International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Efficacy of Connective Tissue Manipulation on Depression, Anxiety and Related Gastrointestinal Symptoms

Eda Akbaş, EminUlaş Erdem, Banu Ünver

ZonguldakBülent Ecevit University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, 67600 EsenköyZonguldak/TURKEY

Corresponding Author: Eda AKBAŞ

ABSTRACT

The aim of this study was to investigate the effects of connective tissue manipulation on depressive symptoms, anxiety, fatigue and mood-related gastrointestinal symptoms in young women. Sixty young women were randomly assigned to connective tissue manipulation group (n=30) or control group (n=30). A total of 10 sessions of connective tissue manipulation were applied to the individuals in the connective tissue manipulation group while control group did not receive any intervention. Beck Anxiety Inventory and Beck Depression Inventory were used to evaluate mood state. The level of fatigue was assessed with The Fatigue Severity Scale. Nausea, reflux, stomachache, burping and dyspepsia symptoms were assessed with the 0- to 10-cm length Visual Analog Scales. The Constipation Severity Instrument was used to determine the frequency, intensity and difficulty/stiffness of stools in individuals. Significant decrease were detected in the both of the groups in terms of depression, anxiety and fatigue scores ($p>0.05$). The intensity of gastric complaints including nausea, reflux, stomachache, and dyspepsia and the sum of the Visual Analog Scale scores significantly decreased in the connective tissue manipulation group ($p<0.05$) while such outcomes did not change in control group ($p>0.05$) except dyspepsia ($p<0.05$). Obstructive Defecation and Pain sub-scores of Constipation Severity Instrument significantly decreased in connective tissue manipulation group, while Obstructive Defecation and Constipation Severity Instrument total score significantly decreased in the control group ($p<0.05$). According to our results, connective tissue manipulation contributes to improve mood state, reduce the severity of fatigue and lessen gastrointestinal symptoms in young women.

Keywords: Connective Tissue Manipulation, Anxiety, Depression, Fatigue, Gastrointestinal Symptoms

INTRODUCTION

Anxiety and mood symptoms which increase the risk of other psychopathology are worrying, disturbing and widespread in youth. [1,2] Gastrointestinal complaints and fatigue due to mood disorders such as anxiety and depression, leads to greater impairment, less favorable response to treatment, and greater utilization of health services. [3-10] Thus, the development of alternative treatment modalities to reduce these symptoms may contribute to the academic and social life of this population and prevent further health problems in ongoing years. [11,12]

Connective tissue manipulation (CTM) is a manipulative reflex therapy that stimulates the distal autonomic nerve endings with pulling force applied to the connective tissue. Although the effect

mechanism of CTM is not yet fully explained, it is argued that the autonomic nervous system (ANS) provides a balance between sympathetic and parasympathetic branches. Connective tissue manipulation creates local mechanical effects on connective tissue and certain cells and activates vasodilating reflex mechanisms by reducing sympathetic activity. As a result, circulation increases and circulation recovery accelerates healing in the organ associated with parasympathetic ganglia. [13-15]

In all functional disorders that do not have a pathological disorder, connective tissue manipulation is useful, especially when the tension due to psychological reasons increases. Connective tissue manipulation is thought to be effective on depressive symptoms and anxiety because it increases parasympathetic activation and leads general body relaxation. Since the past, studies have been conducted which investigate the effectiveness of different manipulation techniques including CTM on depressive symptoms and anxiety. [10,15-18] However, in these studies, no consensus has been reached on whether CTM should be superior to other techniques in reducing these symptoms. It has also been reported that the previous studies are insufficient to present enough evidence because the absence of placebo or control groups in those studies.

