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Original Research

Treatment of Pelvic Pain Using Systemic Manual Therapy

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Abstract

Background: The purpose of this study is to test the effectiveness of physical therapy treatment for non-specific pelvic pain using Systemic Manual Therapy (SMT). This study evaluates outcomes across episode of care and after implementation of specific SMT protocols.

Design: Computerized decision support software (CDSS) analysis of electronic medical records (EMR) using the Halili Physical Therapy Statistical Analysis Tool (HPTSAT) to query EMR.

Methods: Changes in pelvic pain and overall symptoms were measured in 310 patients after provision of 261 SMT protocols or protocol combinations, and across episode of care using the patient identified problem scale (PIP) and a statistical analysis tool (HPTSAT).

Results: Pelvic pain was improved on average by 1.95/9 ($p < 0.001$), overall improvement was 11.11/90 ($p < 0.001$). Eighteen combinations containing 13 distinct protocols passed the HPTSAT criteria. These protocols included seven with direct effects; the five proposed for their effects on central desensitization; and one protocol with either regional or desensitization effects.

Conclusion: An effective treatment for pelvic pain is possible if in addition to direct intervention, regional contributors and central sensitization are addressed.

Keywords: Pelvic pain, Central sensitization, Systemic manual therapy, Fascial counter strain, Barral, Integrative manual therapy, Muscle energy techniques

Impact Statement

This study would have an immediate impact on provision of physical therapy because it identifies specific interventions that appear to be effective in treating the central sensitization component of pelvic pain.

Introduction

Etiology of pain in the pelvic region varies and could be multifactorial. Pain can result from visceral dysfunction [1–7], spinal or peripheral nerve origin [4], musculoskeletal dysfunction [2], degradation of the sacroiliac or other joints in the pelvic region, congestive reasons [4,7,8] or central sensitization (CS) [1–3,5,6,9,10]. The temporal model for central sensitization [11] proposed that specific SMT protocol can successfully address CS.

The effectiveness of SMT protocols [12] used in this study was previously evaluated treating other impairments [13–19]. The source techniques for these protocols can be found in methods such as Fascial counter strain [20–22], Barral [23], Integrative manual therapy [24] and muscle energy techniques [25].

This study aims to evaluate the effectiveness of treatment for pelvic pain using SMT protocols across episode of care as well as evaluating the specific effectiveness of individual and sequences of protocols.

Methodology

This study is a retrospective chart analysis and was exempted by Argus independent Review Board (www.argusirb.com) on July 21, 2021.

The specific outcome measure used for this study was the Patient Identified Problem (PIP) scale [26]. The PIP scale is a 1 to 10 (half point permitted) scale. The patient can score between 1 (which denotes that the problem is not currently active) and 10 (which indicates maximal intensity). Problems were examined both individually and as a cumulative score. The cumulative score was calculated according to the following formula: PIP = SUM (individual score/number of problems) × 10 (adding the scores of all individual problems, dividing the total by the number of individual problems, and then multiplying by 10). Symptoms were graded by the patient whenever possible to decrease the examiner bias. Scoring was always performed at the next visit and not immediately after the treatment. The PIP scale had a specificity and sensitivity of 91.46% and 64.45%, respectively, and an ICC score of 0.96. Minimal clinically important change (MCID) for change observed in the whole scale is 3.8 (95% CI 1.4 to 8.2), and for an individual problem, score change is 0.89 (95% CI 0.33 to 1.5).

Although the PIP is technically an ordinal scale which could indicate the use of a non-parametric approach to evaluate differences between groups, prior studies [13–19] using this scale had demonstrated that in large enough sample size (>20) parametric testing provides equitable differentiation. Nevertheless, when the analysis tool, the Halili Physical Therapy Statistical Analysis Tool (HPTSAT) [27], was developed, a differentiation criteria using both parametric (Welch's t test) and non-parametric (Man-Whitney U) was used.

To identify which SMT protocols or protocol combinations were more effective than the average care, the HPTSAT tool [27] was used to analyze 44,915 blinded visit records of 2710 patients from the Halili Physical Therapy EMR (electronic medical records) system v. 2021, (HPT2021) between the dates of 4/2/2015 and 11/29/2022.

