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Effect of Verbal Instructions in Pain Assessment during a Passive Straight Leg Raise Test in People with Chronic Low Back Pain

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Abstract

The most prevalent issue in physical therapy is pain. Due to the subjective nature of pain, assessment tools are essential in understanding it as objective data. However, assessment of pain may result in distress for the patient. A physical therapist (PT) should conduct these tests as quickly and accurately as possible. Straightforward instructions are vital in such cases. This study aimed to clarify the effect of verbal instructions for pain assessment during a passive straight leg raise (PSLR) test for participants with chronic low back pain (CLBP). This study included 22 participants who provided informed consent and received three consecutive PSLR tests with measurement of the hip flexion range of motion (HFROM) and were instructed to cease the test at submaximal pain before the first test. Following the second and third tests, participants were given specific verbal instructions to remember pain intensity, quality, and location. After each test, participants were to circle the pain location on the body chart and rate their pain intensity on a numeric rating scale (NRS) and pain quality. All participants were then interviewed about the differences between having and not having specific verbal instructions. The results of HFROM, NRS, and pain extent were not significantly different between the first and second tests or between the second and third tests using a paired t-test. Eleven changes in pain location were found in the second test compared to those in the first test. In the third test, only three participants circled a different area than in the second test. Ten participants showed similar changes with pain location in pain quality in the three PSLR tests. This study revealed the effect of specific verbal instructions prior to PSLR tests. Particularly, participants could notice exact pain location. Our findings may help PT to understand pain cause and reduce patients' stress during pain assessment in clinical settings.

Keywords

Chronic Low Back Pain, Pain Assessment, Passive Straight Leg Raise Test, Verbal Instructions

1. Introduction

A comprehensive survey of living conditions conducted in 2019 by the Ministry of Health, Labour and Welfare in Japan reported that the most frequent subjective symptoms were lower back pain, shoulder stiffness, and joint pain in the hands and feet [1]. This result explains the reason for pain as the most common complaint by patients attending physical therapy in a clinical setting [2] [3] [4].

Since pain is subjective and invisible [5], objective and visual assessment tools, such as range of motion (ROM), numeric rating scale (NRS), visual analog scale, and pain drawing (PD) [6], are required to understand symptoms and confirm treatment results.

Pain assessment may cause distress to patients. Therefore, physical therapists (PTs) should conduct these tests as quickly and accurately as possible, which generally requires clear and simple instructions [7]. While these verbal instructions are well known among PTs, there is little evidence regarding their importance.

A previous study demonstrated the effect of verbal instructions on pain assessment during three consecutive passive straight leg raise (PSLR) tests in healthy participants [8]. Participants were given verbal instruction to cease the test at submaximal pain in the first test. During the second and third tests, they were given specific verbal instructions to remember pain intensity, quality, and location during the PSLR tests. Although hip flexion ROM (HFROM) and pain intensity did not show a statistically significant change, a variation in the pain location was observed in more than half of the participants. This study demonstrated that some pain assessment items were altered, with specific verbal instructions, even in healthy people. The importance of communication was suggested in a previous study to understand accurately patient complaints [9]. And the article reported that the physician's question concerning pain may have effect on a patient's perspective of pain [10]. Therefore, verbal instructions also may have a vital role in pain assessment. Chronic low back pain (CLBP) is common, and PTs should understand their pain cause and find an optimal treatment. Thus, this study aimed to examine the effect of specific verbal instructions in pain assessment using the PSLR test in people with CLBP.

2. Methods

For this cross-sectional study, we recruited 22 participants (14 men and 8 women; mean age, 37.5 ± 6.8 years; mean height, 168.3 ± 6.8 cm; and mean weight, 66.3 ± 15.9 kg). Calculated with effect size d = 0.80, α error = 0.05, β error = 0.80, the number of participants was 15. Considering the possible dropout, we recruited 22 participants. The inclusion criteria were age 20 - 50 years and a history of low back pain (LBP) for at least 3 months and had been experiencing leg pain or discomfort since they had LBP. The presence or absence of leg symptom was irrelevant on the day of experiment. The exclusion criteria were the presence of any of the following: a history of back or lower limb surgery, history of neurological disorders, acute musculoskeletal injury, or more severe LBP than usual on the day of the experiment. On the day of experiment, participants without leg pain and participants who did not identify the symptomatic leg had PSLR test conducted on the right leg. If participants had pain in their left leg, we did PSLR test on the left side. In this case, we confirmed the pain was not more severe on that day.