Therapeutic effect of connective tissue manipulation in gastrointestinal problems is based on the same principles. [19,20] Postganglionic neurons of the parasympathetic system are located within the myenteric and submucosal plexus of the enteric nervous system, and the gastrointestinal function increases after the induction of parasympathetic nerves. There are some studies in the literature investigating the effects of CTM on intestinal symptoms, but none of these studies investigated its effects on gastric symptoms. [19,20]

Previous studies investigating the efficacy of connective tissue manipulation on mood problems were conducted with fibromyalgia patients. [16,18] Apart from these studies, although there have been a few trials investigating the effects of connective tissue manipulation on constipation, the effects on gastric complaints has not been investigated at all. In consequence of the inconsistency and deficiency in the literature this study was planned to investigate the effects of connective tissue manipulation on depressive symptoms, anxiety, fatigue and mood related gastrointestinal symptoms in young women.

MATERIALS AND METHODS

The current research was performed as a prospective, randomized controlled experimental study. This study was carried out with the college students staying in ZonguldakBülent Ecevit University Dormitories which is located in the northwest of Turkey and the data were collected between April and June 2018. All the subjects volunteered to participate in this research, and signed the informed consent form approved by the ZonguldakBülent Ecevit University Clinical Research Ethics Committee (Protocol no: 2018-104-11/04).

Females aged between 18 and 25 years and who obtained at least 10 points from Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) participated in the study. Pregnancy, having a diagnosed gastrointestinal disease, medication use that would influence the psychological and gastrointestinal symptoms, contraindications to intervention including malignancy or acute inflammation was exclusion criteria.

On receipt of a completed consent form, 64 participants were randomly assigned to Connective Tissue Manipulation Group (CTMG) and Control Group (CG). After randomization initial assessments were conducted. A total of 10 sessions CTM were applied to the individuals in the CTMG while CG did not receive any intervention during study. Final assessments of the CTMG were conducted right after CTM sessions completed while outcomes of

CG were evaluated 3 weeks after baseline. Two participants of the CTMG dropped out from the study due to personal reasons and two participants of the CG were excluded due to analgesic drug use. The final sample was composed of 60 participants, 30 in the CTMG and 30 in the CG.

Outcome Measures

Beck Anxiety Inventory (BAI) was used to evaluate the anxiety symptoms. BAI is a 21-items self-report instrument for measuring the severity of anxiety in adolescents and adults. For the assessment of depression Beck Depression Inventory (BDI) was used. This index evaluates the grade of depression using 21 questions similarly to BAI. The reliability Turkish version of these scales has been confirmed in the previous studies. [21,22] The higher scores indicate a more severe anxiety, and depression according to the scales.

Nausea, reflux, stomachache, burping and dyspepsia symptoms were assessed with the0- to 10-cm length Visual Analog Scales (VASs). Subjects were asked to mark the appropriate place on the VAS based on the severity of their complaints in the last week. Zero indicated no complaint and the 10 represented the worst imaginable complaint for gastric symptoms.

The Constipation Severity Instrument (CSI) developed by Varma et al. [23] was used to determine the frequency, intensity and difficulty/stiffness of stools in individuals. There are 16 questions on the scale. CSI has three dimensions: Obstructive Defecation (OD), Colonic Inertia (CI) and Pain. The total score that can be taken from CSI is 0 at the lowest, 73 at the highest. High scores indicate that the symptoms are serious. Kaya et al. [24] have shown that the Turkish version of the CSI is a valid and reliable scale for the identification and severity of constipation complaints.

The level of fatigue was assessed with The Fatigue Severity Scale (FSS). FSS is a self-administered questionnaire with 9 items (questions) investigating the severity of fatigue in different situations during the past week. Grading of each item ranges from 1 to 7, where 1 indicates strong disagreement and 7 strong agreement, and the final score represents the mean value of the 9 items. [25]

Connective Tissue Manipulation

A total of 10 sessions CTM were applied to the individuals in the CTMG with 5-20 minutes each session every other day by a trained physiotherapist. Starting from the lumbosacral area (basic section), the sub-thoracic region, scapular region, inter-scapular region and cervical region were included, respectively. During the treatment, the subject was sitting erect on a stool, with 90° flexion of the hips, knees, and ankles. The back was straight and the hands were placed on the thighs for optimal tension of the connective tissue. The pulls were applied to the region where the fascia stuck to the bone or where the fascia was superficial. Physiotherapist manipulated the tissue as not to cause pain and irritate the subject.