A study sample was created using the search terms "pelvic," "pelvis," "sacro," "iliac," "groin," and "pubic" found in the patient's identified problem (PIP) list. The study sample included 310 patients (233 female, 77 male, average age 62.06 (age range 17 to 94). The evaluating physical therapist identified CS as one of the differential diagnoses in 214 patients (70%). This determination was made using a similar methodology to the one outlined by Lluch [28]. One patient was excluded from the study since they had completed less than 2 visits.

Among the 310 patients there were 404 episodes of care (A new episode of care was considered to begin if 90 days had passed between the patient's last visit and a new visit.)

The HPTSAT tool located and analyzed 261 SMT protocols or protocol sequence combinations (having a frequency >5). Further qualitative demographic and comorbidity information as well as episode of care data were compiled and analyzed using the HPTSAT and MedCalc software [29].

Results

To gain some qualitative understanding of the sample we noted the following: The average period that a patient was followed in this study was 378 days. The average length of episode of care was 173 days (95% CI 147 to 199), average visits per episode were 16 (95% CI 14 to 19); average days between treatments was 10. For a list of comorbidities and additional information, refer to the accompanying dataset [30].

Changes in overall PIP scale scores over the study period were as follows: 222 patients (72%) reported improvement in overall PIP complaints, 23 patients (7%) either did not record changes or reported no change, and 64 patients (21%) reported worsening of overall PIP scores. On average, overall PIP scale score improved by 11.11 points (p, STD and 95% CI were < 0.001, 18.47, 13.17 to 9.05 respectively). This change exceeded the MCID of 3.8 including its 95% CI upper limits of 8.2 points. The average improvement at end of episode of care was not statistically different than the average improvement noted at the end of the study period (10.09 vs 11.11, $p = 0.43$).

Specific changes related to pelvic pain complaints were: 195 patients (63%) reported improvement; 72 patients (23%) either did not record or reported no change; and 42 patients (14%) reported worsening of pelvic pain score. On average, individual complaint of pelvic pain improved by 1.95 points (p, STD and 95% CI were < 0.001, 2.77, 2.26 to 1.64 respectively). This change exceeded the MCID of 0.89 as well as its upper CI limit of 1.4. The average improvement over the study period (which included multiple episodes of care), was higher but not statistically significant than the average improvement noted after a single episode of care (1.95 vs. 1.60 $p = 0.08$)

Of the 261 protocol combinations assessed, 18 combinations containing 13 distinct protocols passed the HPTSAT criteria to demonstrate better treatment effect than the average when evaluating the individual complaint of pelvic pain.

The 13 individual protocols passing the HPTSAT criteria include: Cardiac-Cervical-Cranial Vascular (CCCV), lower abdominal-urogenital (LAUG), Muscle Energy Technique sacroiliac combined with Vascular protocol variations (METVAS); Side-Lying Modified Glides (SLMG or SLMGT), Urinary Drainage (UD), Diaphragm-Cranial-Sinus (DCS), Lower Extremity Drainage Jones LEDJ) (all variations), Venous-Thoracic-Cardiopulmonary (VTCP), Barral abdominal motility (Barral), Spinal Drainage Jones (lumbar or cervical variations (SPDJL or SPDJC), Lower Extremity Nerve (LEN), Periosteal lower extremity (OST), and finally Fascial and traditional Counterstrain techniques done using the pragmatic approach of seeking tender points and then treating them (SCS). Two subsets of METVAS -Vascular (VAS) and Vascular Jones (VASJ) - also passed the HPTSAT criteria on their own without the MET portion. All but one (OST) of the protocols that passed the HPTSAT criteria for pelvic pain were also found in the combinations that passed the criteria for effectiveness on overall change.

Five of the 13 passing protocols (CCCV, DCS, UD, Barral, LAUG) were performed because of their hypothesized general effect on central sensitization in accordance with the temporal model for central sensitization [11]. Of these five, two (CCCV and DCS) do not have any direct or regional relationship with the pelvic region.

Seven protocols (METVAS, SLMG, SPDJ, LEDJ, LEN, OST and SCS) are considered to have a direct effect on pelvic pain.

The remaining passing protocol (VTCP) can either improve symptoms by desensitization or other regional indirect mechanisms. Complete information about the passing protocol combinations is listed in **Table 1**.

Although the effects of exercise performed during the therapy session (the HPTSAT controls for the effects of home exercise) did meet the statistical threshold to be better than the average [the average rate of change (ARC5) for exercise

Table 1. Passing combinations, results by individual scores for pelvic pain.

