Addition of integrated neuromuscular inhibition technique to amultimodal treatment program for chronic non specific neck pain.

Mostafa M.Zalabia*, Enas E. Abutaleb*, RehamM.Diab*
Department of basic science , *Faculty for PhysicalTherapy, Cairo University, Cairo, Egypt.
Correspondence to MostafaM.Zalabia ,Department of basic science, Faculty for Physical Therapy, Cairo University

ABSTRACT

Background: Neck pain causes pain and disability in approximately 30% of the adult population worldwide .The zygapophyseal joints and myofascial trigger points can be cause of chronic non specific neck pain. Mulligan technique and integrated neuromuscular inhibition technique may decrease pain intensity and improve neck function .**Purposes**: 1-To investigate the efficacy of a multimodal treatment program that consisted of Mulligan (SNAG, NAGS) with isometric exercises in subjects with chronic non specific neck pain (CNSNP) on pain intensity and neck function. 2-To investigate the efficacy of adding integrated neuromuscular inhibition technique(INIT) to a multimodal treatment program in subjects with CNSNP on pain intensity and neck function **Method:** Thirty patients with chronic non specific neck pain (15 females and 15 males), their age ranged from 18 to 26 years. Patients were divided into three equal groups A, B &C. **Group A** received a multimodal treatment program that consist of Mulligan (SNAG, NAGS) with isometric exercises .**Group B** received integrated neuromuscular inhibition technique (ischemic compression, positional release and muscle energy technique)and a multimodal treatment program .**Group C** (control group) received isometric exercises . Visual analogue scale (VAS) and Neck disability index (NDI) were used to evaluate pain intensity and neck function at two intervals (pre treatment, post treatment)before treatment and after 6 sessions through 2 weeks. **Results:** Within-group analysis there was a significant difference of VAS and NDI pre-post treatment at groups A, B and C ($p<0.05$).Percentage of improvement in mean values of VAS was 62.5%,82.53%,36.2% in 3 groups respectively($p = 0.0001$) . Percentage of improvement in mean values of neck function was 38.6%, 60%,10.2% in 3 groups respectively($p = 0.0001$).Between-groups analysis at VAS there was no significant difference at pre-treatment ($p>0.05$).While there was a significant decrease in VAS of group B compared with that of group C post treatment ($p = 0.0001$). There was no significant difference in VAS between group A and B, and between group A and C post treatment ($p = 0.11$). At NDI there was no significant difference at pre-treatment ($p> 0.05$).) while there was a significant decrease in NDI of group B compared with that of group A and C post treatment ($p = 0.0001$). There was no significant difference in NDI between group A and C post treatment ($p = 0.28$). **Conclusion:** A multi modal treatment program that consisted of Mulligan (SNAG, NAGS) and isometric exercises improve pain intensity and neck function . Adding INIT that consisted of ischemic compression, strain–counter strain and muscle energy technique to a multimodal treatment program (Mulligan (SNAG, NAGS) with isometric exercises) improve neck function .

Key words:SNAG, NAGS, INIT.

Introduction

Neck pain (NP) causes pain and disability in approximately 30% of the adultpopulation worldwide [1].Chronic non specific neck pain (CNNP) is trending more frequently among adolescents with the prevalence of CNNP in high school adolescents is 48.9% [2].Most individuals will suffer neck pain at some time during the course of their lives[3].Chronic non specific neck pain(CNSNP) is defined as neck pain persisting for more than 3 months caused by poor posture and mechanical and degenerative changes, without a specific systemic disease as neck cancer, infections[4,5].

Chronic non specific neck pain can be presented in different conditions(eg,whiplash associated disorder, myofascial neck pain and degenerative changes)while simply referring to themas chronic mechanical neck disorders[6].The zygapophyseal joints are a source of neck pain[7]. Painful cervical facets were identified in 55% of patients with chronic non-specific neck pain[8].Recent clinical studies reported that patients with chronic neck pain have a larger number of myofascial trigger points (MTrPs) in the upper trapezius muscle and levator scapulae than healthy subjects [9,10]. So these studies suggest that MTrPs are responsible for chronic neck pain.