Statistical Analysis

Statistical analysis was performed with SPSS for Windows release 19.0.0/2010 (IBM-SPSS Inc., Chicago, IL). Level of 5 % was used to determine significant differences. Normality tests (visual, and analytical) revealed that continuous variables were not normally distributed. Demographic data and baseline outcomes of two groups were compared using Mann-Whitney U test. Intra-group analysis of the dependent variables was conducted using Wilcoxon signed-rank test.

RESULTS

There were no significant differences between the CTMG, and CG in terms of demographic features including age (years), height (cm), weight (kg), and BMI (kg/m2) ($p>0.05$) (Table 1). Groups were also homogeneous based on the severity of depression, anxiety, fatigue and gastrointestinal symptoms except reflux ($p>0.05$) (Table 1).

Table 1: Demographic features and baseline outcomes of the participants

	CG (n=30) $\overline{X} \pm SD$	CTMG (n=30) $\overline{X} \pm SD$	p
Age	20.60±1.54	21.33±1.60	0.050
Height (m)	163.40±5.98	164.30±6.42	0.599
Weight (kg)	58.30±8.57	56.03±10.47	0.604
BMI (kg/m^2)	21.77±2.42	20.75±3.68	0.379
BDI	16.46±8.41	18.63±11.88	0.579
BAI	18.60±11.84	20.23±12.14	0.584
FSS	4.46±1.42	4.67±1.35	0.579
Nausea	2.20±2.09	2.63±2.07	0.462
Reflux	0.76±1.45	2.46±2.95	0.030*
Stomachache	2.46±1.75	3.40±3.03	0.216
Burping	1.76±2.78	1.63±2.35	0.358
Dyspepsia	3.00±2.77	3.83±3.15	0.278
Total VAS score	10.00±8.02	13.96±9.94	0.103
OD score	12.40±3.92	13.83±4.37	0.309
CI score	10.86±5.28	9.63±4.47	0.370
Painscore	2.33±2.79	2.36±2.91	0.945
Total CSI score	25.06±8.94	25.96±8.62	0.529

**p<0.05*
BMI: Body Mass Index, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, FSS: Fatigue Severity Scale, VAS: Visual Analog Scale, OD: Obstructive Defecation, CI: Colonic Inertia, CSI: Constipation Severity Instrument

Significant decrease were detected in the both of the groups in terms of BDI, BI and FSS scores (p<0.05) (Table 2).

Table 2: Intra-group comparison of depression, anxiety and fatigue

	CG (n=30) $\overline{X} \pm SD$		p	CTMG (n=30) $\overline{X} \pm SD$		p
BDI	B	16.46±8.41	0.008*	B	18.63±11.88	<0.001*
	A	12.56±8.58		A	9.03±8.01	
BAI	B	18.60±11.84	0.033*	B	20.23±12.14	0.002*
	A	14.30±10.64		A	11.36±8.80	
FSS	B	4.46±1.42	0.004*	B	4.67±1.35	0.013*
	A	3.50±1.76		A	3.76±1.94	

**p<0.05*
BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, FSS: Fatigue Severity Scale, B: Before, A: After

Intensity of gastric complaints including nausea, reflux, stomachache, and dyspepsia and the sum of the VAS scores significantly decreased in the CTMG (p<0.05) while such outcomes did not change in CG (p>0.05) except dyspepsia (p<0.05) (Table 3).

