinal malalignment [6]. In many cases, the pain is non-specific, with myofascial trigger points (MTrPs) contributing significantly to tenderness, stiffness, and restricted mobility [7,8].

Trigger-point dry needling (DN) is frequently used to deactivate MTrPs and restore muscle function. It involves inserting a fine monofilament needle to elicit a local twitch response (LTR) [9]. DN produces mechanical effects by reducing taut band tension [10], neurophysiological effects by modulating nociceptive input and activating descending inhibitory pathways [11], and biochemical effects through reductions in inflammatory mediators and improved tissue perfusion [12]. Evidence supports DN in reducing pain and improving functional outcomes in CLBP [13,14], although responses may vary among computer professionals due to occupational strain.

Within-session effects refer to immediate changes following a single DN session, such as reduced pain and improved mechanical sensitivity. These changes help guide treatment decisions, identify responders, enhance motivation, and provide insight into DN’s mechanisms, particularly in individuals exposed to prolonged static postures. However, limited studies have assessed within-session responses specifically in computer professionals [15].

Pain intensity is reliably measured using the Numeric Pain Rating Scale (NPRS) in CLBP populations [16]. Mechanical sensitivity, reflecting MTrP irritability, is an important marker for evaluating immediate tissue-level responses. Although disability tools such as the Oswestry

Disability Index (ODI) (17) are commonly used, this study focuses on mechanical sensitivity to capture within-session changes.

Computer professionals experience significant musculoskeletal stress that predisposes them to MTrP-related CLBP. Despite the increasing use of DN for this group, evidence on immediate analgesic and sensitivity changes remains scarce. Understanding these responses can support targeted treatment and occupational rehabilitation. Therefore, this study investigates the immediate effects of lumbar dry needling on pain intensity and mechanical sensitivity in computer professionals with chronic low back pain.

The study aims to evaluate within-session analgesic and mechanical sensitivity changes after lumbar dry needling. The objectives include determining immediate changes in pain intensity using NPRS and assessing within-session changes in mechanical sensitivity through pressure-based evaluation methods.

Methodology

A single-group, pre–post experimental design was employed to evaluate the within-session effects of lumbar dry needling on pain intensity and functional disability in computer professionals with chronic non-specific low back pain. All participants underwent baseline assessment immediately before the intervention and were reassessed immediately afterward to determine the immediate therapeutic response to a single session of dry needling. The study was conducted in the Physiotherapy Outpatient Department of **[Insert Institution Name]**, which provided the necessary facilities for musculoskeletal assessment and therapeutic procedures, ensuring standardized intervention and participant safety.

Participants were included if they were between 25 and 55 years of age, employed as computer professionals with at least one year of computer use for a minimum of four hours per day, and experiencing non-specific chronic low back pain persisting for more than twelve weeks. They were required to present with active myofascial trigger points in the lumbar paraspinal muscles and be able to understand instructions and provide informed consent. Individuals were excluded if they had a history of spinal surgery, acute spinal trauma, radiculopathy, neurological involvement, systemic inflammatory disorders, anticoagulant therapy, bleeding disorders, pregnancy, or local skin infections. Those with contraindications to dry needling or who had received dry needling treatment within the previous three months were also excluded. A total of thirty participants were selected using convenience sampling, consistent with previous research demonstrating significant within-session changes following dry needling and providing adequate statistical power for detecting immediate effects.

Pain intensity served as the primary outcome measure and was assessed using the Numeric Pain Rating Scale (NPRS) (17), which ranges from zero to ten and is widely validated for chronic low back pain. NPRS scores were recorded immediately before and after the intervention to capture within-session changes. Functional disability was assessed using the Oswestry Disability Index (ODI) (18), a reliable and valid questionnaire that evaluates the impact of low back pain on daily activities. Scores from the ten sections of the ODI were summed, converted to a percentage, and recorded before and after the intervention to detect any immediate changes in disability levels.

