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RESEARCH ARTICLE

Assessment of physiotherapists' sensitivity to palpation pressure

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ABSTRACT

Aim: This study was planned to investigate the pressure sensitivity applied by physiotherapists during palpation and the effect of their experience on palpation sensitivity.

Methods: 62 physiotherapists with an age of 31.06 ± 5.29 years and a working experience of 6.88 ± 4.76 years were included in the study. The physiotherapists were divided into two groups: those working in the field of manual therapy and those not working. The participants were asked to apply pressure on an electronic scale with four different weights (500 gr, 1000 gr, 2000 gr, and 4000 gr, respectively). The display screen of the scale on which the measurement was made was blinded to the physiotherapists. After the first measurements, a short training was given and the same measurements were repeated randomly.

Results: In the first evaluation made before the training, it was found that there was a statistical difference between the two groups in the application of 500 grams of pressure ($p=0.003$). However, no significant difference was found between the two groups in the measurements made after the training ($p>0.05$). It was observed that the level of professional experience did not significantly affect pressure sensitivity ($p>0.05$).

Conclusion: This study demonstrates that manual therapy physiotherapists had increased palpation sensitivity when using smaller weights. It is therefore advised that physiotherapists undergo training to enhance their palpation sensitivity, as this is an effective diagnostic and therapeutic technique.

Keywords: Physiotherapists, palpation pressure, manual therapy, training, sensitivity

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INTRODUCTION

One of the best diagnostic and treatment tools for physiotherapists working in musculoskeletal rehabilitation is the hands (1). Manual physiotherapy techniques applied by hand in the treatment of musculoskeletal problems are muscle energy techniques, myofascial release techniques, joint mobilization, and manipulation techniques. Although there are different concepts, the umbrella term used for approaches that include these techniques is manual therapy (2). The amount of pressure applied during palpation is very important for effective manual therapy. Palpation skills are critical both in the accurate diagnosis and treatment of somatic dysfunction (3,4). The pressure applied during palpation should be low enough not to cause complaints in the patient and sufficient to produce therapeutic effects (5). Palpation skills can be improved with intensive practice and training (6,7).

The success of joint mobilization, muscle relaxation, and trigger point release techniques depends on the physiotherapist's accuracy in assessing tissue resistance (8). Physiotherapists must be able to accurately assess the elasticity of the tissue they are interested in and pathological changes in the tone of this tissue using palpation skills (3,9). It has been shown that effective and accurate palpation helps in making a diagnosis and as a result, the quality of the therapeutic intervention increases (8). Myburgh et al. (10) stated that appropriate pressure and application skills are influenced by many factors such as the therapist's expertise, experience and training. Iwata et al. (11) and Snodgrass et al. (12) emphasized that continuous feedback and practice are essential to ensure accuracy in palpation pressure in training programs to improve palpation skills. Aasa et al. (13) and Mora-Relucio et al. (14) also showed in their study that physiotherapists with manual therapy experience had different palpation skills compared to those without. They also emphasized the importance of specialization in the field.

The use of proven palpation skills as a therapeutic and diagnostic tool is essential in the management of musculoskeletal disorders (15). Ineffective palpation leads to misdiagnosis of dysfunction, which highlights the importance for physiotherapists to acquire high proficiency in palpation skills (16). Jaeger (17) stated that the pressure between 2-4 kilograms is effective in relaxing trigger points and that the pressure in this range has good therapeutic effects. It has been emphasized in many previous studies that finding an appropriate pressure in trigger point treatment is important in terms of treatment efficacy. The same researchers stated that continuous pressure between 2-4 kg not only relaxes the trigger point but also reduces pain. Wytrazek et al. (18) and Fischer (19) have reported that approximately 3 kilograms of pressure produced effective improvement in the treatment of myofascial pain problems in the musculoskeletal system.

Although it is accepted that correct palpation is important, there is limited research examining the amount of pressure applied by physiotherapists in clinical practice and evaluating whether the pressure applied in the clinic is adequate. The lack of detailed access to data obtained from studies poses an obstacle to the development of standard training protocols and assessment tools. Additionally, due to the lack of a standard in techniques used during pressure application among physiotherapists with different levels of experience and expertise, more comprehensive research is needed in this area (20). The aim of our study was to measure physiotherapists' sensitivity to pressure during palpation, and in addition to this, to assess their ability to apply pressure levels consistently and accurately in controllable situations. Another aim of our study was to determine the pressure application skills and sensitivities of physiotherapists with different experience and expertise levels.

