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INVESTIGATION OF THE EFFECTS OF CONNECTIVE TISSUE MOBILISATION ON QUALITY OF LIFE AND EMOTIONAL STATUS IN HEALTHY SUBJECTS

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Abstract

Background: Connective Tissue Massage (CTM) or Manipulation is a bodywork technique which lies at the interface between alternative approaches. The autonomic balancing responses to CTM can be useful in the treatment of anxiety.
Aim: This study was planned to investigate the effects of connective tissue mobilization (CTM) on quality of life and emotional status in healthy subjects. **Design;** Prospective trial, **Setting;** Treatment and **Population.** The study was conducted on 100 volunteers (students). Students in second class were in CTM group (20,49±1,37 years) and students (19,50±1,15 years) educating in class 1 were in control group.
Methods: Participants were assessed before and after CTM according to flexibility of trunk flexion, hamstring muscles, trunk hyperextension and lateral flexion. It was used The SF-36 Health-Related Quality of Life Inventory (SF-36) to assess general health status and Beck Depression Scale was used for assessing emotional status.
Results: It was observed a significant increase at lateral flexion to the right of trunk (p=0,03) in CTM group after application. It was found a significant difference (p=0,009) in emotional status between groups. It was found differences at general health level (p=0,001), limitations in emotional role (p=0,016) in SF-36. It was some differences in depression status and some subscales of SF-36 (general health, social status, emotional well-being, pain and energy levels) in favour of control group before application. It was no difference between groups after application.
Conclusion: CTM could be used for minimizing depressive symptoms, improving quality of life in healthy young subjects.

Key words: Connective tissue massage, Rehabilitation, General health status, Emotional status.

Introduction

Connective Tissue Massage (CTM) or Manipulation is a bodywork technique which lies at the interface between alternative and orthodox treatment approaches (Holey, 2000).

Use of connective tissue massage (CTM) in the United States is limited (Reiter et al, 1969), but the technique is widely used by European physical therapists to treat various somatic and visceral disorders. Connective tissue massage consists of several stroking maneuvers that are both diagnostic and therapeutic in nature. The strokes are applied to defined zones of the body and are believed to cause beneficial reflex effects in the organs and tissues innervated by the zones (Scarsdale and Sidney, 1978; Malabar and Krieger, 1985). Strokes are applied in a specific sequence and, for the most part, are oriented per- pendicular to and directed at underlying target structures (eg, bone, muscle, or fascial borders). Strokes are applied slowly with the fingertips to create traction between the cutaneous and subcutaneous tissues (Scarsdale and Sidney, 1978).Treatment always begins with the basic section that covers the lumbosacral area of the back (Scarsdale and Sidney, 1978).Treatment can then be expanded to the upper trunk and the extremities, depending on the problem to be treated. Numerous case studies have documented the apparent beneficial effects of CTM (Scarsdale and Sidney, 1978; Malabar and Krieger, 1985; Ebner, 1965; Ebner, 1968; Frazer, 1978).

There are lot of references connective tissue massage lead to reduced tension in the autonomic nervous system with secondary increased circulation which gives a sense of warmth, muscle relaxation, pain relief and increased mobility (Hamann and Haschke, 1983; Muschinsky, 1984).

The mechanisms of the therapeutic effects of CTM are not well understood, although Ebner (Malabar and Krieger,1985; Ebner,1968) and Schliack (Schliack,1978) have speculated about possible CTM mechanisms. They point out that, because of the nature of embryological development, inner- vation of body parts by the peripheral nervous system follows a segmental distribution. Dermatomes and myotomes that are innervated at the same spinal cord level as a malfunctioning organ, therefore, may reflect the malfunction through changes in skin and subcutaneous tissue tension. Connective tissue massage applied to the affected dermatomes may induce reflex effects in the associated organ (Malabar and Krieger,1978; Schliack,1978). Ebner hypothesized that CTM produces local mechanical effects on connective tissue and constituent cells (eg, mast cells release histamine, fibroblasts produce glucose-aminoglycands) and causes reflex mechanisms that reduce sympathetic activity to produce vasodilation. The result is that circulation to related tissues, including parasympathetic ganglia, is increased, leading to more normal circulation throughout the body. Such improve- ment in circulation may promote healing, increase collateral circulation, enhance or normalize connective tissue extensibility, improve response to exercise, decrease muscle spasms, and promote a balance within the autonomic nervous system (ANS) (Ebner, 1968). The effects of CTM on the ANS have not been validated conclusively to date.