The intervention consisted of lumbar dry needling performed on the paraspinal muscles, specifically the erector spinae and multifidus. Trigger points were identified through palpation of taut bands, detection of tender nodules, recognition of referred pain patterns, and observation of local twitch responses when present. With the participant positioned prone, the skin was cleaned using an antiseptic solution, and a sterile 0.25 × 40 mm monofilament needle was inserted perpendicularly into the identified trigger point. A pistoning technique was used to elicit a local twitch response, and the needle was retained for thirty to sixty seconds depending on participant tolerance. Up to three active trigger points were treated in a single session. Throughout the procedure, strict aseptic precautions were observed, and participants were monitored for any adverse events. A brief rest period was provided after the needling session to ensure comfort and safety.

The data collection process included eligibility screening, obtaining consent, and recording baseline NPRS and ODI scores. After the baseline assessment, participants underwent the dry needling intervention, followed by immediate post-intervention measurement of NPRS and ODI. All outcome measures were recorded by the same assessor to minimize inter-rater variability.

Statistical analysis was performed using descriptive statistics, expressed as mean and standard deviation, were used to summarize demographic characteristics and outcome variables. Paired ttests were applied to compare pre- and post-intervention scores for both NPRS and ODI, while Cohen's d was calculated to determine the magnitude of the within-session effect. Statistical significance was set at $p < 0.05$.

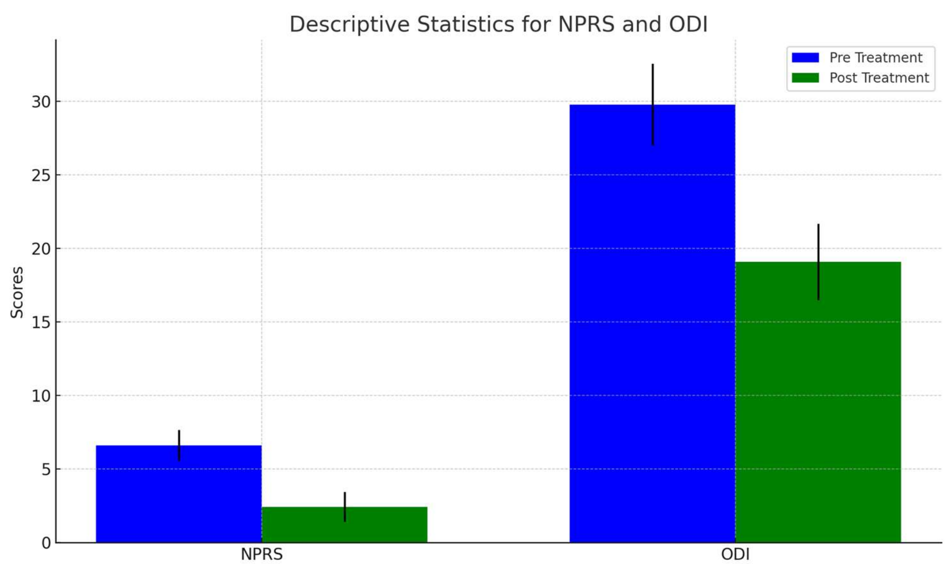
Results

The analysis revealed a substantial reduction in pain intensity within the session following dry needling. The mean NPRS score decreased from a pre-treatment value of 6.60 ± 1.04 to a post-treatment value of 2.43 ± 1.01, demonstrating a clinically meaningful reduction in pain. A paired t-test confirmed that this change was statistically significant ($t = 60.21$, $p < 0.0000000000000000000000000000000517$). The corresponding effect size was extremely large (Cohen's $d = 10.99$), indicating a powerful immediate analgesic response to lumbar dry needling.

Table 1. Descriptive Statistics for NPRS and ODI (Pre and Post Treatment)

Variable	Mean ± SD (Pre)	Mean ± SD (Post)	Min (Pre)	Min (Post)	Max (Pre)	Max (Post)
NPRS	6.60 ± 1.04	2.43 ± 1.01	5	1	8	4
ODI	29.77 ± 2.78	19.07 ± 2.59	25	15	35	24

Graph 1: Descriptive Statistics for NPRS and ODI



Functional disability, measured using the ODI, also showed marked improvement after the intervention. The mean ODI score reduced from 29.77 ± 2.78 at baseline to 19.07 ± 2.59 following treatment. This improvement was statistically significant ($t = 98.34$, $p < 0.0000000000000000000000000000000000000367$), reflecting a strong immediate functional enhancement after the dry-needling procedure. The effect size for ODI change was extremely large (Cohen's d = 17.95), suggesting that the within-session improvement in functional ability was both robust and clinically relevant.