Ethical approval was granted by the Ethics Committee of the Kanazawa Orthopedic Sports Medical Clinic (registration number: Kanazawa-OSMC-2020-002). All participants provided signed consent after receiving an explanation of this research and understood that the PSLR test induced pain. We conducted the data collection at Biwako Professional University of Rehabilitation in March 2022.

2.1. Procedure

Three consecutive PSLR tests were conducted as follows: a first test (without specific verbal instructions), second test (with specific verbal instructions), and third test (with the same specific verbal instructions). Participants were asked to identify the point of submaximal pain, defined as "the moment the pain or symptom increases and you want to cease the test" [11] [12]. This was a common verbal instruction given during the three tests. Before the first test, participants were given only this verbal instruction. For the second and third tests, participants were given additional specific verbal instructions on what they should remember: pain intensity, quality, and location. Immediately after each test, participants completed PD for pain location and described the pain intensity and quality. After the second test, participants were interviewed about what they felt different when conducting the tests with and without specific verbal instructions.

2.2. Data Collection

Participants laid on the plinth in a supine position with their arms resting on their abdomen. If necessary, a towel was placed under their heads to maintain the cervical spine in a neutral position. The rater positioned the ankle in maximal dorsiflexion, held the knee joint in extension and the hip joint in a neutral position, and then slowly raised the leg [13]. The degree of HFROM was measured when the participants asked the rater to cease the test, using a magnetic three-dimensional position measuring device (LIBERTY; Polhemus, USA) placed 15 cm above the patella. Pain assessment was conducted immediately after the

PSLR test.

For PD, participants highlighted the pain location as accurately as possible using a circle on the back view of the body chart. The NRS was used for measuring pain intensity, and pain quality was expressed freely. If participants experienced pain in multiple locations, these areas would be circled, and the pain intensity and quality described.

The body chart was classified into five areas: buttock, thigh, popliteus, lower thigh, and ankle to express changes in pain location. Multiple marked areas were classified into larger associated areas. The NRS accompanied with the classified area was used to analyze. Regarding analyze of pain quality, all expressed quality were summarized in each test and participants.

Pain location was also quantified as pain extent (PE). The pixels of the front and back view of the body chart were measured using the Image J Freehand function (Version 1.47, National Institutions of Health, USA), and the pixels for the entire surface of the body chart were summed. The pixel of pain location was measured using the same method, and the percentage of the whole surface was calculated and defined as PE. The participant's reports during the interview were classified using three keywords: pain intensity, quality, and location.

2.3. Statistical Analysis

All statistical analyses were performed using SPSS (version 21.0, IBM, U.S.A). A paired t-test was used to analyze the differences in HFROM, PE, and NRS between the first and second tests to examine the effect of being given specific verbal instructions. In contrast, the differences between the second and third tests were used to confirm the effect of the same verbal instructions. The level of significance was set at $p < 0.05$.

The intraclass correlation coefficient (ICC) was used to measure the intra-rater reliability of ROM and PE between the first and second tests and the second and third tests. The results of ICC were judged according to the guidelines set by Koo *et al.* [14].

3. Results

After three consecutive PSLR tests, none of the participants had any remaining symptoms. The ICC ranged from moderate to excellent for ROM and good to moderate for PE. **Table 1** shows the mean values of ROM, PE, and NRS. There were no significant differences between the first and second tests or between the second and third tests. Even so, various changes were found in PD. Eleven participants marked different pain locations on the second test than those in the first one. However, comparing the third test with the second one, only three participants marked different pain locations (**Figure 1**). In the third test, several participants localized their pain location in the same area as that in the second. For instance, a participant who marked the whole lower leg area circled the lateral lower leg area in the third test (**Figure 2**).

Table 1. Mean and p values of ROM, PE, and NRS.

					(n = 22)
		mean ± SD		p value	
test	1st	2nd	3rd	1st-2nd	2nd-3rd
ROM (˚)	42.3 ± 14.0	46.4 ± 15.5	47.6 ± 15.6	0.07	0.35
PE (%)	1.52 ± 1.32	1.19 ± 0.87	1.17 ± 0.84	0.08	0.84
NRS	6.1 ± 1.9	6.2 ± 2.0	6.2 ± 1.9	0.85	0.77

SD: Standard Deviation.