Table 3: Intra-group comparison of gastric symptoms

	CG (n=30) $\overline{X} \pm SD$		p	CTMG (n=30) $\overline{X} \pm SD$		p
Nausea	B	2.20±2.09	0.331	B	2.63±2.07	0.004*
	A	1.66±1.74		A	1.43±1.35	
Reflux	B	0.76±1.45	0.473	B	2.46±2.95	0.020*
	A	1.00±1.68		A	1.30±1.60	
Stomachache	B	2.46±1.75	0.103	B	3.40±3.03	0.022*
	A	1.66±2.05		A	2.26±2.01	
Burping	B	1.76±2.78	0.833	B	1.63±2.35	0.102
	A	1.76±2.22		A	1.16±1.78	
Dyspepsia	B	3.00±2.77	0.019*	B	3.83±3.15	0.004*
	A	1.63±2.26		A	2.43±2.06	
Total VAS score	B	10.00±8.02	0.095	B	13.96±9.94	0.001*
	A	7.80±7.48		A	8.53±5.95	

**p<0.05*
VAS: Visual Analog Scale, B: Before, A: After

Analyses also revealed that OD and Pain sub-scores significantly decreased in CTMG, while OD and CSI total score significantly decreased in the CG (p<0.05). There were no significant differences between initial and final outcomes in the both of the groups in terms of CI sub-scores (p>0.05)(Table 4).

Table 4: Intra-group comparison of Constipation Severity Instrument Scores

	CG (n=30) $\overline{X} \pm SD$		p	CTMG (n=30) $\overline{X} \pm SD$		p
OD score	B	12.40±3.92	0.032*	B	13.83±4.37	0.033*
	A	10.16±4.82		A	12.13±4.11	
CI score	B	10.86±5.28	0.056	B	9.63±4.47	0.580
	A	8.56±4.55		A	10.10±5.89	
Painscore	B	2.33±2.79	0.109	B	2.36±2.91	0.024*
	A	1.56±2.86		A	1.40±2.01	
Total CSI score	B	25.06±8.94	0.020*	B	25.96±8.62	0.072
	A	20.30±10.84		A	23.13±8.21	

**p<0.05*
VAS: Visual Analog Scale, B: Before, A: After

DISCUSSION

This study was conducted to investigate the effects of connective tissue manipulation on gastrointestinal symptoms, depression, anxiety and fatigue in young women. According to our results, connective tissue manipulation contributes to improve mood state, reduce the severity of fatigue and lessen majority of gastrointestinal symptoms in young women.

Anxiety and depressive symptoms and other related physical complaints are permanent in young population. Although the individuals are not diagnosed psychiatrically, the worsening and variability of mood adversely affect their social and academic lives. In the literature a few studies have investigated the effectiveness of connective tissue manipulation on anxiety and depressive symptoms and these were solely conducted in patients with fibromyalgia syndrome. [16,18] Ekiciet al. [16] concluded that connective tissue manipulation may affect the health-related quality of life positively which includes emotional reactions in patients with fibromyalgia syndrome. However, manual lymph drainage therapy was found to be more effective than CTM according morning tiredness and anxiety items of Fibromyalgia Impact Questionnaire. There was no significant change in the fatigue item score of the same questionnaire after interventions. A previous study showed greater improvements in depression and quality of life in the connective tissue massage therapy group versus controls, but no differences in anxiety in patients with fibromyalgia. [18] The current study revealed that 10 sessions connective tissue manipulation might decrease the severity of anxiety and depressive symptoms. The reduction in the level of fatigue of the participants is another benefit stemming from the connective tissue manipulation. Yet unexpectedly, our results also indicated that anxiety and depressive symptoms were reduced in the control group too, which did not receive any intervention during study. We think this condition might be the demonstration of variability of the emotions and mood state of this population. Besides psychological state can be affected by many unpredictable personal and/or environmental factors.

