ORIGINAL RESEARCH

Observations on the Therapeutic Efficacy of Biomimetic Physiotherapy Combined with Manipulation Therapy in Managing Myofascial Pelvic Pain Syndrome in Women

Xiaojuan Su, MM; Junxia Liu, BM; Huiqian Yang, MM; Hailong Chen, MM; Xiangmei Yin, MM; Danqing Gu, MM; Yu Wang, MM

ABSTRACT

Objective • This study aims to investigate the clinical efficacy of biomimetic physiotherapy combined with manipulation therapy in the management of female myofascial pelvic pain syndrome (MPPS).

Methods • A total of 120 patients diagnosed with MPPS at our hospital from June 2018 to June 2021 were included. All patients had a history of sexual activity, met the diagnostic criteria for female chronic pelvic pain, and exhibited pelvic floor muscle and myofascial trigger points in gynecological examinations. Based on treatment methods, patients were categorized into a control group (n=64, treated with biomimetic physiotherapy) and an experimental group (n=56, treated with biomimetic physiotherapy plus manipulation therapy). Pre- and post-treatment assessments in both groups included pelvic floor muscle surface electromyogram, Visual Analogue Scale (VAS) score, pelvic floor muscle tenderness score, and pelvic floor muscle strength.

Results • After treatment, in the control group, the mean values of pre-resting potential and post-resting potential declined significantly, from (9.58±2.22) to (4.06±0.77) and from (8.18±1.78) to (3.56±0.61), respectively. In the experimental group, these values decreased from (9.61±2.77) to (3.15±0.58), and from (8.16±1.78) to (2.79±0.59). The VAS score exhibited a noteworthy decrease from (6.18±1.00) to (3.15±0.56) in the control group and from (6.20±1.13) to (2.04±0.68) in the experimental group. The pelvic floor muscle tenderness score decreased from (8.14±0.86) to (3.78±0.77) in the control group and from (7.91±1.03) to (1.93±0.80) in the experimental group. Furthermore, the percentage of patients whose pelvic floor muscle strength increased from <grade III to ≥grade III, to 69.39% in the control group and 72.73% in the experimental group.

Conclusions • Biomimetic physiotherapy plus manipulation therapy demonstrated enhanced pelvic floor muscle contractility, reduced subjective pain and pelvic floor myofascial tenderness, improved synergic movement, increased muscle fatigue resistance, and alleviated muscle spasms. This combined approach proved to be effective in the treatment of female MPPS. (*Altern Ther Health Med.* 2024;30(5):162-167)

Xiaojuan Su, MM; **Junxia Liu**, BM; **Hailong Chen**, MM; **Xiangmei Yin**, MM; **Danqing Gu**, MM; **Yu Wang**, MM, Department of Gynecology; Shijiazhuang People's Hospital; Shijiazhuang; China. **Huiqian Yang**, MM, Department of Acupuncture and Moxibustion; Shijiazhuang People's Hospital; Shijiazhuang; China.

Corresponding author: Yu Wang, MM
E-mail: kuaileyu666@163.com

INTRODUCTION

Myofascial pelvic pain syndrome (MPPS) encompasses a spectrum of diseases or syndromes characterized by recurrent pain persisting for more than six months, stemming from various biological and functional factors.[1-3] In recent years, there has been increased clinical interest in chronic pelvic pain attributed to pelvic floor muscle and myofascial lesions. It is predominantly evident through pelvic tenderness and pain in the surrounding tissues.[1] MPPS is characterized by the presence of trigger points, tenderness upon palpation, and localized referred pain.[2]

Chronic pelvic pain commonly manifests in the pelvic, waist, buttocks, and vulva regions.[3] In the realm of traditional Chinese medicine (TCM), chronic pelvic pain falls under the category of "leukorrheal disease, abdominal mass." It is attributed to disruptions in healthy qi, meridian obstruction, qi stagnation, and blood stasis, with a predominant influence on qi stagnation and blood stasis. Persistent pelvic pain, affecting up to one in four women (5.7-26.6%),[4,5] is associated with significant somatic, functional, and psychosocial impacts.[6,7]

Pain can originate from various systems, including the urinary, gynecological, gastrointestinal, pelvic muscle, skeletal, and nervous systems.[8] Persistent pelvic pain, when left

untreated, exerts a profound influence not only on the physical and mental well-being of patients but also on their overall quality of life. Additionally, it can reduce sexual function and fertility.[6-8] Chronic pelvic pain arises from a complex relationship of one or more factors, presenting substantial challenges in both diagnosis and treatment. Currently, no universally effective treatment exists for this condition.