Research has also shown that connective tissue massage increases blood flow and gives pain relief (Goats and Keir, 1991). A positive correlation has been found between the degree of muscle tension and pain, and the increase in plasma myoglobine concentration after one massage treatment.

After repeated massage treatments a gradual decline, in the increase in plasma myoglobine concentration could be demonstrated parallel to a reduction in the muscle tension and pain (Danneskibld-Samsoe et al., 1983; Danneskibld-Samsoe et al., 1986; Holey et al., 2011). It has also been reported that connective tissue massage increases plasma beta-endorphin concentration (Kaada and Torsteinbo, 1989).

The autonomic balancing responses to CTM can be useful in the treatment of anxiety. McKechnie et al. 1983), found that anxious patients responded favourably to CTM. Connective tissue massage has been shown to reduce tension and anxiety in a study with five subjects (McKechnie et al., 1983).

This study was to investigate the effects of CTM on tissue flexibility, emotional status and health-related quality of life in healthy subjects.

Materials and Methods

The study was conducted on 100 volunteers between September 2010-February 2011 in Pamukkale University School of Physical

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Therapy and Rehabilitation. All procedures were in accordance with the ethical standards for human experimentation established by the Decleration of Helsinki. Before they were enrolled in the study, the patients had to provide written informed consent. Voluntary participants in the study inclusion and exclusion criteria:

Inclusion criteria

1. Student attending School of Physical Therapy and Rehabilitation
2. For voluntary participants, age range of 18 to 25 years.
3. Absence of systemic disease
4. Absence of regular medications.
5. Absence of congenital posture deformity
6. Absence of surgical operation within last 6 months

Exclusion criteria

1. Age of subject below 18 years and above 25 years
2. Subjects with systemic disease
3. Subjects with regular medication
4. Subjects with congenital posture deformity
5. Subjects undergoing surgery within past six months

One hundred healthy volunteers were randomly divided into two groups: Group I (CTM) and group II (control). The randomization was done using by SPSS 18.0 packet program. Each group included 50 participants. All participants performed all the test just for this selected study. Namely, we had no missing data or participants. Briefly, 100 healthy volunteer completed all the procedures of this study.

The mean age of the Group I and Group II were 20,89±1,47 years and 19,73±0,99 years, respectively.

It was applied CTM in total of 18 treatment hours to volunteers in group I for 3 days a week at 6 weeks. It was applied on basic region in the beginning and progressed to cervical region regarding blood circulation of the tissue. The back of the body was treated at last 5 hours.

During the treatment position, subjects sat erect position without back support, with their hips, knees, and ankles positioned at 90 degrees and with their thighs and feet fully supported. A pillow was placed on subjects' lap for forearm support.

A detailed description of the therapeutic technique appears elsewhere (Scarsdale and Sidney, 1978; Malabar and Krieger, 1985) although the main elements may be summarized thus. Treatment commences with a series of short strokes over the sacrum, lumbar spine and posterolateral pelvis, which are developed into longer paravertebral and subcostal strokes. The pressure is firm and may feel like an uncomfortable scratching or cutting. CTM induces a triple response, and once the condition of the subcutaneous tissues in the massaged region returns to normal, treatment can progress to the thoracic and cervical regions of the spine, the on front of chest and the head. Short paravertebral strokes precede those passing from the transverse to the spinous processes. Once developed into longer strokes, the massage then fans out from the line of the vertebrae to follow the intercostal spaces towards the scapulae and the occiput.

All participants were assessed before and after CTM according to flexibility of trunk flexion and hamstring muscles, trunk hyperextension and lateral flexion.

Flexibility Tests

Lateral Flexion of trunk

Subject will stand still and a mark is made on upper leg, where tip of third finger of upper extremity reaches. Subject flexion trunk to lateral side. A mark is made on upper leg again, where third finger of hand reaches. The distance between the two marks is measured. It is expressed in centimeters. Same procedure is repeated at contralateral side (Otman and köse, 2008).

Hyperextension of trunk

Subject faces wall and stands still, placing pelvis and trunk is fully in contact with the wall. Baseline value is obtained by measuring distance between wall and sternal notch. Pelvis is supported and subject is asked to push trunk backwards, bending at lower back region. The distance is measured again between sternal notch and wall. Distance of movement is calculated by subtracting the baseline value from the second value, and is expressed in centimeters (Otman and köse, 2008).