Literature provided evidence supporting the importance of anxiety as an important mediating factor affecting gastrointestinal symptom severity. [3-5] Current study showed that connective tissue manipulation is effective on decreasing intensity of gastrointestinal complaints besides anxiety. A previous study showed that CTM and lifestyle advice were superior to reducing symptoms of constipation and quality of life compared with lifestyle advice alone for patients with chronic constipation. [19] A recent trial also concluded that CTM and KT were equally effective physiotherapy approaches for the treatment of pediatric constipation and these approaches might be added to bowel rehabilitation program. [20] Although there are only a few studies in the literature investigating the relationship between connective tissue manipulation and chronic constipation, there are no relevant studies investigating the relationship between CTM and gastric complaints. This study is unique at the point that investigating the effectiveness of CTM on the intensity of gastric complaints and we revealed that CTM contributes reducing nausea, reflux, stomachache, and dyspepsia in line with decrease in anxiety and depressive symptoms. Besides, in accordance with the literature, our study demonstrated that CTM was also effective on reducing constipation symptoms in terms of obstructive defecation and pain items. Connective tissue manipulation stimulates the autonomic nervous system by reflex ways to increase intestinal mobility. [19,20] Reflexive effect of connective tissue manipulation on gastrointestinal symptoms might be achieved by balancing the sympathetic and parasympathetic components, increasing circulation in the parasympathetic ganglion and increasing the circulatory reaction at the same time. [19,20,26-28]

Although anxiety and depressive signs and other physical symptoms associated with these are common in young women and the effect mechanism of connective tissue manipulation promises to improve this situation, there is no evidence in the literature on this subject. The most significant contribution of this study to the literature is to be the first research investigating the effectiveness of connective tissue manipulation on gastric symptoms.

The major limitation of this study was that although a lower limit for anxiety and depressive symptoms was set as inclusion criteria, poor mood related physical symptoms of the participants were not particularly significant as expected at the baseline. We think this situation makes it difficult to clearly demonstrate the effectiveness of connective tissue manipulation.

CONCLUSION

According to our results, connective tissue manipulation contributes to reduce the intensity of anxiety, depressive symptoms, and fatigue and depress gastrointestinal symptoms in young women. As authors, we think that connective tissue manipulation promises to manage mood-related physical complaints and can be applied to improve mental and physical well-being of the individuals.

REFERENCES

1. Garber J, Weersing VR. Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. ClinPsychol (New York). 2010;17(4):293-306.
2. Kendall PC, Compton SN, Walkup JT et al. Clinical characteristics of anxiety disordered youth. J Anxiety Disord. 2010:24(3):360-365.
3. Jerndal P, Ringström G, Agerforz P et al. Gastrointestinal-specific anxiety: an important factor for severity of GI symptoms and quality of life in IBS. J NeurogastroenterolMotil. 2010;22(6):646-e179.
4. Gros DF, Antony MM, McCabe RE et al. Frequency and severity of the symptoms of irritable bowel syndrome across the anxiety disorders and depression. J Anxiety Disord. 2009;23(2):290-296.
5. Kearney DJ, McDermott K, Martinez M et al. Association of participation in a mindfulness programme with bowel symptoms, gastrointestinal symptom-specific anxiety and quality of life. Aliment PharmacolTher. 2011;34(3): 363-373.
6. Hartono JL, Mahadeva S, GOH KL.Anxiety and depression in various functional gastrointestinal disorders: do differences exist? J Dig Dis. 2012;13(5):252-257.
7. Addolorato G, Mirijello A, D'Angelo et al. State and trait anxiety and depression in patients affected by gastrointestinal diseases: psychometric evaluation of 1641 patients referred to an internal medicine outpatient setting. Int J ClinPract. 2008;62(7):1063-1069.
8. Cho HS, Park JM, Lim CH et al. Anxiety, depression and quality of life in patients with irritable bowel syndrome. GUT LIVER. 2011;5(1):29.
9. Roy-Byrne PP, Davidson KW, Kessler RC et al. Anxiety disorders and comorbid medical illness. Gen Hosp Psychiatry. 2008;30(3):208-225.
10. Castro-Sánchez AM, Matarán-Peñarrocha GA, Granero-Molina J et al. Benefits of massage-myofascial release therapy on pain, anxiety, quality of sleep, depression, and quality of life in patients with fibromyalgia. Evid Based Complement Alternat Med, 2011.
11. Jorm AF, Morgan AJ, Wright A. Interventions that are helpful for depression and anxiety in young people: a comparison of clinicians' beliefs with those of youth and their parents. J Affect Disord. 2008;111(2-3):227-234.
12. Garner B, Phillips LJ, Schmidt HM et al. Pilot study evaluating the effect of massage therapy on stress, anxiety and aggression in a young adult psychiatric inpatient unit. Aust N Z J. 2008;42(5):414-422.
13. Holey LA, Dixon J. Connective tissue manipulation: a review of theory and clinical evidence. J BodywMovTher. 2014; 18(1):112-118.
14. Holey LA, Dixon J, Selfe J et al. An exploratory thermographic investigation of the effects of connective tissue massage on