Patients with CNSNP complain from pain ,decreased range of motion ,point tenderness and decreased function[4,11].Soft tissue therapies and spinal manipulation/ mobilization are manual therapies commonly used in the management of mechanical neck pain and associated impairments[12].There is no long-term difference between the application of manipulation ,mobalization and Sustained Natural Apophysial Glide (SNAG) in pain, disability and cervical range of motion for patients with Chronic neck pain [13].

Mulligan first proposed the use of Sustained Natural Apophyseal Glide (SNAG) and Natural Apophyseal Glides (NAGs) mobilization techniques which can be applied for spinal pain treatment [14].Mulligan technique (SNAG and NAGs) used to restore single or multidirectional movement restriction due to pain or stiffness from C2–7 [15]. Although Mulligan technique is one of manual therapy techniques , there is scarce researchs that dealt with efficacy

of mulligan (SNAG, NAGS) and exercises in subject with chronic non specific neck pain[16,17].

Many treatment dealt with MTrPs as muscle energy techniques (METs), strain–counter strain (SCS), myofascial release and ischemic compression (IC) that cause reactive hyperemia and local reduction of tone to relieve pain and muscle spasm .Chaitow feels that the combination of MET, IC and SCS produces the most effective approach to trigger point (TrP) release that is called integrated neuromuscular Inhibition technique (INIT) [18].

In patients with non-specific neck pain, INIT for deactivating upper trapezius trigger points has proven to be more beneficial in relieving pain, reducing stiffness, and improving functional ability as MET in isolation [18].

So this study was conducted to investigate firstly the efficacy of a multimodal treatment program that include Mulligan (SNAG, NAGS) with isometric exercises on pain intensity and neck function in CNSNP. Secondly ,investigate the addition of INIT to a multimodal treatment program on pain intensity and neck function in CNSNP.

Aim of this work

The aim of the present study firstly was to investigate firstly the efficacy of a multimodal treatment program that include Mulligan (SNAG, NAGS) with isometric exercises on pain intensity and neck function in CNSNP. Secondly ,investigate the addition of INIT to a multimodal treatment program on pain intensity and neck function in CNSNP.

Subjects, Instrumentations and Methods

Subjects:

Patients and methods

Design of the study

Pre and post test Randomized control trial design. 30 Patients were randomly assigned into 3 equal groups using block randomization according to a computer generated randomization listand kept in numbered envelopes for allocation concealment .

Subjects:

45 Patients of both gender having CNSNP were referred to Faculty of Physical Therapy outpatient clinic after medical diagnosis. 30 Participants who met the following criteria wererecruited for the study:**1-**The patients aged ranged from 18 to 24 years suffered from chronic nonspecific neck pain with active trigger point of upper fiber

of trapezius and /or levator scapulae (pain duration of more than 12 weeks referred by orthopaedist) [18]**. 2-**Neck pain perceived in the posterior region of the cervical spine, from the superior nuchal line to the first thoracic spinous process with sufficient intensity (2 or more from 10 on visual analogue scale) to permit clinically worthwhile effect to be demonstrated. **3-**Patients with neck stiffness and hypomobilityinvolvement (unidirectional or multidirectional)[15]**.4-**Symptoms provoked by maintained neck postures or by movement, or by palpation of the cervical muscles .**5**-Neck symptomsreproduced during passive accessory movements (central andunilateral posteroanterior (PA) mobilization).

The participants with thefollowing criteria were excluded:1- neck pain associated with whiplash injuries .2- History of cervical spine surgery.3- Cervical radiculopathy or myelopathy.4- Having undergone physical therapy within the past 3 months before the study. 6- Medical red flag history (tumour , fracture, metabolic diseases, rheumatoid arthritis, osteoporosis).7-Cervical disc herniation.8- Fibromyalgia syndrome.9-Neck pain accompanied by vertigo caused by vertebrobasilar insufficiency or accompanied by non-cervicogenic headaches and psychiatric disorders.10-TMJ disorders .

All participants underwent physical examination by blinded assessor and were included into the study if they satisfied the inclusion and exclusion criteria. Nine participants were excluded and six participants expressed their inability to attend therapy regularly. Thirty participants (15 females and 15 males) participated and completed the study. Informed consent was obtained from each participant, and the procedure was approved by the institute ethics committee.