Common treatment modalities encompass, drug therapy, surgical therapy and physical therapy. Drug therapy includes the use of antibiotics, painkillers, registered Chinese medicines, and psychotropic drugs. While these medications can alleviate symptoms, their overall efficacy may be unsatisfactory. Individuals with a clear etiology of chronic pelvic pain may opt for surgical intervention, which can significantly reduce pain in some cases. However, follow-up studies have indicated that surgical therapy typically does not result in a cure for the condition.[9]

Physical therapy is characterized by its simplicity, notable effectiveness, and minimal adverse reactions, interventions such as electrical stimulation, pelvic floor muscle exercises, and biofeedback therapy have gained gradual acceptance among patients. Notably, pelvic floor physical therapy has been proposed as a treatment for chronic pelvic pain.[10] The straightforward application and proven efficacy of these methods contribute to their increasing acceptance among individuals seeking relief from chronic pelvic pain.

Manipulation therapy stands as a prominent treatment modality in traditional Chinese medicine, encompassing various techniques such as acupuncture, manipulation, massage, traction, and physiotherapy. Rooted in the principles of human biophysics, manipulation therapy leverages specific physical forces and techniques to treat and alleviate a spectrum of diseases and injuries affecting the human body. The application of manipulation, guided by human biophysics principles, offers a nuanced and effective approach to addressing diverse health conditions.[6-9]

This paper explores the application of acupoint massage and pelvic floor muscle traction massage to activate blood circulation, remove blood stasis, and facilitate the warming of channels and dredging of collaterals. Achieved through the stimulation of pain acupoints and direct massage of affected areas, these interventions aim to alleviate symptoms. Notably, clinical studies are scarce on the utilization of manipulation therapy in the context of female MPPS. The primary objective of this study was to investigate the effects of biomimetic physiotherapy in combination with manipulation therapy. By combining these therapeutic approaches, the study provides valuable insights to guide clinical practice, particularly in catering to the needs of most female patients experiencing MPPS. The exploration of biomimetic physiotherapy and manipulation therapy may offer enhanced treatment strategies for the effective management of this condition.

DATA AND METHODS

Study Design

A cohort of 120 patients diagnosed with MPPS was assembled at our hospital. All patients, within the age range of 20-50 years, had a documented history of sexual activity, met the diagnostic criteria for female chronic pelvic pain, and exhibited pelvic floor muscle and myofascial trigger points as observed in gynecological examinations. To facilitate differentiated treatment approaches, patients were stratified into two groups: the control group (n=64), receiving biomimetic physiotherapy, and the experimental group (n=56), undergoing a combination of biomimetic physiotherapy and manipulation therapy, refer to Table 1 and Figure 1. This stratification enables a comprehensive evaluation of the outcomes associated with the distinct treatment modalities.

Inclusion and Exclusion Criteria

This study carefully defined its inclusion and exclusion criteria to ensure the relevance and homogeneity of the participant cohort. Inclusion criteria encompassed: (1) individuals diagnosed with MPPS; (2) within the age range of 20-50 years; (3) possessing a history of sexual activity and meeting the diagnostic criteria for female chronic pelvic pain; (4) participants needed to exhibit pelvic floor muscle and myofascial trigger points as confirmed through gynecological examinations.