Rx	n (original)	freq, control	ARC5	Control, Diff	SD (95% CI)	Welch	MW	ANOVA	Hedges' g
METVAS DCS	23	182, 26719	**0.82**	1.01, 0.19	1.51 (1.73 to 1.29)	< .001	< .001	< .001	0.62
LEDJ OST LEN UD	22	66, 26835	**0.72**	0.91, 0.19	1.95 (2.42 to 1.48)	0.004	0.003	< .001	0.53
VASJ	47	588, 26313	**0.62**	0.8, 0.18	1.74 (1.88 to 1.6)	< .001	< .001	< .001	0.46
OST LEN UD	25	147, 26754	**0.57**	0.76, 0.19	1.8 (2.09 to 1.51)	< .001	< .001	< .001	0.42
LAUG LEDJ UD MET	27	65, 26836	**0.56**	0.75, 0.19	1.74 (2.16 to 1.32)	0.011	0.038	< .001	0.42
LEDJ OST LEN	32	170, 26731	**0.5**	0.69, 0.19	1.53 (1.77 to 1.3)	< .001	< .001	< .001	0.38
METVAS BARRAL	20	136, 26765	**0.5**	0.69, 0.19	1.48 (1.73 to 1.23)	< .001	< .001	< .001	0.37
METVAS SPDJ	29	256, 26645	**0.5**	0.69, 0.19	1.09 (1.23 to 0.96)	< .001	< .001	< .001	0.38
LEDJ UD MET	38	190, 26711	**0.48**	0.67, 0.19	1.55 (1.77 to 1.33)	< .001	< .001	< .001	0.36
OST LEN	35	305, 26596	**0.44**	0.63, 0.19	1.53 (1.7 to 1.36)	< .001	< .001	< .001	0.33
VTCP MET	20	169, 26732	**0.43**	0.62, 0.19	1.61 (1.85 to 1.37)	< .001	< .001	< .001	0.32
LEN UD	56	511, 26390	**0.43**	0.61, 0.18	1.73 (1.88 to 1.58)	< .001	< .001	< .001	0.31
METVAS SLMG	57	523, 26378	**0.36**	0.54, 0.18	1.52 (1.65 to 1.39)	< .001	< .001	< .001	0.26
UD METVAS	102	996, 25905	**0.32**	0.5, 0.18	1.54 (1.63 to 1.44)	< .001	< .001	< .001	0.24
VAS	246	2867, 22042	**0.31**	0.46, 0.15	1.34 (1.39 to 1.29)	< .001	< .001	< .001	0.23
UD DCS BARRAL	179	859, 26042	**0.3**	0.48, 0.18	1.75 (1.86 to 1.63)	< .001	< .001	< .001	0.22
UD DCS BARRAL CCCV	159	414, 26487	**0.29**	0.48, 0.19	1.74 (1.91 to 1.57)	< .001	0.001	< .001	0.22
SCS	26	304, 26597	**0.28**	0.47, 0.19	1.32 (1.47 to 1.17)	< .001	< .001	< .001	0.21
Part Two overall PIP scale score									
Rx	**n (original)**	**freq, control**	**ARC5**	**Control, Diff**	**SD (95% CI)**	**Welch**	**MW**	**ANOVA**	**Hedges' g**
LAUG LEDJ UD DCS BARRAL	32	32, 26869	**5.19**	6.5, 1.31	9.43 (12.7 to 6.16)	0.004	0.001	< .001	0.75
METVAS DCS	23	182, 26719	**5.07**	6.35, 1.28	10.27 (11.76 to 8.77)	< .001	< .001	< .001	0.73
LEDJ UD DCS BARRAL CCCV	32	32, 26869	**3.66**	4.97, 1.31	7.46 (10.05 to 4.88)	0.009	0.004	0.003	0.53
VTCP MET	20	169, 26732	**3.42**	4.71, 1.29	8.25 (9.5 to 7.01)	< .001	< .001	< .001	0.49