Procedure

A) ASSESSMENT procedure

B) 1- Pain Intensity Assessment :

VAS is used to measure pain intensity which consisted of a line, usually 10cm long, the patient was instructed to place a vertical mark on to indicate his pain, ranging from no pain or discomfort(0), to the worst pain (10) that the patient could feel [19]**.**

2-Neck FunctionalActivities Assessment:

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The functional disability of each patient was assessed by neck Disability Index (NDI) . It is avalid and reliable tool. It is consists of 10 multiple choice questions for neck pain, where the patient selects one sentence out of six that best describes their function , higher score5 indicate great loss of function and lower score 0indicate no disability. The questions are measured on a 6- point scale from 0 (no disability) to 5 (full disability). The numeric response for each item was summed for score varying from 0 to 50 [20]**.**And percentage of disability scores was calculated.Scores of 10-28% was considered mild disability, 30-48% was moderate, 50-68% was sever and 72% or more was complete disability[21]**.**

The numeric response for each item was summed for score varying from 0 to 50 [20]**.**

Blinded assessor evaluate pain Intensity and level of neck function . Treatment was delivered by physiotherapist with more than 5 years of experience in musculoskeletal physiotherapy with post graduate training in manual therapy and Mulligan technique by a certified Mulligan teacher. All the outcome measures was collected at baseline and after intervention .

B) **Treatment procedure**

1-**Group A** received a multimodal treatment program that consisted of Mulligantechniques in form of NAG and SNAG with isometric exercises

I-Natural Apophyseal Glide (NAG**):**NAG was applied to group A and B

Patient sat well supported in a chair. Therapist stood facing the patient in step stance posture stabilizing patient's shoulder/ trunk.Painless oscillatory mid to end-range mobilization was applied in the plane of the facet joints on the spinous process or articular pillar. This technique can be applied between C2–C7.

II - Sustained natural apophysial glide (SNAG):SNAGwas applied to group A and B

Patient sat well supported in a chair. The cervical spine and head were set in a neutral position. A painless passive posterior to anterior (PA) glide is applied in the plane of the facets on either the spinous process or the articular pillar.While the glide was

sustained the patient actively moved their neck in the direction that previously produced the symptoms. If symptom-free, the patient applied over-pressure further into the movement of restriction as in flexion,extension, side bending and rotation .

III -isometric exercises was applied to group A , B and C

Isometric exercises for muscle responsible for neck extension ,Lt side bending, Rt side bending and flexion (deep neck flexors).Therapist counteracted these movement and hold 6 seconds , repeated these movement 10 times .

IV- hot packwas applied to group A , B and C for 12 minutes.

V- INITwas applied to group B

a-**INIT**for trigger point of upper fiber of trapezius

The patients were placed in supine and physiotherapist identified any active TrP in the fibers of the upper trapezius and applied ischemic compression with a pincer grasp 5 seconds of pressure, 2-3 seconds release, followed by a further 5 seconds of pressure. Ischemic compression was followed by the application of positional release technique through positioning the muscle in a shortened/relaxed position.Ease was defined as the point where a reduction in pain of at least 70% was produced. The patient was in supine lying with the head side bent towards the involved side while the practitioner positioned the ipsilateral arm in flexion, abduction and external rotation to reduce the reported TrP pain. Once the position of ease was identified, it was held for 20–30 s and repeated for three to five repetitions. Lastly, the subjects receive MET directed towards the involved upper trapezius. Each isometric contraction for shoulder elevation (autogenic inhibition) is hold for 7–10 s followed by isometric contraction for shoulder depression (reciprocal inhibition) then followed by further contralateral side bending, flexion, and ipsilateral rotation to maintain the soft tissue stretch for 30 seconds and repeated three to five times per treatment session [18].

a-**INIT**for trigger point of levator scapulae

The patients were placed in side lying with pillow under patient head ,

therapist placed patient head in slight extension ,then therapist applied firm pressure by thumb to trigger point near superior angle 5 seconds of pressure, 2-3 seconds release,repeat 3-5 times. Ischemic compression was followed by the application of positional release technique. Therapist elevateshoulder in abduction to put muscle in a shortened position to reduce the reported TrP pain. Once the position of ease was identified, it was held for 20–30 s and repeated for three to five repetitions . Lastly, the subjects receive MET directed towards the involved levatorscapulae . Each isometric contraction for shoulder elevation (autogenic inhibition) is hold for 7–10 s Fig(3-23) then isometric contraction for shoulder depression (reciprocal inhibition) Fig(3-24).then patient returned to supine position and therapist applied stretch to levator scapulae by taking head into flexion ,lateral flexion and rotation to opposite side and maintained 30 s.