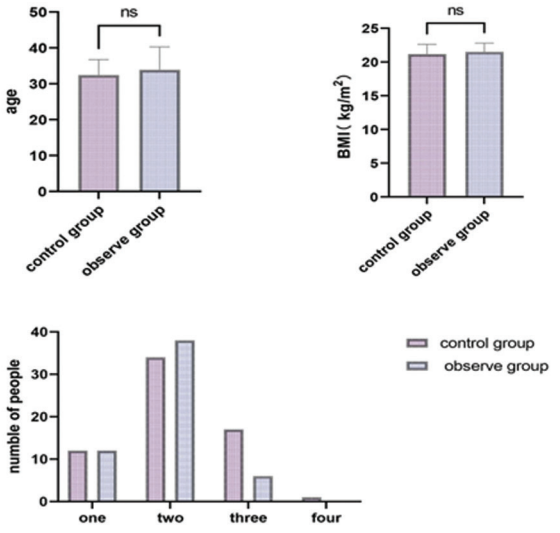
Exclusion criteria were as follows: (1) individuals with pre-existing medical conditions such as neurological

Table 1. Comparision of General Characteristics between Two Groups ($\bar{x} \pm s$)

Group	Age (years)	Body Mass Index (kg/m²)	Production Frequency (times)
Control Group (n=64)	32.45±4.27	21.19±1.44	2.11±0.72
Experimental Group (n=56)	33.91±6.36	21.52±1.28	1.89±0.56
t/χ^2	1.4923	1.3186	1.8487
P value	0.1383	0.1899	0.0670

Note: Data presented as mean ± standard deviation ($\bar{x} \pm s$). The *P* values indicate the significance level for the comparison between the control and experimental groups.

Figure 1. Comparison of Inclusion Data Between Control and Observation Groups Before Treatment



Note: The figure illustrates that there was no significant difference in inclusion data between the control group and the observation group ($P > .05$). Both groups did not receive any treatment before delivery.

disorders, autoimmune diseases, or other chronic pain syndromes were excluded. (2) Additionally, participants with prior pelvic surgeries or interventions that might impact the efficacy assessment of biomimetic physiotherapy and manipulation therapy were excluded.

Treatment Methods

Control Group: Electrical Stimulation Therapy. The control group received electrical stimulation therapy using the RX-C4-IV multi-channel low-frequency neuromuscular electrical stimulation devices (RENXIN). In this phase, we conducted a comprehensive assessment of the pelvic floor muscles, focusing on locating and identifying the contracted muscles and tender points. The procedure involved placing a vaginal electrode within the vagina, and an electrode slice at the pain site on the body surface. The initial stage consisted of a 20-minute session of electrical stimulation (frequency: 4-105 Hz, pulse width: 250-350 us) aimed at enhancing arterial blood flow to a comfortable level. Subsequently, in the second stage, electrical stimulation (frequency: 1/4/1 Hz, pulse width: 270/230/270 us) was administered for 20 minutes, adjusted to the patient's maximum tolerance. This treatment was conducted every other day, with a total of 10 sessions constituting one course.

Experimental Group: Biomimetic Physiotherapy Plus Manipulation Therapy. In addition to biomimetic physiotherapy, the experimental group received manipulation therapy administered by trained clinicians. This involved the insertion of the index and middle fingers into the vagina to palpate various muscles, including musculus pubococcygeus, musculus iliococcygeus, musculus ischiococcygeus, musculus obturator internus, and musculus piriformis. Muscular fasciae with spasm and tenderness were carefully addressed by pressing, stretching contracted muscle fibers vertically, and applying massage with appropriate pressure to gradually relax the spastic pelvic floor muscles. Manipulation therapy was performed once a day, with each session lasting 5-10 minutes, and a total of 10 sessions forming one course. This integrated approach aimed to comprehensively address the complexities of myofascial pelvic pain syndrome.

Evaluation Criteria for Therapeutic Effect

Pelvic Floor Muscle Surface Electromyogram Changes. The study precisely compared alterations in pelvic floor muscle surface electromyogram (EMG) between the control and experimental groups both before and after treatment. This assessment aimed to measure the impact of the interventions on the electrical activity of pelvic floor muscles, providing valuable insights into the therapeutic outcomes.