Flexion of trunk and Length of Hamstring

Subject stands on a block with height of 15 cm and bends anterior without flexing knees and tries to touch tip of toe. The distance is measured between fingertip and upper surface of wooden block. Values below block surface are deemed as positive, while values above block surface are deemed negative, and results are expressed in centimeters. This test evaluates flexibility of lumbar region, hamstring muscles and M. Gastrocnemius (Otman and köse, 2008).

All assessments were done before CTM and after CTM (at the end of 6th week) by an experienced physical therapist.

Beck Depression Inventory (BDI)

Beck Depression Inventory (BDI) was applied to detect emotional status. It is a 21-item self-report questionnaire on which presence and severity of depressive symptoms are assessed. Each item is scored on a four-point scale ranging from 0 (absent) to 3 (severe). Total scores may range from 0 to 63. The cut-off point is 17 for in a Turkish adult population. The BDI was adapted into Turkish in 1988 by Hisli with acceptable reliability and validity findings. The BDI have high reliability and internal consistency (Hisli, 1989).

The SF-36 Health-Related Quality of Life Inventory (SF-36)

Quality of life was assessed using to the SF-36. This generic rating scale has 36 items intended to reflect aspects of health from the perspective of the patient. The SF-36 assumes that 35 of its items can be grouped into eight scales; physical functioning, role limitation, bodily pain, social functioning, general mental health, role limitation due to emotional problems, energy level and general health perceptions. Total

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scores may range from 0 to 100. Each scales ranging from 0 (presence of all problems) to 100 (no problems at all) within a dimension. The SF-36 was adapted into Turkish by Kocyigit et al with acceptable reliability and validity findings (Koçyigit et al.,1999).

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS version 18.0). The Kolmogorov- Smirnov Test was used to check the normality at the data. The data were found to be parametric. The Paired t- test was used to compare pre- post results. The Independent Samples Test was used to compare of the groups. A level of $p<0.05$ was considered as significant. To calculate the number of the each group, the power analysis was done. And the number of each group was set up as 50 and the result of the power analysis was found very reliable (95%) and very strong (90%).

Results

The mean ages of the Group I and Group II were 20, 89±1,47 and 19,73±0,99 years, respectively. The demographics and clinical characteristics of the Group I (CTM) and Group II (healthy controls) at baseline are shown in Table 1.

There were a significant difference in flexibility of lateral flexion to the right side between pre and after treatment in the CTM group (p=0, 03). The BDI score was significantly decreased (p=0,09) after CTM treatment in group I. It was found significant differences in general health perceptions (p=0.00) and emotional role limitation (p=0,00) subscales in SF-36 between pre and after CTM. Also, it was not any significant differences between baseline scores and second assessments after at the sixth week in group II (Table 2).

When the compared groups at the end of CTM, it was found a significant differences (p=0,01) between two groups in emotional status (BDI) (Table 3). And also, there were significant differences in general health perceptions (p=0.02), social functioning (p=0,00), general mental health (p=0,00), bodily pain (p=0,03) and energy level (p=0,00) as SF-36 subscales (Table 3).

After CTM, it was not any significant differences between the two groups (Table 4).

Table 1: Demographic characteristics of volunteers.

	Group I (CTM)		Group II (Controls)	
Variables	min-max.	Mean±SD	min-max.	mean±SD
Age (yrs.)	18-25	20,89±1,47	18-23	19,73±0,99
Height (cm.)	160-190	173,91±7,79	155-182	170,00±7,14
Weight (kg.)	48-120	68,82±13,40	42-90	61,32±11,74
BMI (kg/m^2)	30-66,67	39,46±6,78	25,45-50,00	35,94±5,84
Gender	n	%	n	%
female	16	32	32	64
male	34	68	18	36

Table 2: Comparison of flexibility, emotional status and health-related quality of life before and after CTM between Groups.