Treatment was done 3 times /week for 2 weeks over 6 sessions .

Statistical analysis:

Descriptive statistics and MANOVA-test were conducted for comparison of the mean age, weight, height, and BMI of the three groups.Mixed MANOVA was conducted to investigate the effect treatment on VAS andNDI.The level of significance for all statistical tests was set at $p < 0.05$.All statistical tests were performed through the statistical package for social studies (SPSS) version 22 for windows. (IBM SPSS, Chicago, IL, USA).

RESULTS

Mixed MANOVA was conducted to investigate the effect of treatment on VAS and NDI .Comparison of the mean values of all variables(VAS and NDI) pre and post treatment in three groups (GA, GB and GC) revealed significant difference indicating an improvement in all them ($P<0.05$).Percentage of improvement in mean values of VAS was 62.5%,82.53%,36.2% in 3 groups respectively($p = 0.0001$) . Percentage of improvement in mean values of function was 38.6%, 60%,10.2% in 3 groups respectively($p = 0.0001$) .Multiple pairwise comparisons showed no significant difference between groups pre treatmentregarding VAS and NDI score ($p > 0.05$).There was a

significant decrease in VAS score of group B compared with that of group C post treatment (p = 0.0001). There was no significant difference in VAS between group A and B, and between group A and C post treatment (p = 0.11).There was a significant decrease in NDI of group B compared with that of group A and C post treatment (p = 0.0001). There was no significant difference in NDI between group A and C post treatment (p = 0.28)**table (1).**

Table (1): Mixed ANOVA for the effect of Different interventions on VAS and NDI (p = 0.0001). **.**

	VAS		**NDI**	
	pre	**Post**	**Pre**	**Post**
	$\overline{X}$ **±SD**	$\overline{X}$ **±SD**	$\overline{X}$ **±SD**	$\overline{X}$ **±SD**
Group A	6.4 ± 1.64	2.4 ± 0.96	31.6 ± 3.37	19.4 ± 2.67
Group B	6.3 ± 1.33	1.1 ± 1.28	31 ± 3.91	12.4 ± 2.36
Group C	5.8 ± 1.61	3.7 ± 1.63	29.4 ± 4	26.4 ± 15.54
Between group comparison				
A vs B	0.1	1.3	0.6	7
A vs C	0.6	-1.3	2.2	-2
B vs C	0.5	-2.6	1.6	-9

$\overline{X}$ **: Mean** **SD: Standard deviation** **pvalue: Probability value** **NS: Non significant**

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DISCUSION

The results of this study showed that a multimodal treatment program had significant effects on decreasing pain intensity and neck function.

Group A also shows a significant decrease in pain intensity afterapplication of NAGS and SNAGS mobilisation combined with isometric exercise for two weeks . Possible explanations for decreasing pain due to segmental and/or local peripheral mechanisms [22]**.** It has been suggested that stimulation of large diameter, low threshold mechanoreceptors by spinal mobilisation might produce pain inhibition at the spinal cord level as in the 'Gate Control' theory [22]**.**

Descending pain-inhibitory systems (endorphin) might be activated, mediated by areas such as the periaqueductal gray of the midbrain. Furthermore, the spinal release of serotonin from descending neurons may be important in mediating the pain modulatory effect of mobilisation[23]**.** Mulligan proposed that positional fault at cervical spine motion segments were likely the source of the abnormal afferent activity and thus responsible for the symptoms so NAG and SNAG reverse and correct this positional fault at the zygapophyseal joint, although a SNAG could influence the entire spinal functional unit to abolish symptoms [15]**.**

Multimodal treatment program improve function significantly by reduction in score of neck disability index (NDI) that was related to reduction of pain [24]**.**NDI score was sensitive to change and correlated significantly with VAS [21]**.**

