Journal of Back and Musculoskeletal Rehabilitation 30 (2017) 419–425
DOI 10.3233/BMR-150424
IOS Press

The effect of visceral osteopathic manual therapy applications on pain, quality of life and function in patients with chronic nonspecific low back pain

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Abstract.
BACKGROUND: The efficacy of osteopathic manual therapy (OMT) applications on chronic nonspecific low back pain (LBP) has been demonstrated. However, visceral applications, which are an important part of OMT techniques, have not been included in those studies.
OBJECTIVE: The study's objective was to determine the effect of OMT including visceral applications on the function and quality of life (QoL) in patients with chronic nonspecific LBP.
DESIGN: The study was designed with a simple method of block randomization.
METHODS: Thirty-nine patients with chronic nonspecific LBP were included in the study. OMT group consisted of 19 patients to whom OMT and exercise methods were applied. The visceral osteopathic manual therapy (vOMT) group consisted of 20 patients to whom visceral applications were applied in addition to the applications carried out in the other group. Ten sessions were performed over a two-week period. Pain (VAS), function (Oswestry Index) and QoL (SF-36) assessments were carried out before the treatment and on the sixth week of treatment.
RESULTS: Both of the treatments were found to be effective on pain and function, physical function, pain, general health, social function of the QoL sub-parameter. vOMT was effective on all sub-QoL parameters ($p < 0.05$). Comparing the groups, it was determined that the energy and physical limitations of the QoL scores in vOMT were higher ($p < 0.05$).
CONCLUSION: Visceral applications on patients with non-specific LBP gave positive results together with OMT and exercise methods. We believe that visceral fascial limitations, which we think cause limitations and pain in the lumbar segment, should be taken into consideration.

Keywords: Low back pain, osteopathic manipulative treatment, manual therapy, visceral manipulation

1. Introduction

Low back pain is a problem faced by individuals quite often, particularly in developed societies. It negatively affects the quality of life and physical activity levels while increasing the health-related costs and leading to loss of labor [1–3].

Chronic nonspecific low back pain comprises 85% of all back pain, but indicates no problem that would be the cause of pain, such as spinal pathology, radicular syndrome, infection or tumor [4,5]. There are many treatment options for coping with chronic nonspecific low back pain, such as manual therapy techniques, including exercise methods, cognitive therapy training, back schools, massage, manipulation and mobilization, taping [6] and physiotherapy modalities [7].

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It was shown that manual therapy, which is among the most used methods in recent years, is effective in terms of cost and recovery [8]. Osteopathic manual therapy (OMT) is a treatment option that investigates the cause of the problem based on the relationship between structure and function. It strives to normalize the biomechanical and somatic dysfunctions and includes various manual treatment methods [9].

The effect of osteopathic treatment approaches on individuals with chronic low back pain is, in the literature, usually compared between different physiotherapy methods [10–13]. In a systematic review study conducted in 2005, it was reported that usually OMTs containing a single method were used, and those methods were effective in the reduction of pain [14,15]. It was determined that the studies conducted on nonspecific lower back pain up to 2013 included some of the osteopathic methods (soft-tissue techniques, myofascial techniques, muscle-energy techniques, manipulation and mobilization techniques), and this review study reported that these methods had positive effects [16]. Visceral techniques comprise an important part of osteopathic methods. In the literature, visceral techniques have generally been applied exclusively or for visceral problems [17]. However, there are no studies on the use of visceral techniques on lower back pain, except for one study that explains the study protocol, and the results of that study have not been published [18]. Visceral problems arising from local fascial limitations, referred pain and central sensitization may cause low back pain [18]. In this manner, with visceral techniques, a vertebral segment can be induced for somato-visceral impact by implementing neurophysiological stimulation. In fact, one study has shown that the pain threshold increased in the related vertebral segment due to the application of visceral techniques on healthy individuals [19].

Our study was planned as a hypothesis of the efficacy of using OMT methods together with visceral osteopathic methods (vOMT) on patients with low back pain. Such a methodology is now being used in clinical trials, but there is still no evidence-based scientific study. Our aim is to determine the effect of OMT techniques, including visceral applications, on the function and quality of life in patients with chronic nonspecific low back pain.

2. Methods

Thirty-nine individuals, as included in the study, had been directed to Hacettepe University's Department of Physical Therapy and Rehabilitation, Low Back-Neck Health Unit with non-specific lower back pain for more than 12 weeks but had received no treatment for the last six months. Individuals with tumor, severe scoliosis, inflammatory problems, radicular symptoms, motor and sensory deficits, or abdominal surgery in the last six months were not included in the study. The permission and approval for our study was granted by the Hacettepe University Non-invasive Clinical Research Ethics Committee on 10.01.2013, under Decision No. GO131550-11.