Visual Analogue Scale (VAS) Score Variations. We examined the variation in Visual Analogue Scale (VAS) scores before and after treatment in both the control and experimental groups. The VAS scores were examined to quantify the subjective pain experience, allowing for a comprehensive evaluation of the effectiveness of the therapeutic approaches employed.

Pelvic Floor Muscle Tenderness Score Changes. The investigation included a comparative analysis of alterations in pelvic floor muscle tenderness scores between the two groups before and after treatment. This assessment was conducted to quantify changes in tenderness, providing a measure of the impact of interventions on localized sensitivity and discomfort.

Pelvic Floor Muscle Strength Transformations. The study assessed changes in pelvic floor muscle strength before and after treatment in both groups. This analysis aimed to capture improvements or alterations in muscle strength, offering insights into the effectiveness of the applied therapeutic modalities. This structured approach to observation ensures a comprehensive understanding of the multifaceted therapeutic effects on various parameters associated with MPPS.

Statistical Analysis

We used SPSS 13.0 software (International Business Machines, Corp., Armonk, NY, USA) for statistical analysis, ensuring the precision and reliability of the statistical assessments. The statistical analysis employed in this study involved the description of measurement data through mean ± standard deviation ($\bar{x} \pm s$), which was then subjected to a *t*-test for robust assessment. Enumeration data, on the other hand, were concisely summarized using percentages (%) and underwent analysis through a chi-square test (χ^2). This systematic approach to statistical analysis enhances the clarity and transparency of the methodology, facilitating a comprehensive understanding of the results obtained.

RESULTS

Pelvic Floor Muscle Surface Electromyogram Comparison

Initially, there was no significant difference in pelvic floor muscle surface electromyogram between the two groups before treatment ($P > .05$). However, noteworthy distinctions emerged after the therapeutic interventions ($P < .05$). After treatment, in the control group, the mean values of both pre-resting potential and post-resting potential exhibited substantial declines from (9.58±2.22) to (4.06±0.77) and from (8.18±1.78) to (3.56±0.61), respectively.

Similarly, in the experimental group, there were significant reductions, with values dropping from (9.61±2.77) to (3.15±0.58) for pre-resting potential and from (8.16±1.78) to (2.79±0.59) for post-resting potential. refer to Table 2 and Figure 2. This observed discrepancy post-treatment underscores the effectiveness of the therapeutic approaches in influencing pelvic floor muscle activity and highlights the potential utility of the combined biomimetic physiotherapy and manipulation therapy in addressing MPPS.

Comparison of Visual Analogue Scale (VAS) Score

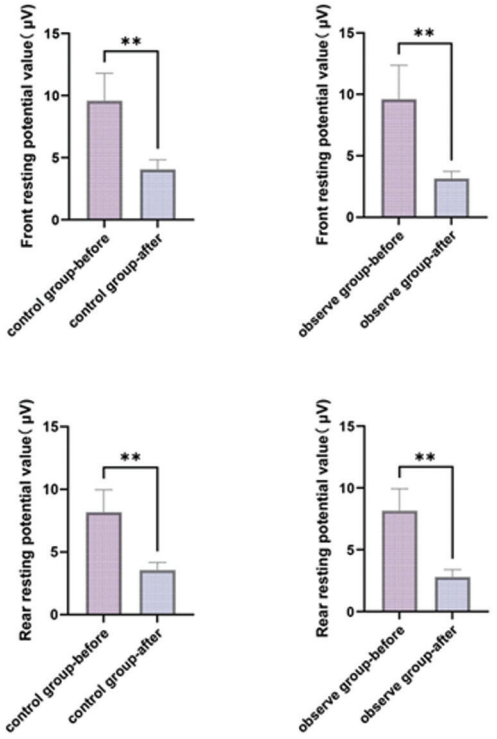
Before treatment, there was no significant difference in the VAS score between the two groups ($P > .05$). However, post-treatment analysis revealed substantial distinctions ($P < .05$). In the control group, the VAS score exhibited a notable