MATERIALS AND METHOD

Participants

The relevant study was given ethical approval by the Bolu Abant İzzet Baysal University Ethics Committee on 22.11.2022 (Decision No: 2022/305) and written consent was obtained from all participants in the study.

The power analysis of the sample size was performed using GPower 3.1 program. This situation is consistent with the report submitted to the ethics committee.

Kamp et al. (21) published in 2019, it was concluded that it was appropriate to include at least 25 physiotherapists in each group with 80% power and 5% margin of error. Our study results meet the power value calculated by including a total of 62 therapists in the study by including the number of missing errors. A total of 62 physiotherapists actively practicing physiotherapy participated in the study. Participants were divided into two groups according to their specialization: manual therapy group (n=31) and non-manual techniques (neurodevelopmental therapy) group (n=31) (Table 1). Further statistical stratification was applied according to years of professional experience and participants were divided into 3 groups. These groups can be expressed as 0-5 years (24 participants), 6-10 years (23 participants), 11-20 years (n=15) (Table 2). Therapists with neurologic conditions such as carpal tunnel syndrome, cervical myelopathy, pronator teres syndrome, which may have a negative impact on palpation skills were excluded.

Equipment and procedure

In the study, an electronic scale with a sensitivity of ±1 gram was used to measure the pressure applied by physiotherapists with their hands. Each participant was asked to apply 500 grams, 1000 grams, 2000 grams, and 4000 grams of pressure 3 times respectively. The values obtained from the measurements were recorded and the arithmetic averages of these measurements were calculated. During the measurements, the screen of the scale was positioned so that it could be seen by the evaluator but not by the physiotherapist applying the pressure. After completing the first set of measurements, participants were allowed to practice independently with the electronic balance for up to 5 minutes to familiarize themselves with the equipment and improve their technique. After this practice period, the display of the balance was turned off as mentioned before and the measurements were repeated. In the final measurements (as a repetition of the initial application), the participants were asked to apply 500 grams, 1000 grams, 2000 grams, and 4000 grams of pressure in a random order 3 times each.

Table 1. Demographic Data Table by Therapeutic Method

	Non-Manual Therapy	Manual therapy	Total	P value
N	31	31	62	
Age	32.10 ± 5.52	30.03 ± 4.93	31.06 ± 5.29	0.125
Height	174.39 ± 9.10	169.13 ± 8.11	171.76 ± 8.95	**0.019**
Weight	78.32 ± 17.35	67.00 ± 13.67	72.66 ± 16.51	**0.006**
Total years of experience	8.19 ± 5.30	5.57 ± 3.81	6.88 ± 4.76	**0.030**
Active professional years	7.68 ± 5.26	5.03 ± 3.94	6.35 ± 4.80	**0.029**
Active weekly working day	5.39 ± 0.60	5.35 ± 0.80	5.37 ± 0.70	0.825

Table 2. Demographic Data Table by Years of Experience

	0-5	6-10	11-20	Total
N	24	23	15	62
Age	26.46 ± 3.09	31.57 ± 2.56	37.67 ± 3.56	31.06 ± 5.29
Height	171.50 ± 7.96	171.57 ± 9.13	172.47 ± 10.65	171.76 ± 8.95
Weight	68.42 ± 12.44	72.13 ± 15.13	80.27 ± 21.90	72.66 ± 16.51
Total years of experience	2.53 ± 1.26	7.00 ± 1.38	13.67 ± 3.39	6.88 ± 4.76
Active professional years	1.95 ± 1.24	6.43 ± 1.16	13.27 ± 3.37	6.35 ± 4.80
Active weekly working day	5.46 ± 0.59	5.35 ± 0.83	5.27 ± 0.68	5.37 ± 0.70

Data analysis

Data were analyzed with the licensed SPSS-25 program (IBM Corporation, Armonk, NY, USA). Histograms and Kolmogorov-Smirnov Test were used to assess the normality of the data distribution. Depending on the normality of the data, an independent sample T test or Mann-Whitney U test was used to compare the mean pressure application between groups. ANOVA test was used to examine the relationship between "years of experience" and "pressure application accuracy".