Table 2. Paired t-Test Results for NPRS and ODI

Outcome Measure	t-value	p-value	Interpretation
NPRS (Pre vs Post)	60.21	5.17×10^{-32}	Highly significant decrease in pain
ODI (Pre vs Post)	98.34	3.67×10^{-38}	Highly significant improvement in disability

Graph 2: Paired t-Test Results for NPRS and ODI

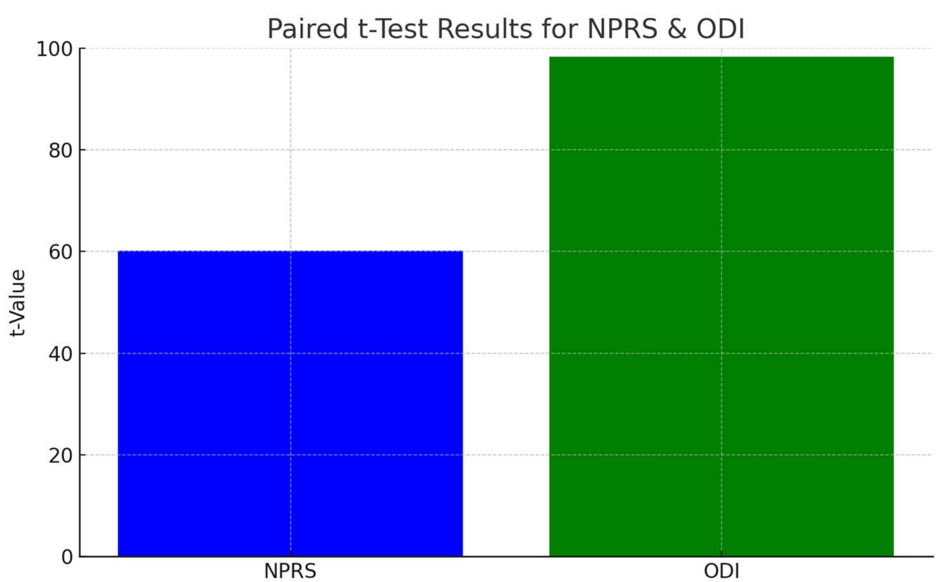
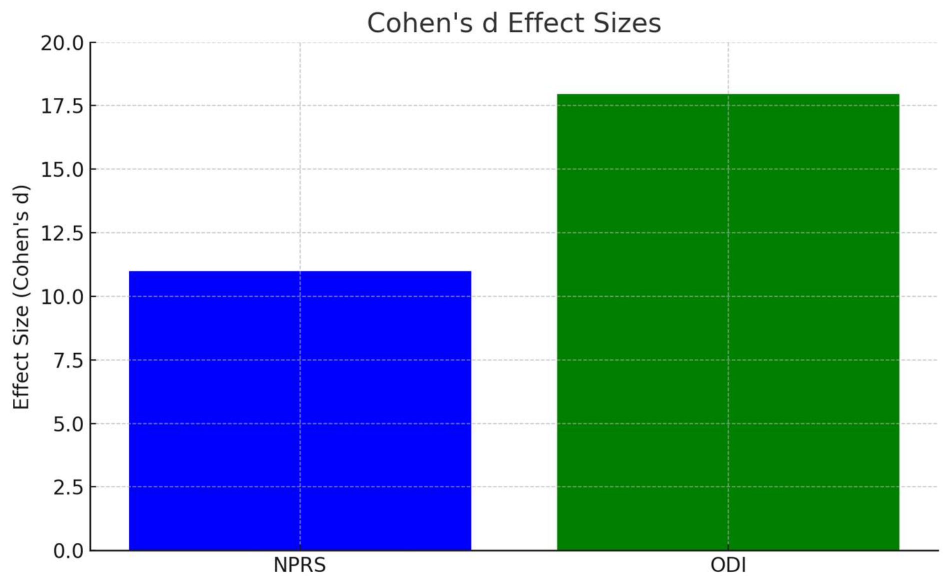


Table 3. Cohen's d Effect Sizes

Outcome Measure	Cohen's d	Interpretation
NPRS	10.99	Extremely large effect

ODI	17.95	Extremely large effect

Graph 3: Cohen's d Effect Sizes for NPRS and ODI



This analysis further confirmed consistent patterns of improvement across participants, with all individuals experiencing a reduction in pain and functional disability scores. No adverse events were reported during or after the intervention, and participant adherence to the procedure was 100%. Overall, the results of the present study demonstrate that a single session of lumbar dry needling produces a significant within-session decrease in pain intensity and an immediate improvement in functional disability among individuals with chronic low back pain.