Table 2. Evaluation of Pelvic Floor Surface Electromyography during Pre and Post Rest Stages ($\bar{x} \pm s$)

Group	Front Resting Potential Value (μV)		Rear Resting Potential Value (μV)	
	Before Treatment	After Treatment	Before Treatment	After Treatment
Control Group (n=64)	9.58±2.22	4.06±0.77	8.18±1.78	3.56±0.61
Experimental Group (n=56)	9.61±2.77	3.15±0.58	8.16±1.78	2.79±0.59

Note: Data displayed as mean ± standard deviation ($\bar{x} \pm s$). The table presents the evaluation of pelvic floor surface electromyography readings before and after treatment for the control and experimental groups.

Figure 2. Comparison of Resting Muscle Potential Before and After Treatment Between Control and Observation Groups



Note: The figure demonstrates that the resting muscle potential of the control group before and after treatment was significantly higher than that of the observation group ($P < .05$). This suggests that in the evaluation of resting muscle potential, the observation group exhibits a more favorable therapeutic effect.

decrease from (6.18±1.00) to (3.15±0.56), indicating a significant reduction in perceived pain. Similarly, in the experimental group, the VAS score decreased from (6.20±1.13) to (2.04±0.68), reflecting a substantial alleviation of pain intensity, refer to Table 3 and Figure 3. This observed improvement stresses the efficacy of the applied therapeutic modalities, particularly the combined biomimetic physiotherapy and manipulation therapy, in mitigating pain symptoms associated with MPPS.

Comparison of Pelvic Floor Muscle Tenderness Score

Before treatment, there was no significant difference in the pelvic floor muscle tenderness score between the two groups ($P > .05$). However, post-treatment analysis revealed noteworthy differences ($P < .05$). In the control group, the pelvic floor

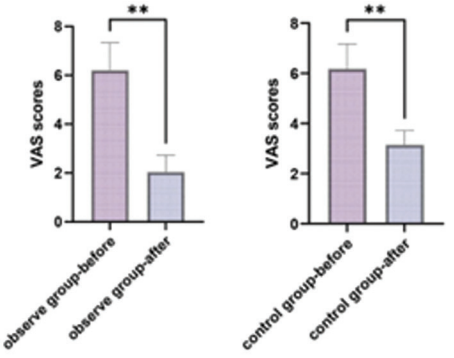
Table 3. Comparison of Visual Analogue Scale (VAS) Scores for Anterior and Posterior Pelvic Floor Fascial Tenderness ($\bar{x} \pm s$)

Group	Before Treatment	After Treatment
Control Group (n=64)	6.18±1.00	3.15±0.56[a]
Experimental Group (n=56)	6.20±1.13	2.04±0.68[a]
t/χ^2	0.1029	9.8026
P value	.9182	<.05

[a]$P < .05$ indicates statistical significance compared to before treatment.

Note: Data displayed as mean ± standard deviation ($\bar{x} \pm s$). The table compares Visual Analogue Scale (VAS) scores for anterior and posterior pelvic floor fascial tenderness before and after treatment.

Figure 3. Comparison of Subjective Pain Score Before and After Treatment Between Control and Observation Groups



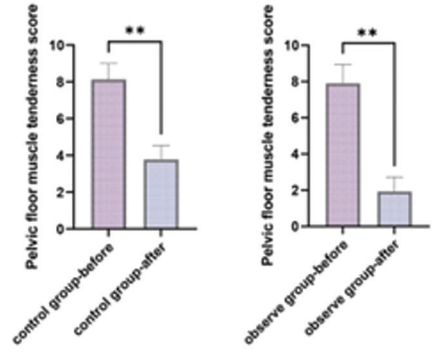
Note: The figure reveals that the subjective pain score of the control group before and after treatment was significantly higher than that of the observation group ($P < .05$). In the evaluation of the subjective pain score, the observation group demonstrates a more favorable treatment effect.