autonomic function. J Manipulative PhysiolTher. 2011;34(7):457-462.
15. Yuan SLK, Matsutani LA, Marques AP. Effectiveness of different styles of massage therapy in fibromyalgia: a systematic review and meta-analysis. Man ther. 2015; 20(2): 257-264.
16. Ekici G, Bakar Y, Akbayrak T et al. Comparison of manual lymph drainage therapy and connective tissue massage in women with fibromyalgia: a randomized controlled trial. J Manipulative PhysiolTher. 2009;32(2):127-133.
17. Kalichman L. Massage therapy for fibromyalgia symptoms. Rheumatol Int. 2010;30(9):1151-1157.
18. Brattberg G. Connective tissue massage in the treatment of fibromyalgia. Eur J Pain. 1999;3:235–244.
19. Gürsen C, Günel MK, Kaya S et al. Effect of connective tissue manipulation on symptoms and quality of life in patients with chronic constipation: a randomized controlled trial. J Manipulative PhysiolTher. 2015;38(5): 335-343.
20. Orhan C, Kaya Kara O, Kaya S et al. The effects of connective tissue manipulation and Kinesio Taping on chronic constipation in children with cerebral palsy: a randomized controlled trial. DisabilRehabil. 2018;40(1):10-20.
21. Ulusoy M. Turkish version of the Beck Anxiety Inventory: psychometric properties. J CognitPsychotherInternat Quart. 1998; 12:2.
22. Hisli N. Beck Depresyon Envanteri' ningeçerliğiüzerinebirçalışma. Psikolojidergisi. 1988;6(22):118-122.
23. Varma MG, Wang JY, Berian JR et al. The constipation severity instrument: a validated measure. *Dis Colon Rectum*. 2008;*51*(2): 162-172.
24. Kaya N, Turan N. Konstipasyon Ciddiyet ÖlçeğininGüvenilirlikveGeçerliliği. *Turkiye Klinikleri J Med Sci*. 2011;*31*(6):1491-1501.
25. Armutlu K, Korkmaz NC, Keser I. The validity and reliability of the Fatigue Severity Scale in Turkish multiple sclerosis patients. *Int J Rehabil Res. 2007;30*(1):81-85.
26. Çıtak-Karakaya İ, Akbayrak T, Demirtürk F et al. Short and long-term results of connective tissue manipulation and combined ultrasound therapy in patients with fibromyalgia. J Manipulative Physiol Ther. 2006;29(7): 524-528.
27. Holey EA. Connective tissue massage: a bridge between complementary and orthodox approaches. J BodywMovTher. 2000;4(1):72-80.
28. Reis C, Hardy E, Sousa M. The effectiveness of connective tissue massage in the treatment of primary dysmenorrhea among young women. Rev Bras Saúde Mater Infant. 2010;10(2):247-256.

How to cite this article: Akbaş E, Erdem E, Ünver B. Efficacy of connective tissue manipulation on depression, anxiety and related gastrointestinal symptoms. Int J Health Sci Res. 2018; 8(11):37-43.

******