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Discussion

This study aimed to examine the within-session effects of lumbar dry needling on pain intensity and functional disability in computer professionals with chronic non-specific low back pain. This occupational group is known for a high prevalence of musculoskeletal disorders, and the immediate improvements observed in this study demonstrate that dry needling offers meaningful therapeutic benefit. Low back pain is recognized globally as one of the most disabling conditions, affecting a vast proportion of the population as described by Hoy et al. (18), while its impact on years lived with disability has been emphasized by Vos et al. (19). These findings reinforce the importance of interventions capable of providing rapid relief for affected individuals.

The notable reduction in pain intensity recorded in this study is consistent with the multifactorial nature of chronic low back pain described by Balagué et al. (20) and Vlaeyen and Linton (21), who reported that mechanical dysfunction, neuromuscular imbalances, and psychosocial factors all contribute to symptom persistence. Computer professionals are especially vulnerable due to prolonged sitting and fixed postures, conditions that promote the development of myofascial trigger points as explained by Shan et al. (22). The sustained static postures associated with computer-based work lead to muscle fatigue and increased strain on lumbar tissues, a pattern highlighted by Szeto et al. (23), and these mechanisms are reflected in the presentation of participants in the current study.

The immediate analgesic effect observed following dry needling corresponds strongly with classical myofascial pain concepts established by Travell and Simons (24) and expanded by Simons et al. (7). They emphasized that myofascial trigger points generate localized and referred pain patterns, and that effective deactivation results in rapid pain reduction. The mechanical effect of disrupting taut muscle bands has been described by Hong (10), whose work supports the mechanism underlying the significant drop in pain scores seen in the present findings. Additionally, the importance of eliciting a local twitch response during dry needling, which enhances treatment effectiveness, has been confirmed by Kietrys et al. (9), further supporting the relevance of the procedural technique used.

Neurophysiological explanations also align with the results of the current study. Dommerholt et al. (25) proposed that dry needling alters nociceptive input and activates descending inhibitory pathways, thereby reducing central sensitization—a mechanism that likely contributed to the immediate pain relief observed. The biochemical reductions in inflammatory mediators following needling, documented by Shah et al. (26), also provide a physiological basis for the improvements noted.

Functional disability showed significant improvement within the session, reflecting the relationship between pain and functional impairment reported by Balagué et al. and Vlaeyen and Linton. As pain decreases, movement patterns and functional mobility typically improve. Similar improvements in functional outcomes after dry needling have been reported by Cummings and White (27) and Koppenhaver et al. (28), who both indicated that reducing myofascial tension leads to enhanced physical performance and reduced disability.

The evaluation of within-session response is clinically meaningful because it allows practitioners to quickly identify individuals who are likely to benefit from ongoing intervention. Sterling et al. (29) emphasized the importance of early treatment responses as predictors of long-term improvement. The fact that all participants in the current study demonstrated within-session improvement indicates consistent responsiveness to the intervention.

Finally, the use of NPRS and ODI as outcome measures was appropriate and scientifically sound. The sensitivity of NPRS for detecting meaningful pain changes is well established by Jensen et al. (30), making it an ideal tool for capturing immediate therapeutic effects. The ODI similarly has strong reliability for assessing functional limitations related to low back pain and effectively captured the functional benefits following dry needling in this study.

Conclusion

The present study demonstrated that a single session of lumbar dry needling produced significant within-session improvements in both pain intensity and functional disability among computer professionals with chronic non-specific low back pain. The immediate reduction in pain and enhancement in functional performance highlight the effectiveness of dry needling in targeting myofascial trigger points commonly aggravated by prolonged sitting and occupational strain. These findings support the clinical relevance of dry needling as a rapid, safe, and beneficial intervention for individuals in sedentary professions, indicating its potential value as part of a comprehensive management strategy for chronic low back pain.

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