Rx	n (original)	freq, control	ARC5	Control, Diff	SD (95% CI)	Welch	MW	ANOVA	Hedges' g
LEDJ UD DCS BARRAL	36	106, 26795	**3.28**	4.58, 1.3	8.38 (9.97 to 6.78)	< .001	< .001	< .001	0.47
UD DCS BARRAL CCCV SYMPN	37	37, 26864	**3.18**	4.49, 1.31	7.93 (10.49 to 5.38)	0.039	0.038	0.014	0.4
DCS BARRAL CCCV LAUG	23	68, 26833	**3.06**	4.37, 1.31	6.81 (8.43 to 5.19)	0.001	< .001	< .001	0.41
UD DCS BARRAL CCCV	159	414, 26487	**3.01**	4.28, 1.27	7.35 (8.05 to 6.64)	< .001	< .001	< .001	0.4
UD DCS BARRAL	179	859, 26042	**2.63**	3.86, 1.23	7.64 (8.15 to 7.13)	< .001	< .001	< .001	0.38
LAUG LEDJ UD DCS	51	128, 26773	**2.57**	3.87, 1.3	8.08 (9.48 to 6.68)	< .001	< .001	< .001	0.37
LEDJ UD MET	38	190, 26711	**2.54**	3.84, 1.3	10.74 (12.27 to 9.21)	0.001	0.036	< .001	0.37
LEDJHF	27	260, 26641	**2.35**	3.64, 1.29	7.06 (7.92 to 6.2)	< .001	< .001	< .001	0.34
UD DCS LAUG CCCV	38	98, 26803	**2.32**	3.63, 1.31	6.27 (7.51 to 5.03)	< .001	< .001	< .001	0.34
BARRAL CCCV VTCP	22	123, 26778	**2.31**	3.62, 1.31	7.24 (8.52 to 5.96)	< .001	0.001	< .001	0.33
METVAS SPDJ	29	256, 26645	**2.27**	3.56, 1.29	6.23 (7 to 5.47)	< .001	< .001	< .001	0.33
DCS BARRAL CCCV SYMPN	42	122, 26779	**2.21**	3.52, 1.31	7.82 (9.2 to 6.43)	0.002	0.001	< .001	0.32
SCS	26	304, 26597	**2.2**	3.49, 1.29	9.75 (10.85 to 8.66)	< .001	< .001	< .001	0.32
DCS BARRAL CCCV	196	1040, 25861	**2.16**	3.39, 1.23	7.48 (7.93 to 7.02)	< .001	< .001	< .001	0.31
LEDJ LEN UD	24	126, 26775	**2.09**	3.4, 1.31	7.53 (8.85 to 6.22)	0.002	0.002	< .001	0.3
DCS BARRAL	223	1860, 25041	**2.07**	3.24, 1.17	7.53 (7.87 to 7.19)	< .001	< .001	< .001	0.3
LAUG LEDJ UD	157	741, 26160	**1.87**	3.13, 1.26	9.53 (10.22 to 8.84)	< .001	< .001	< .001	0.27
MET SI VAS Vr. SLMG	57	523, 26378	**1.78**	3.06, 1.28	8.15 (8.84 to 7.45)	< .001	< .001	< .001	0.26
UD METVAS	102	996, 25905	**1.72**	2.97, 1.25	8.86 (9.41 to 8.31)	< .001	< .001	< .001	0.25
METVAS BARRAL	20	136, 26765	**1.68**	2.99, 1.31	9.77 (11.41 to 8.13)	0.047	0.019	0.005	0.24
LEDJ UD	215	1798, 25103	**1.54**	2.75, 1.21	9.44 (9.88 to 9)	< .001	< .001	< .001	0.22
EXERCISE	51	565, 26336	**1.53**	2.81, 1.28	8.66 (9.37 to 7.95)	< .001	< .001	< .001	0.22
VASH	23	260, 26641	**1.53**	2.83, 1.3	8.96 (10.05 to 7.87)	0.007	< .001	< .001	0.22
BARRAL CCCV METVAS	58	315, 26586	**1.49**	2.79, 1.3	8.32 (9.24 to 7.4)	0.002	< .001	< .001	0.22
DCS LAUG CCCV	62	324, 26577	**1.48**	2.78, 1.3	6.4 (7.1 to 5.7)	< .001	< .001	< .001	0.21
BARRAL CCCV	275	2398, 24503	**1.45**	2.64, 1.19	7.23 (7.52 to 6.94)	< .001	< .001	< .001	0.21