The socio-demographic data of the chronic nonspecific LBP patients such as age, height, weight, gender were recorded. Patients were randomly assigned into OMT ($n = 19$) and vOMT ($n = 20$) groups using the stratified block randomization procedure with sealed envelopes containing group allocation numbers from a computer-generated random number table.

Soft-tissue mobilizations, muscle-energy techniques, manipulation and mobilization for lumbar segment techniques were applied to the first group (OMT) according to the patients' needs; moreover, exercise approaches were implemented, consisting of spinal stabilization, strengthening and stretching exercises.

In addition to the applications implemented on the first group, based on the evaluations of the physiotherapist trained on the related subject, thorax, lymphatic and liver pumping techniques, pelvic floor, diaphragm relaxation techniques and, according to the patients' needs, arterial, venous and neural techniques, lymphatic drainage and fascial mobilization for visceral organs were applied to the individuals in the second group (vOMT).

The treatment program comprised a total of 10 sessions for five weeks at two sessions per week. The evaluations were repeated on the sixth week after the beginning of the treatment.

The visual analog scale (VAS) was used to assess pain intensity. The patient determined the pain intensity on a 10 cm scale marked with points ranging from predetermined no pain and excruciating pain. Pain intensity was determined by measuring the marked area with a ruler.

For the quality-of-life determination, the SF-36 scale developed in 1992 by Rand Corporation was used. Sub-parameters including physical function, physical role limitations, pain, general health, energy, social function, emotional role limitations and mental health were evaluated with 36 questions with this scale, which was validated for Turkish reliability and validity in 1999. Each parameter was scaled as 0 being the worst state and 100 being the best [20,21].

Table 1
Demographic data of the patients

		Group I (OMT) ($n = 19$)	Group II (vOMT) ($n = 20$)	p[a]
Age (years)	Median (%25–75)	36 (29–47)	42 (34.2–51.5)	0.136
Height (cm)		172 (163–177)	162 (160–172)	0.078
Weight (kg)		78 (60–90)	75.5 (63–86.5)	0.899
BMI (kg/m^2)		27.1 (22.8–29.4)	26.7 (24.6–31.2)	0.368
Gender				
Female	N (%)	9 (47.4)	12 (60)	0.435[b]
Male		10 (52.6)	8 (40)	

The Mann-Whitney U[a] test for median numerical data (25%–75%) and $^{\mathrm{Chi}}$-square test[b] for categorical data were used for data values.

The function levels of the individuals were evaluated through means of the Oswestry Function Scale, which was validated for Turkish reliability and validity, by defining their condition consisting of six choices during activities including personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and travel. Lower values indicated the high excuse intensity in the function, while the high values indicated a good functional state [22,23].

All evaluations were conducted before the treatment and six weeks after the beginning of treatment.

2.1. Statistical analysis

PASW statistics 18 was used for statistical analysis. The data's compliance with the normal distribution was examined with visual (histograms and probability plots) and analytical methods (Kolmogorov-Smirnov, Shapiro-Wilk tests). Because it was determined that it was not in accordance with the normal distribution, the differences between the OMT group and the vOMT group were determined with the Mann-Whitney U test, for categorical data Chi-square test (for sex) and the changes after the treatment were determined with the Wilcoxon test. The statistical significance level was accepted as $p < 0.05$.

We used the Gx Power Package Program (Gx power, version 3.0.10, Franz Faul, Universitat Kiel, GERMAN) to determine the observed power. For SF-36 total physical score 39 patients was enough to obtain %80 power but other variable was defined as less than %80. Because there was no similar study in the literature we didn't calculate sample size at the beginning of the study so we want to show our early first results.

3. Results

The socio-demographic data of the individuals is shown in Table 1. Through the examination of the data, it was found that there were no statistically significant differences involving age, height, weight, body mass index (BMI) or gender variables in both groups ($p < 0.05$) (Table 1).

Pain intensity in both the OMT and vOMT groups decreased after the treatment (p OMT 0.000; p vOMT $= 0.000$). Significant developments were obtained in both groups in Oswestry function evaluation scores (p OMT $= 0.000$; p vOMT $= 0.000$). Comparing the SF-36 results before and after the treatment, improvement was observed in all parameters except for energy, emotional role limitations, mental health and total mental scores ($p > 0.05$), while improvement was observed in all subgroups of quality-of-life scores in vOMT after the treatment ($p < 0.05$) (Table 2).

Comparing the pain, function and quality-of-life values before the treatment, it was found that the values for both groups were similar for all parameters ($p < 0.05$). Comparing the change (difference) values before and after treatment, improvements in the physical function ($p = 0.028$), energy ($p = 0.034$) and total physical score ($p = 0.025$) parameters in the vOMT group were statistically better compared to the other variables.