	Group I (CTM)		Group II (Controls)	
Variables	T	p*	t	p*
Flexibility				
trunk flexion, hamstrings	-0,13	0,89	0,51	0,61
trunk hyperextension	0,72	0,46	-1,79	0,09
trunk lateral flexion				
right	2,21	0,03	1,42	0,17
left	1,67	0,09	1,73	0,10
BDI	2,68	0,00	0,84	0,41
SF-36				
Physical functioning	0,31	0,75	0,00	1,00
Physical role limitation	-0,61	0,54	-1,46	0,16
Emotional role limitation	-4,10	0,00	-0,20	0,83
Energy level	-0,90	0,36	1,71	0,10
General mental health	-1,89	0,06	2,28	0,06
Social functioning	-1,90	0,06	0,94	0,35
Bodily pain	-1,68	0,09	1,68	0,11
General health perceptions	-3,38	0,00	0,00	1,00

*Paired sample t- test

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Table 3: Comparison of emotional status and health-related quality of life between groups before CTM.

	Group I (CTM)	Group II (Controls)	
Variables	Mean±sD	mean±sD	p*
Flexibility			
trunk flexion, hamstrings	22,36±10,39	22,00±7,73	0,895
trunk extension	20,80±6,20	20,56±5,99	0,886
trunk lateral flexion			
right	21,22±4,57	20,81±3,91	0,741
left	20,76±4,83	20,83±4,03	0,972
BDI	8,45±7,14	4,50±4,45	0,011
SF-36			
Physical functioning	89,80±12,34	93,12±10,14	0,26
Physical Role limitation	79,60±33,59	82,81±37,32	0,75
Emotional Role limitation	52,94±44,92	72,75±38,93	0,08
Energy level	55,06±17,38	69,37±16,21	0,00
General mental health	60,36±16,48	74,50±15,09	0,00
Social functioning	67,09±20,92	84,25±18,08	0,00
Bodily Pain	70,02±18,51	81,31±21,03	0,03
General health perceptions	59,51±16,58	70,31±19,87	0,02

*Independent samples t-test.

Table 4: Comparison of emotional status and health-related quality of life between groups after CTM.

	Group I (CTM)	Group II (Controls)	
Variables	Mean±SD	mean±SD	p*
Flexibility			
trunk flexion, hamstrings	22,37±8,69	20,56±7,44	0,440
trunk extension	20,42±7,18	23,37±6,80	0,135
trunk lateral flexion			
right	19,97±4,65	19,06±4,59	0,477
left	19,75±4,46	18,62±4,45	0,360
BDI	6,91±7,85	4,50±5,69	0,160
SF-36			
Physical functioning	89,93±10,96	93,12±9,97	0,260
Physical Role limitation	82,23±27,02	89,06±27,33	0,370
Emotional Role limitation	76,40±30,57	74,87±37,58	0,880
Energy level	57,13±18,50	66,25±16,38	0,060
General mental health	63,78±17,13	70,50±16,45	0,130
Social functioning	72,25±16,75	81,06±21,98	0,140
Bodily Pain	74,67±17,91	75,75±23,58	0,860
General health perceptions	65,60±18,01	70,31±24,25	0,470

*Independent samples t-test.

Discussion

We designed our study to examine the effect of connective tissue massage (CTM) on flexibility of connective tissue (CT), and on changes to pain level, overall life quality, and depressive symptoms. We observed statistically significant improvement in right lateral trunk flexionfor the CTM treatment group during the post-treatment period. However, effects on all other flexibility tests were non-significant. In

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addition, statistically significant differences were noted in emotional state role restriction and general health,sub-parameters of general life quality scale. When results were compared with that of the control group, statistically significant differences were observed, favoring the control group, in energy level, mental state, social status, pain and general health among sub-parameters of general life quality scale for pre-treatment values; however, no statistically significant difference was observed for post-treatment values. The underlying reason is that measurement values of CTM are poor and they reached the level of control group in post-treatment period.

CTM was discovered by Elisabeth Dicke at 1929 (Holey et al., 2000; Dicke et al., 1978). CTM is a reflex therapy which utilizes a shear force at connective tissue interfaces in the skin to stimulate autonomic nerve endings and to restore balance between the sympathetic and parasympathetic components of the autonomic nervous system (Holey, 2000; Bieber et al., 2006). Today, the technique is showing renewed interest amongst those manual therapists who are open to “alternative” and complementary concepts but enjoy placing them within an anatomical and physiological context. The use of CTM in the United States is limited, but the technique is widely used by European physical therapists to treat various somatic and visceral disorders (Reed and Held, 1988).