Key: n: number of times combination was done; freq: number of 1–5 measurements including this combination; control: number of 1–5 measurements not including this combination; ARC5: Average Rate of Change Over Five Measurements; Rx: ARC5 of freq; oSOC: ARC5 of Optimal Standard of Care (control frequency); SD: Standard Deviation; CI: Confidence Interval; Welch: P of Welch's t Test; MW: P of Mann-Whitney Test; ANOVA: P of Analysis of Variance; Hedges' g: Hedges's g Effect Size; CCCV: Cardiac-Cervical-Cranial Vascular; LAUG: Lower Abdominal-Urogenital; METVAS: Muscle Energy Technique Sacroiliac Combined with Vascular Protocol Variations; VAS: Vascular Protocol; VASJ: Vascular Protocol Jones Version; VASH: Vascular Protocol Hesch Version; SLMG: Side-Lying Modified Glides; UD: Urinary Drainage; DCS: Diaphragm-Cranial-Sinus; SYMPN: Sympathetic-Nerve; LEDJ: Lower Extremity Drainage (all versions); LEDJHF: Lower Extremity Drainage Foot and Hip Version; VTCP: Venous-Thoracic-Cardiopulmonary; BARRAL: Barral Abdominal Motility; SPDJ: Spinal Drainage Jones; OST: Periosteal Protocol Lower Extremity; LEN: Lower Extremity Nerve Protocol; SCS: Combination of Traditional and Fascial Counter Strain Techniques Done in a Pragmatic Manner; EXERCISE: Exercises Done during the Therapy Session.

was 0.30 vs 0.19 for average change $p = 0.063$ and effect size of 0.08], exercise during the therapy session met the passing HPTSAT criteria when looking at the overall effect on the entire PIP (ARC5 was 2.81 vs 1.28 for the average change $p < 0.001$ and effect size of 0.22).

The complete performance of the remaining protocol combinations, the effects of comorbidities, additional post-hoc tests, and raw data tables are available in the accompanying dataset [30].

Discussion and Conclusion

Based on the results of this study, SMT appears to be an effective and noninvasive approach for treatment of pain in the pelvic region. The benefits seem to be because of direct and regional effects as well as alteration of CS status.

Five protocols proposed to address CS (UD, DCS, Barral, CCCV, LAUG) were found to be more effective than average to treat pelvic pain. Because UD Barral and LAUG can also have a direct or regional effect on the pelvis, only the effects of DCS and CCCV protocols can be attributed to impacting CS in this study. One other protocol (VTCP) is emerging as a possible additional protocol that can influence the aberrant visceral input associated with CS.

The results of the study also demonstrate the benefits of the more traditional pragmatic application of fascial counterstrain techniques on pelvic pain as well as supervised exercises on the patient's overall symptoms.

Limitations

- Since most patients are seeking help for multiple problems (not just for pelvic pain), until outcome data for multiple other problems similar to this study are available, and until there is better understanding of how each problem interacts with any other problems present, the treating physical therapist must still rely on the basic hypothesis-oriented algorithm for clinicians (HOAC) [31,32] qualitative model when developing an individual plan of care.
- This study established with statistical certainty that LAUG, Barral and UD protocols are effective in treating both pelvic pain and overall symptoms. However, because of the possibility that the effectiveness of these protocols was due to a direct effect on the pelvic region, we cannot quantify their effect on CS. This quantification will have to happen studying conditions like facial pain, for example, where neither of these protocols has a proposed direct or regional effect on the primary problem.
- The study sample does not have sufficient variability in the order in which the sequences of protocols were performed. Therefore, we cannot make a statistical inference as to what the optimal order of protocols in a sequence would be.
- Because the search term did not include the term "pain" it is possible that the analysis included patient identified problems that described other dysfunctions in the pelvic regions other than pain. This could have some influence; however, it should not have changed the hypothesis testing element of observing an anatomically remote relationship between the area treated and the pelvic region.

Generalizability and Applicability

The findings of this investigation are consistent with existing theory and application of SMT-type protocols [13–19], thus reinforcing the external validity of these methods.

The findings of this study can also be generalized in two additional ways: First, any clinicians who use SMT, fascial counterstrain, IMT or Barral techniques can immediately implement the SMT protocols suggested in this study. The episode of care outcome is the second generalization that can be made. This outcome can be considered by any professional who treats pelvic pain and used as a benchmark against which all other interventions can be measured.

Key Points

- Pain in the pelvic area is derived from multiple factors including central sensitization.
- With standardization of care, outcome tools and data analysis methods it is possible to test the temporal model hypothesis for central sensitization and the effects of the proposed treatment using systemic manual therapy protocols.
- This study identifies systemic manual therapy protocol that can directly treat pelvic pain.

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