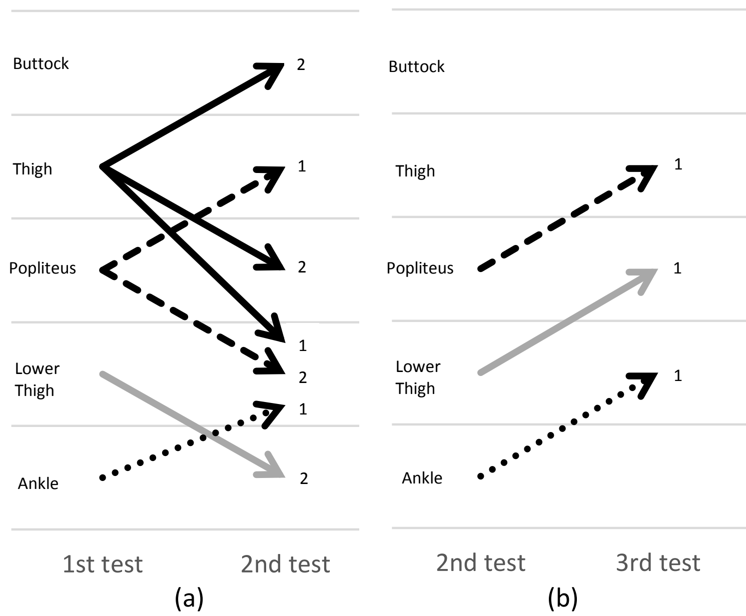

Figure 1. Changes in pain location.

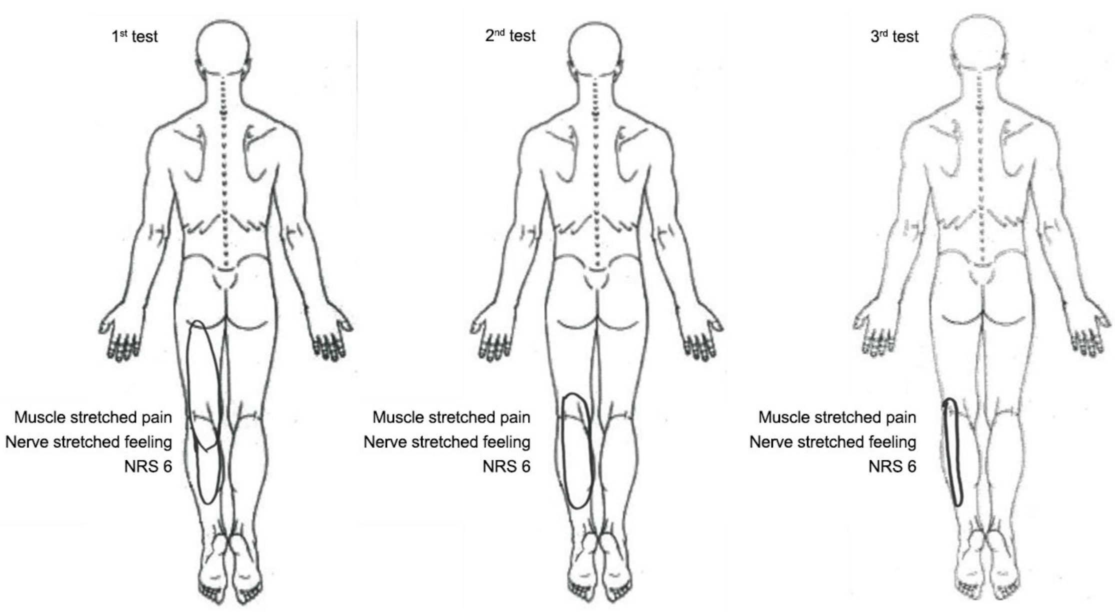

Figure 2. Changes in the localization of pain. A participant circled the localized area within the same area after the specific verbal instruction, in the second and third tests.

During the three consecutive PSLR tests, nine participants responded with the same pain quality, and three participants described a different type of quality in each PSLR test. In contrast, ten participants showed variable changes in the second test, including added or changed expressions of pain quality. And two in the ten participants added different pain quality in the third test.

The keywords from the interviews asked for the differences experienced with or without specific verbal instructions and were categorized according to pain intensity, quality, and location. Thirteen participants described the pain location as "it was ambiguous, but it became clear," and "could concentrate on where the exact pain location was." Five participants also reported that the pain intensity became clearer. Several participants answered that they could narrow down the area of pain and that it was easier to respond to PD or whole pain assessment.