Table 4. Comparison of Pelvic Floor Muscle Tenderness Scores

Group	Before Treatment	After Treatment
Control Group (n=64)	8.14±0.86	3.78±0.77
Experimental Group (n=56)	7.91±1.03	1.93±0.80
t/χ^2	1.3329	12.8938
P value	0.1851	<.05

Note: Data displayed as mean ± standard deviation ($\bar{x} \pm s$). The table compares pelvic floor muscle tenderness scores before and after treatment.

Figure 4. Comparison of Pelvic Floor Muscle Tenderness Score Before and After Treatment Between Control and Observation Groups



Note: The figure indicates that the pelvic floor muscle tenderness score of the control group before and after treatment was significantly higher than that of the observation group ($P < .05$). In the evaluation of the pelvic floor muscle tenderness score, the observation group exhibits a more favorable treatment effect.

muscle tenderness score exhibited a substantial reduction from (8.14±0.86) to (3.78±0.77), indicating a significant alleviation of tenderness. Similarly, in the experimental group, the tenderness score decreased from (7.91±1.03) to (1.93±0.80), reflecting a considerable improvement in tenderness perception, refer to Table 4 and Figure 4.

Pelvic Floor Muscle Strength

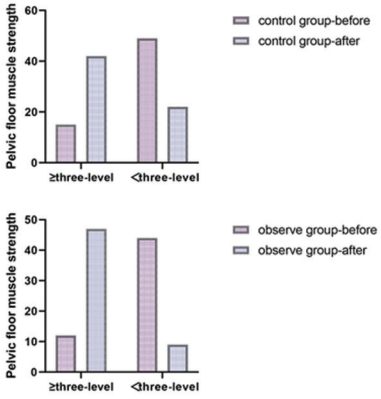
Before treatment, there was no significant difference in pelvic floor muscle strength between the two groups ($P > .05$). However, post-treatment analysis revealed a notable difference ($P < .05$). The count of patients with pelvic floor muscle strength <grade III reduced from 49 to 15 in the control group and from 44 to 12 in the experimental group. Simultaneously, the number of patients with pelvic floor muscle strength ≥grade III increased from 22 to 42 in the control group (an increased percentage of 69.39%) and from 9 to 47 in the experimental group (an increased percentage of 72.73%), refer to Table 5 and Figure 5. This observed improvement in pelvic floor muscle strength underscores the efficacy of the applied therapeutic modalities.

Table 5. Comparison of Pelvic Floor Muscle Strength Before and After Treatment

Group	Before Treatment		After Treatment	
	<Level III	≥Level III	<Level III	≥Level III
Control Group (n=64)	49 (76.56)	15 (23.44)	22 (34.38)	54 (65.62)
Experimental Group (n=56)	44 (78.57)	12 (21.43)	9 (16.07)	47 (83.93)
t/χ^2	0.0691		5.2224	
P value	.7927		.0223	

Note: Data displayed as mean ± standard deviation ($\bar{x} \pm s$). The table compares pelvic floor muscle strength before and after treatment.

Figure 5. Comparison of Changes in Pelvic Floor Muscle Strength Before and After Treatment Between Control and Observation Groups



Note: The figure illustrates that the number of changes in pelvic floor muscle strength before and after treatment in the control group was significantly lower than that in the observation group ($P < .05$). In the evaluation of changes in pelvic floor muscle strength, the observation group demonstrates a more favorable treatment effect.

DISCUSSION

MPPS is prevalent in clinical settings, exhibiting a high morbidity rate, and can arise from various underlying factors, including infections, autoimmunity, and neuromuscular spasms.[11] In TCM, chronic pelvic pain is conceptualized as a sequel to gynecological inflammation, marked by recurrent episodes and challenging recovery. This condition falls within the category of "leukorrheal disease, abdominal mass" and is attributed to imbalances in healthy qi, meridian obstruction, qi stagnation, and blood stasis dominance, aligning with TCM principles. This holistic perspective emphasizes the interconnectedness of physiological factors contributing to chronic pelvic pain, enriching our understanding and paving the way for comprehensive therapeutic interventions.