Validity and reliability

The validity of the palpation pressures applied by the therapists (internal consistency) was assessed by comparing the consistency of measurements across trials. Studies have shown that effective deactivation of trigger points can usually be achieved with continuous pressure of about 2 to 4 kilograms (17-19). Therefore, the ability to apply these pressures correctly is crucial for therapeutic efficacy. The reliability of the measurements was assessed by calculating intraclass correlation coefficients for repeated trials.

RESULTS

Independent sample T-test was used to analyze the pressure application between physiotherapists with manual therapy expertise and physiotherapists from another specialty (Table 3). The primary measurements yielded the following results: 500 grams (p=0.003), 1000 grams (p=0.898), 2000 grams (p=0.134) and 4000 grams (p=0.333). After a short training, the results of the statistical analysis were measured at

Table 3. Pressure Sensitivity Table by Years of Experience

		0-5	6-10	11-20	Total	P value
		n=24	n=23	n=15	n=62	
Pre-Study	500 gr	862.92 ± 1001.23	858.04 ± 902.24	954.64 ± 1572.17	883.30 ± 1113.78	p = 0.961
	1000 gr	1981.00 ± 2382.69	1573.80 ± 1663.34	990.69 ± 1218.96	1590.35 ± 1904.73	p = 0.291
	2000 gr	2090.14 ± 2296.60	2055.04 ± 2302.76	1130.69 ± 1303.45	1844.99 ± 2111.12	p = 0.327
	4000 gr	2269.89 ± 1706.79	2414.28 ± 1848.86	1700.62 ± 1523.87	2185.73 ± 1715.96	p = 0.442
After Study	500 gr	483.75 ± 660.70	529.55 ± 520.33	376.96 ± 295.56	474.90 ± 534.61	p = 0.694
	1000 gr	628.51 ± 782.92	740.13 ± 791.13	355.62 ± 333.40	603.90 ± 710.46	p = 0.262
	2000 gr	688.29 ± 491.84	694.58 ± 697.64	660.29 ± 390.60	683.85 ± 549.49	p = 0.982
	4000 gr	1083.28 ± 996.59	1102.58 ± 1121.01	1078.20 ± 738.60	1089.21 ± 976.23	p = 0.997

Table 4. Pressure Sensitivity Table by Therapeutic Method

		Non-Manual Therapy	Manual therapy	Total	P value
		n=31	n=31	n=62	
Pre-Study	500 gr	1208.51 ± 1399.38	558.10 ± 587.82	883.30 ± 1113.78	p = 0.003
	1000 gr	1747.10 ± 1853.33	1433.60 ± 1972.64	1590.35 ± 1904.73	p = 0.898
	2000 gr	2123.17 ± 2314.62	1566.82 ± 1882.76	1844.99 ± 2111.12	p = 0.134
	4000 gr	2448.96 ± 1836.54	1922.49 ± 1571.98	2185.73 ± 1715.96	p = 0.333
After Study	500 gr	542.43 ± 655.22	407.38 ± 377.36	474.90 ± 534.61	p = 0.082
	1000 gr	513.91 ± 678.08	693.88 ± 741.49	603.90 ± 710.46	p = 0.424
	2000 gr	649.97 ± 404.20	717.73 ± 669.48	683.85 ± 549.49	p = 0.231
	4000 gr	1090.71 ± 800.21	1087.71 ± 1139.07	1089.21 ± 976.23	p = 0.315

500 grams (p=0.082), 1000 grams (p=0.424), 2000 grams (p=0.231) and 4000 grams (p=0.315). These findings showed that there was a significant difference between the group with and without manual therapy expertise only in the 500 gram analysis before the training session (Table 4).

According to the ANOVA test results, it was reported that there was no significant difference between the different levels of experience (0-5, 6-10 and 11-20 years). P-values were achieved for 500 grams (p=0.961), 1000 grams (p=0.291), 2000 grams (p=0.327) and 4000 grams (p=0.442). These findings showed that the experience level of a physiotherapist did not statistically affect the accuracy of pressure application. After a short training, the results of the statistical analysis changed. P-values were achieved for 500 grams (p=0.694), 1000 grams (p=0.262), 2000 grams (p=0.982) and 4000 grams (p=0.997).