4. Discussion

This study examined the effect of verbal instructions for pain assessment during the PSLR test in people with CLBP. We used HFROM, NRS, PD, and pain quality for pain assessment. The results did not significantly differ in comparing the tests where patients were provided with and without specific verbal instructions. In contrast, pain location and pain quality showed variable changes. These results are supported by those of a previous study that examined healthy participants [8].

After receiving specific verbal instructions, eleven changes in pain location were found in the second test compared to that in the first. While comparing the third test with the second test, only three participants showed changes in pain location. In addition, several participants could localize their pain. This was reflected in the 13 participants who responded with "pain location became clear" in the interview. PE did not show a significant difference after giving the specific verbal instructions. Although PE is useful for quantifying pain distribution and correlation to pain intensity [15], Margolis *et al.* (1998) investigated the test-retest reliability of PDs and suggested that the same PE did not mean the same pain area [16]. Thus, not only PE, but also pain location should be confirmed to find the problematic tissues in pain assessment. The specific verbal instruction would help patients to find the exact pain location.

Nine participants responded with the same number and pain quality in the three PSLR tests. The rest showed an increase or decrease in the number and pain quality after receiving specific verbal instructions. A few participants reported the pain in more detail in the second and third tests. Descriptions of pain quality also help in identifying a physiological pain mechanism [17] [18]. Peripheral neuropathic pain has typical descriptions such as burning or shooting [18]. Specific verbal instructions may aid in understanding the source of the pain and help assess the degree of severity and irritability of the patient. This detailed information would help PTs determine the priority of physical examination and treatment in clinical settings. We found a tendency that nerve-related pain or numbness had higher NRS than muscle stretched feeling while analyzing pain quality. Therefore, pain quality should be asked in combination with pain intensity [6].

HFROM remained unaffected by specific verbal instructions, which suggests that participants could consistently identify their submaximal pain during each PSLR test, regardless of being given instructions. However, two participants showed an increase of over 20˚ between the first and second tests. HFROM was stable in the second and third tests. It was assumed that participants who were afraid of experiencing pain would cease the PSLR test earlier in the first test than in the subsequent ones. Other possible causes include the specific verbal instructions that participants were required to focus on or learning effect of identifying the point of submaximal pain. The exact reason remains unclear and will be explored in a future study.

The PSLR test is used by doctors as a neurodynamic test to assess the presence or degree of neurological dysfunction in people with LBP. In the current study, we were able to elicit detailed information, particularly the pain location—a trait that cannot be expressed with numeric values—from patients with CLBP by giving specific verbal instructions before conducting the PSLR test. Therefore, not only may a positive/negative neurological symptom be diagnosed, but a single PSLR test with specific verbal instructions can help gather useful information for pain assessment. Detailed information assists PTs in understanding pain pathology and providing appropriate treatment and pain management [6] [19]. Our findings may contribute to faster and more precise pain assessment, reducing patients' distress in clinical settings.

Limitations and Future Directions

Participants in the current study expressed their pain quality freely, and a few used onomatopoeias, making the sensation they felt challenging to categorize. Since the measurement of pain quality is based on verbal descriptions [20], the McGill questionnaire or presenting choices of pain qualities is recommended to standardize and understand the source of the discomfort felt.

Regarding PD, we divided pain locations into five areas to analyze the results. Consequently, some variables were excluded, such as the presence of a small new pain location or narrowing within the same area. Therefore, the grid body chart by Margolis or digital body chart [21] may be easier to assess.

Since CLBP patients may have also been affected by psychosocial factors [22], questionnaires are necessary for appropriate pain assessment in both clinical and research settings.

Furthermore, the limited sample size did not allow for generalization. We would recruit a larger population and examine the differences in the effect of specific verbal instructions in pain assessment among each variable: type of LBP or psychosocial factors.

To gain further evidence regarding specific verbal instructions in pain assessment, confirm the contribution of the learning effect in the future study.

5. Conclusion

This study determined the influence of verbal instructions on pain assessment during a PSLR test in patients with CLBP. Assessment tools that expressed objective numeric values, HFROM, NRS, and PE, did not show a significant change. However, pain location variations and quality were found after they were given specific verbal instructions. Therefore, specific verbal instructions before conducting the PSLR test may lead to quick and appropriate/useful pain evaluation to better understand patients.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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