4. Discussion

Our study has been the first to apply visceral techniques in non-specific lower back pain patients and determine the effect of vOMT methods on pain, function and quality of life in comparison with OMT methods. In our study, it was found that both treatment groups had an effect on pain and function, and physical function, pain, general health, social function of quality-of-life sub-parameters, while vOMT was effective on all sub-quality-of-life parameters in patients with chronic lower back pain.

In non-specific [24] low back pain, which is defined as a symptom characterized by tension and muscle stiffness in the waist region without any pathology, body muscle spasm and normal joint movements

Table 2
OMT and vOMT groups' data before and after the treatment

	OMT Group				vOMT Group			
	Before treatment median (25%–75%)	After treatment median (25%–75%)	Z	p^c	Before treatment median (25%–75%)	After treatment median (25%–75%)	Z	p^c
Pain	7 (5–7)	2 (1–3)	−3,828	*< 0.001**	8 (6.1–8)	2 (0.2–3)	−3,924	*< 0.001**
Oswestry	42 (32–60)	26 (11.1–36)	−3.704	*< 0.001**	50 (26.5–65.5)	16.5 (4.5–27)	−3.809	*< 0.001*
SF-36 physical function	45 (36–70)	75 (65–82)	−2.654	*0.008**	40 (22.5–50)	86 (70–90)	−3.928	*< 0.001**
Physical role limitations	0 (0–50)	50 (0–100)	−2.020	*0.043**	21.5 (0–68.7)	94 (60–100)	−3.658	*< 0.001**
Pain	41 (2–51)	62 (41–74)	−2.200	*0.028**	26.5 (22–48)	65 (62–74)	−3.921	*< 0.001**
General health	47 (42–60)	67 (45–72)	−2.204	*0.028**	51 (40–60)	67 (57–75.7)	−3.753	*< 0.001**
Energy	40 (35–50)	50 (30–70)	−1.400	0.162	38 (26.2–49.2)	60 (50–77.5)	−3,728	*< 0.001**
Social function	50 (35–70)	75 (62.5–75)	−2.849	*0.004**	62.5 (37.5–75)	73.5 (62.5–87.5)	−2.706	*0.007**
Emotional role limitations	33.3 (0–69)	66.7 (0–100)	−1.381	0.167	61.6 (0–66.7)	66.7 (66.7–100)	−3.119	*0.002**
Mental health	56 (44–60)	68 (52–74)	−1.352	0.176	50 (36–76)	73 (52.5–84)	−3.486	*< 0.001**
Total physical score	34.5 (29.3–41)	45 (37.8–50.9)	−2.294	*0.022**	29.9 (21–38.9)	50.5 (42.9–53.2)	−3.920	*< 0.001**
Total mental score	39.2 (33.2–48.2)	40.5 (33.5–52.1)	−1.288	0.198	38.5 (35–51.1)	50.6 (40.2–56.9)	−2.726	*0.006**

Wilcoxon analysis[c] results, before and after the treatment, statistical significance $*p < 0.05$.

Table 3
Comparison of OMT and vOMT group individuals before and after treatment

	Before treatment		BT-AT difference			
	Z	p^a	OMT average ± SD	vOMT average ± SD	Z	p^a
Pain	−1.493	0.136	4.77 ± 1.91	5.65 ± 1.64	−1.424	0.154
Oswestry	−0.014	0.989	22.60 ± 14.09	28.40 ± 18.19	−1.168	0.243
SF-36 physical function	−1.368	0,171	22 ± 28.54	42.95 ± 23.4	−2.200	0.028*
Physical role limitations	−1.241	0.215	31.36 ± 56.15	46.00 ± 35.14	−0.642	0.521
Pain-induced limitations	−0.711	0.477	19.26 ± 34.80	34.30 ± 19.21	−1.238	0,216
General health	−0.409	0.682	9.63 ± 16.65	17.25 ± 13.75	−1.297	0.195
Energy	−0.578	0.563	7.47 ± 20.76	21.10 ± 16.24	−2.115	0.034*
Social function	−1.229	0.219	21.11 ± 23.26	16.88 ± 23.48	−0.665	0.506
Emotional role limitations	−0.173	0.862	16.74 ± 45.63	29.76 ± 33.99	−1.101	0.271
Mental health	−0.211	0.833	6.94 ± 19.30	15.20 ± 17.09	−0.837	0.403
Total physical score	−0.956	0.339	8.08 ± 14.54	17.27 ± 7.96	−2.234	0.025*
Total mental score	−0.422	0.673	2.02 ± 9.57	7.15 ± 9.27	−1.405	0.160