Statistically, chronic pelvic pain affects approximately 25% of women, exerting a significant impact on both their quality of life and healthcare costs.[12] Past studies examined the laparoscopic findings in women with chronic pelvic pain, epidemiological investigations into the prevalence of chronic pelvic pain, and assessments of women with functional somatic syndrome. Their findings suggest that chronic pelvic pain is inherently complex, frequently presenting as a multifactorial disorder.[13]

Described as a vague, dull pain or a sensation of pressure high up in the rectum, it typically intensifies when sitting compared to standing or lying down.[14] Patients struggling with chronic pelvic pain often contend with psychosocial distress, including conditions such as depression and anxiety, contributing to impaired overall quality of life.[15] The multifaceted nature of chronic pelvic pain underscores the need for a comprehensive and holistic approach to diagnosis, management, and patient care.

Currently, there exists no unified and standardized treatment protocol for MPPS in both China and other countries, leading to unsatisfactory outcomes with diverse treatment approaches. This addressed this gap by thoroughly analyzing the clinical efficacy of biomimetic physiotherapy combined with manipulation therapy for MPPS, leveraging statistical evidence. Our findings contribute substantiated findings that can serve as the foundation for a definitive and more effective treatment protocol for individuals struggling with chronic pelvic pain.

It is widely acknowledged that these anatomical abnormalities arise from underlying functional lesions. Conservative nonsurgical treatment is universally recognized as the initial approach.[16] Biomimetic physiotherapy emerges as a promising intervention, enhancing pelvic floor muscle electromyogram, mitigating pelvic floor muscle dysfunctional movement, supporting muscle fatigue resistance, alleviating muscle spasms, and reducing pain. This form of pelvic floor physiotherapy extends its benefits beyond mere symptom relief, also addressing sexual dysfunction effectively.[17]

Manipulation therapy stands as a notable treatment method within TCM. In this study a customized treatment approach was formulated, tailored to the individual patient's circumstances encompassing a blend of acupuncture, manipulation, massage, and traction as needed. Massage was administered to stimulate acupoints, increasing blood circulation and alleviating blood stasis. This approach aimed

to warm channels, facilitating the unblocking of collaterals. Additionally, myofascial trigger points were targeted through strategic pressure application, to enhance the pain threshold of myofascial receptors and mitigate overall pain sensitivity.

Massage and stretching prove effective in relaxing spastic muscles, restoring blood supply, and alleviating pain. Our outcomes revealed that the combination of biomimetic physiotherapy and manipulation therapy successfully reduced the resting potential of pelvic floor muscles. Additionally, it led to a concurrent decrease in both subjective pain scores and pelvic floor muscle tenderness scores, while also enhancing pelvic floor muscle strength. Therefore, this combined therapeutic approach demonstrated significant efficacy in addressing MPPS.

Study Limitations

Despite offering valuable insights, our study has limitations. The relatively small sample size, lack of long-term follow-up, and single-center focus may impact generalizability. Additionally, the study relies on self-reported measures, introducing potential subjectivity. Future research with larger, multi-center cohorts and extended follow-up periods is essential for comprehensive validation of our findings.

CONCLUSION

In conclusion, our study underscores the efficacy of biomimetic physiotherapy coupled with manipulation therapy in effectively addressing MPPS. The combined intervention demonstrated a notable reduction in resting potential of pelvic floor muscles, decreased subjective pain scores, and enhanced pelvic floor muscle strength. These findings advocate for the integration of this therapeutic approach as a valuable strategy for managing MPPS, providing a foundation for further research and clinical implementation.

COMPETING INTERESTS

The authors report no conflict of interest.

FUNDING

None.