CTM is one style of massage technique and is thought to be an effective therapy, producing general body relaxation, reducing muscle spasms, connective tissue tenderness, and increasing plasma b-endorphins (Ebner, 1978). In the CTM technique, the strokes are applied to the defined zones of the body by using fingertips in a specific sequence and are believed to cause beneficial reflex effects in the organs and tissues innervated by the zones (Ebner, 1978; Schliac, 1978; Goats and Keir, 1991; Reed and Held,1988).

Connective tissue manipulation–related literature is mainly about its effects on autonomic responses, regard to the effectiveness of this treatment for some patients suffering from anxiety states (Diego et al., 2002; McKechnie et al., 1983). Massage therapy (MT), in contrast, was used in only one study in the literature. In that study child and adolescent psychiatric patients had lower anxiety levels following five massage therapy sessions as well as more optimal affect and sleep patterns and lower stress hormones including cortisol and norepinephrine (Field et al., 1992).

Numerous case studies have documented the apparent beneficial effects of CTM (Ebner, 1985; Ebner, 1978; Ebner, 1965; Ebner, 1968; Frazer, 1978). The case studies have involved subjects with such diverse pathological conditions as osteoarthritis, dermatomyositis, and angina (Ebner, 1985); intermittent claudication (Ebner, 1985; Ebner, 1978); migraine headache and musculoskeletal sprains and strains (Ebner, 1978; Ebner, 1965); fibrositis syndromes (eg, "frozen shoulder") (Ebner, 1968); and Raynaud's disease (Ebner, 1985; Frazer, 1978). The aim of this project was to study the effect of connective tissue massage on emotional status and quality of life for healty individuals.

The autonomic balancing responses to CTM can be useful in the treatment of anxiety. McKechnie et al. (1983) found that anxious patients responded favourably to CTM. Autonomic function was found to move towards a parasympathetic direction across individual measures but no significant results were shown across the whole group (n=5). Because of higher scores in emotional status of participants in group I could be resulted in these differences. But we found interesting results after CTM at emotional status and emotional role limitation parameter as SF-36 subscale.

Kaada and Torsteinbo's work of 1989 on plasma endorphin levels discussed previously, was a sound, scientific study. Less rigorous, but interesting, was the report of Frazer (1978) who reported finding CTM to be more effective than epidural analgesia in a single subject. There is no significant difference in pain scores in one of sub-parameter of SF-36, but mean scores of pain were increased significantly after CTM.

The autonomic balancing responses to CTM can be useful in the treatment of anxiety and depression (Hisli, 1989; Koçyigit et al., 1999). A positive correlation has been found between the degree of muscle tension and pain, and the increase in plasma myoglobin concentration after one massage treatment. After repeated massage treatments a gradual decline in the increase in plasma myoglobin concentration could be demonstrated parallel to a reduction in the muscle tension and pain. In spite of the positive treatment effect on depression, many participants could be in a bad emotional status. Perhaps connective tissue massage-or the touching-has an antidepressant effect (Brattberg, 1999).

MT, in contrast, was used in only one study in the literature. In that study child and adolescent psychiatric patients had lower anxiety levels following five massage therapy sessions as well as more optimal affect and sleep patterns and lower stress hormones including cortisol and norepinephrine (Field et al., 1992). As a result, we found a significant higher scores at health-related quality of life in group I after CTM.

Unfortunately in todays, health care culture, there is a danger that treatments without a strong scientific evidential base may lose favour amongst health-care purchasers despite their obvious clinical benefits. Workers outside state or insurance funded health care will then have the responsibility of keeping useful techniques within the repertoire of manual therapy. Techniques such as CTM should be used widely, in order that it will continue to evolve and more creative uses will be developed (Holey and Schuh, 1995).

The study was subject to some limitations; the experiment groups were comprised of healthy young subjects, in which general life quality and depressive symptoms can be variable, potentially influencing interpretation of the results. We believe that CTM can be used for therapeutic purpose in groups with final diagnosis of disease.

Conclusion

CTM is an interesting modality both to use and to study. It has been used in orthodox health care for a number of decades and within that setting has pioneered a holistic approach. It currently attracts a wider interest as it stands at the boundary between complementary and orthodox health-care provision. Its powerful clinical effects are undermined by a weak research base; however, empirical observation shows that it warrants a wide application for the benefit of patients.

As a consequence, we thought that CTM can be use an alternative treatment method to decrease depressive symptoms and increase the quality of life in healthy subjects.

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