DISCUSSION

The findings of this study indicate that there could be some differences in palpation pressure sensitivity among physiotherapists specialized in different fields, irrespective of their experience level. Despite the common assumption that increased experience and specialization in manual therapy will lead to greater success in the application of prescribed pressures, the data of this study suggest that these factors alone are insufficient for optimal palpation competence. These findings are in line with the views of Lavazza et al. (7) and Keating et al. (22) who found that consistent pressure application is influenced by a number of factors, including the therapist's expertise, experience and quality of training.

The results of our study revealed a significant change in pressure application sensitivity before and after the therapist's self-study. This difference is particularly evident in the significant difference (p=0.003) in the application of 500 grams of pressure at baseline between the therapy groups with and without manual therapy expertise, indicating the importance of specialized training interventions. The non-significant results obtained after training show that skill gaps can be filled effectively through appropriate training, consistent with the findings of Lavazza et al. (23), who emphasized the importance of targeted training programs and feedback added to these training programs in the development of palpation skills.

The lack of significant differences in the ability to apply palpation pressure between different levels of experience (0-5, 6-10 and 11-20 years) suggests that secondary factors such as training in palpation or manual therapy may play more critical roles. This situation is supported by the statement by Myburgh et al. (10) that "palpation sensitivity is necessary for the effectiveness of manual therapy". Significant improvements in pressure accuracy after a short training demonstrates the potential for rapid skill development through targeted interventions, regardless of previous experience levels.

This study provides insights into differences in palpation skills between physiotherapists with and without manual therapy experience and highlights the importance of palpation skills training (24,25). Our results suggest that the implementation of standardized training protocols can improve overall palpation accuracy by reducing variations in the literature. Effective palpation skills are critical for accurate diagnosis and treatment, and stand out as a fundamental parameter in manual therapy practice, as they significantly affect patient outcomes and comfort (11,26). Another contribution of the study to the literature is to contribute to ongoing studies on the need for standardized diagnosis and treatment protocols in physical therapy. Differences in palpation methods observed among physiotherapists with different levels of competence highlight the need for further academic research and the development of standard guidelines (20). This study provided findings that could contribute to the development of palpation skills and provided valuable information for future research and training programs aimed at improving treatment effectiveness.

In line with these findings, future studies should investigate the long-term effects of comprehensive training interventions on palpation skills. Additionally, examining the effect of standardized training protocols on different regions and practice standards may increase the generalizability of our results.

One of the strengths of this study is that it provided a comprehensive view of palpation skills by selecting participants with different levels of expertise and experience. Additionally, the use of an electronic scale for precise and objective pressure measurements increases the reliability of the findings. Furthermore, this study effectively demonstrated the potential for skill development through training by assessing pressure accuracy before and after a short training session. However, our study has some limitations. Focusing on physiotherapists in Turkey may limit the generalizability of the results as training and practice standards in other regions may differ. The short training period may not reflect the long-term effects of more comprehensive training programs on palpation skills. Furthermore, categorizing participants according to their self-reported experience may introduce bias as subjective assessments of skills and experience may differ.

CONCLUSION

This study highlights the importance of targeted training in improving palpation pressure accuracy among physiotherapists. While experience and expertise are valuable, they alone may not provide sufficient accuracy in palpation pressure. Consistent pressure skills can be significantly improved through specific training programs. Future research should examine the long-term effects of comprehensive training interventions and the establishment of standard protocols to further improve palpation skills. Precise palpation pressure is critical for effective diagnosis and treatment in manual therapy. Quality data from these initial steps will significantly contribute to overall treatment success by improving patient outcomes and comfort.

Ethical approval

This study has been approved by the Bolu Abant İzzet Baysal University Ethics Committee (approval date 22/11/2022, number 2022/305). Written informed consent was obtained from the participants.

Author contribution

Designed and coordinated the study idea: ÖOP; Concept: ÖOP, NY; Design: MFU; Data Collection or Processing: ÖOP, NY, BB, MAA; Analysis or Interpretation: ÖOP; Literature Search: NY, BB, MAA; Writing: ÖOP, NY, BB, MAA, MFU. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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