ACKNOWLEDGEMENTS

None.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Wei Y, Chen X, Wang T, Dong X, Zhu Z. Effects of Du Meridian Moxibustion Combined with Mild Moxibustion on Female Pelvic Floor Myofascial Pain Syndrome: A Retrospective Cohort Study. [J]. *Evid Based Complement Alternat Med*. 2022;2022:7388864. doi:10.1155/2022/7388864
2. Meister MR, Shivakumar N, Sutcliffe S, Spitznagle T, Lowder JL. Physical examination techniques for the assessment of pelvic floor myofascial pain: a systematic review. [J]. *Am J Obstet Gynecol*. 2018;219(5):497.e1-497.e13. doi:10.1016/j.ajog.2018.06.014
3. Joseph K, Mills J. Unmet treatment needs in patients with chronic pelvic pain in a New Zealand gynaecology service. [J]. *Aust N Z J Obstet Gynaecol*. 2019;59(6):856-860. doi:10.1111/ajo.13059
4. Ahangari A. Prevalence of chronic pelvic pain among women: an updated review. [J]. *Pain Physician*. 2014;17(2):E141-E147. doi:10.36076/ppj.2014/17/E141
5. Cagnacci A, Della Vecchia E, Xholli A. Chronic pelvic pain improvement: impact on quality of life and mood. [J]. *Gynecol Endocrinol*. 2019;35(6):502-505. doi:10.1080/09513590.2018.1540571
6. Facchin F, Barbara G, Saita E, et al. Impact of endometriosis on quality of life and mental health: pelvic pain makes the difference. [J]. *J Psychosom Obstet Gynaecol*. 2015;36(4):135-141. doi:10.3109/0167482X.2015.1074173
7. Grinberg K, Sela Y, Nissanholtz-Gannot R. New Insights about Chronic Pelvic Pain Syndrome (CPPS). [J]. *Int J Environ Res Public Health*. 2020;17(9):3005. doi:10.3390/ijerph17093005
8. Lamvu G, Carrillo J, Ouyang C, Rapkin A. Chronic Pelvic Pain in Women: A Review. [J]. *JAMA*. 2021;325(23):2381-2391. doi:10.1001/jama.2021.2631
9. Ball E, Khan KS. Recent advances in understanding and managing chronic pelvic pain in women with special consideration to endometriosis. [J]. *F1000 Res*. 2020;9:9. doi:10.12688/f1000research.20750.1
10. Bi X, Zhao J, Zhao L, et al. Pelvic floor muscle exercise for chronic low back pain. [J]. *J Int Med Res*. 2013;41(1):146-152. doi:10.1177/0300060513475383
11. Schaeffer AJ. Clinical practice. Chronic prostatitis and the chronic pelvic pain syndrome. [J]. *N Engl J Med*. 2006;355(16):1690-1698. doi:10.1056/NEJMcp060423
12. Mathias SD, Kuppermann M, Liberman RF, Lipschutz RC, Steege JF. Chronic pelvic pain: prevalence, health-related quality of life, and economic correlates. [J]. *Obstet Gynecol*. 1996;87(3):321-327. doi:10.1016/0029-7844(95)00458-0
13. Warren JW, Morozov V, Howard FM. Could chronic pelvic pain be a functional somatic syndrome? [J]. *Am J Obstet Gynecol*. 2011;205(3):199.e1-199.e5. doi:10.1016/j.ajog.2011.04.003
14. Bharucha AE, Lee TH. Anorectal and Pelvic Pain. [J]. *Mayo Clin Proc*. 2016;91(10):1471-1486. doi:10.1016/j.mayocp.2016.08.011
15. Heymen S, Wexner SD, Gulledge AD. MMPI assessment of patients with functional bowel disorders. [J]. *Dis Colon Rectum*. 1993;36(6):593-596. doi:10.1007/BF02049867
16. Giarenis I, Robinson D. Prevention and management of pelvic organ prolapse. [J]. *F1000Prime Rep*. 2014;6:77. doi:10.12703/P6-77
17. Anderson RU, Wise D, Sawyer T, Chan CA. Sexual dysfunction in men with chronic prostatitis/chronic pelvic pain syndrome: improvement after trigger point release and paradoxical relaxation training. [J]. *J Urol*. 2006;176(4 Pt 1):1534-1538. doi:10.1016/j.juro.2006.06.010