Comparison of before treatment results and changes between before treatment and after the treatment, [a]Mann-Whitney-U test, *, statistical significance $p < 0.05$.

are restricted against harmful stress and the related segment or segments are stabilized [25] Spasm in the periphery triggers the pain, and the pain becomes chronic. Consequently, dysfunctions occur in the primary somato-sensorial area, which detects and conducts the pain [26] and in efferent pathways, which reduces the pain [27] in the central nervous system. The resulting pain reduces the functionality of the individual and negatively affects his or her quality of life. Examining the pain results in our study, pain intensity was reduced in both groups to which OMT and vOMT were applied after treatment. We believe that our program, supported by the OMT method and exercises, provides pain inhibition by reducing the muscle spasms and sympathetic system activation. This result, based on pain and spasm, has affected the literature in a similar way [12,14–16]. In the studies, the mechanism of pain reduction at the spinal and supraspinal levels with manual therapy techniques has not been fully revealed [28,29]. It was reported that osteopathic manual therapy, when applied together with many different methods as the innovation of manual therapy techniques [30,31], regulates the corticospinal changes that cause somatic function [32] and pain [33] by regulating the sensitivity of the 1a reflex pathway in various segments due to biomechanical loading on the mus-

cle spindles in patients with low back pain, thus reducing the pain in a short period based on the gate control theory [34,35]. Conclusively, it was shown that it can be effective in reducing pain and increasing function [36,37]. In a similar study by Crown et al. (2008) on patients with chronic non-specific low back pain, it was reported that OMT applications had positive effects on the function and quality of life of individuals [38]. In our study, we believe that the effect in the OMT group being not seen in energy, mental health, emotional role limitations and total mental score variables in the quality-of-life parameters is associated with the mental health state of the individuals in this group being related to factors other than physical health [39]. Thus, the examination of the depression states of individuals may be necessary in further studies.

It is thought that the visceral techniques used in OMT approaches, in addition to peripheral, spinal and central nociceptor stimulation, i.e., neurophysiological effects, have an effect on the related segment through somato-visceral effect [19,40]. Studies have shown that visceral techniques applied to healthy individuals can reduce the pain threshold compared to placebo application [19]. There were no studies available on the use of visceral techniques on individuals with nonspecific low back pain except for the study protocol proposed for application to 64 patients. As the results have not been published, the efficacy of visceral techniques on patients with chronic nonspecific low back pain is not known [18]. In our study, in which we shared the effects of visceral applications on the function and quality of life, it was found that on the sixth week of the treatment the visceral methods (vOMT) applied in addition to OMT and exercise approaches had an effect on all quality-of-life parameters. The studies proved that the muscles between the thoracic vertebrae and lumbosacral joint contracted as a result of the stimulation of internal organs [41]. Therefore, the additional stimuli formed with visceral applications in our study may have reduced the spasm of the related segment and regulated the peripheral and central pathways through the visceral somatic reflex arc, thus providing improvement. In our study, the positive emotional effects of visceral methods compared to the OMT group can be associated with (in addition to patients' solving their fascial visceral limitations, which most of the patients were not even aware of) the increase in morale and motivation in individuals by questioning their visceral problems and engaging in their resolution.

As a result of our study, in addition to improvement in both groups, it was found that the vOMT group had a greater effect on energy, physical limitations and the total score of the physical limitations from quality-of-life scores compared to the OMT group. We believe that the techniques we used for each patient during visceral applications improved the blood circulation in the patients' bodies, facilitated the elimination of body fluid and made the individual feel more energetic [42,43].

Conclusively, we believe that the use of visceral applications in patients with non-specific low back pain together with OMT and physiotherapy methods will provide positive treatment results. Therefore, the visceral fascial limitations, which we think are responsible for limitations and pain in lumbar segments, should be taken into account.

4.1. Limitations

Our study includes the results at the end of the sixth week, in which a total of 10 sessions were applied, being two sessions per week. The limited number of patients and the lack of long-term follow-up in the placebo control group, as well as the inability to give the results with different physiotherapy methods, functional and objective evaluation methods, are the limitations of our study. Therefore, randomized controlled long-term follow-up studies, including larger numbers of individual participants, are needed on this subject.

5. Conclusion

At the end of our study, it was found that OMT and vOMT, when applied to individuals with chronic lower back pain, reduced the pain, increased function and had positive effects on quality of life. The positive effect of the vOMT program on quality of life showed that visceral applications can be useful. The target of the study is to improve and share these results, which were given as a pilot, by applying them to a larger number of individuals with a longer follow-up period.

Conflict of interest

The authors have no conflict of interest to report.

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