Previous study stated the efficacy of Mulligan NAGs in neck pain with the results demonstrated that NAGs are effective mobilization techniques for reduction of pain and improvement of cervical range of motion for neck pain patients [17]**.**Other study was conducted to compare Maitland and Mulligan Mobilization techniques on neck pain and ROM. It found that Mulligan mobilization was more effective than Maitland in improving neck pain, functional status of neck and ROM [24]**.**Also, NAGS was more effective than Maitland grade I & IImobilizations [25]**.** SNAGS and isometric exercises were more beneficial than SNAGS alone for subjects of mechanical neck pain in terms of decreasing pain and improving their life style [26]**.**Manual mobilizations with strengthening exercises were effective for decreasing neck pain and changing their quality of life[27]**.**

Although Adding INIT which consists of ischemic compression , strain counter strain (SCS) and muscle energy technique (MET) to multimodal treatment program was not statistical significant difference but there was some clinical significant difference in VAS As INIT directly deal with muscle trigger point that aids in its deactivatation[28]**.**

Ischemic compression aims to slow down blood supply then produce

reactive hyperemia that aids in relieve pain and muscle tension (muscle spasm) by decreasing the sensitivity of painful nodules and normalizing length of sarcomeres in the affected TrP .SCS improve tissue relaxation created by maintaining a position ease of TrP by mechanism of facilitating unopposed arterial filling that decrease muscle tone which aids in modification of neural reporting , improvement of local circulation and decreasing of pain .MET inhibit muscle tone by isometric contraction to the involved muscle producing post-isometric relaxation through stimulation of Golgi tendon organs (autogenic inhibition) and to the antagonistic muscle group producing reciprocal inhibition in affected agonistic muscle [18].

NDI was sensitive to change and correlates significantly with VAS [21].Addition of INIT to multimodal treatment program improved function significantly by reduction in score of NDI that was related to reduction of pain [24].

One study was conductedby Nagrale proved that INIT for TrPs deactivation was more beneficial in relieving pain, reducing stiffness and improving functional ability than METs in isolation for patients with non-specific neck pain[18].Other study was conductedby Sibbyproved that both INIT and Laser with stretching were equally effective in managing neck pain due to trapezius trigger point [29].Other study was conductedbyJyothirmai proved that INIT with strength training were more effective than INIT alone in reducing pain, decreasing neck disability and improving range of motion in individuals with upper trapezius trigger points [30].

Several studies had demonstrated that neck muscle atrophy was strongly correlated with neck pain [31].Muscle strength decrement may be caused by the inhibitive effect of pain and changes in muscle structures [32].Strengthening exercises imrove also pain due to improvement in blood circulation [33].Strengthening exercises also leads to enhancing the protein metabolism, which helps in the recovery of a painful muscle and as the muscle gets stronger, it can better withstand pressure and stress [34].

Group c also shows a significant improvement in pain . Intense exercise may also increase activity in motor

pathways, so exerting an inhibitory effect on pain centers in the central nervous system. Furthermore, muscle contraction will stimulate the mechanoreceptors and increase sensory nerve activity, which in turn may inhibit the pathways mediating pain [35].Isometric exercises might have led to increased sensitivity of the muscle spindles, golgi tendon organs and proprioceptors of joints [36]. Decrease in pain reported by the patients may have reduced inhibition of the motor system which potentially decrease muscle spasm and thus, in part, facilitate movement and improved neck function [31,37].

Group c isometric strengthening exercises improved neck function significantly by reduction in score of NDI that was related to reduction of pain [24].NDI was sensitive to change and correlates significantly with VAS[21].

Conclusion

Amultimodal treatment program(Mulligan (SNAG, NAGS) and isometric exercises) improved pain intensity and neck function . Adding INITto a multimodal treatment program (Mulligan (SNAG, NAGS) with isometric exercises) improved neck function .

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Conflicts of interest

There are no conflicts of interest.

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الخلفية : ألم الرقبة يسبب الألم والإعاقة في حوالي 30٪ من السكان البالغين في جميع أنحاء العالم.وقد يكون سبب آلام الرقبة المزمنة الغير محددةهي المفاصل الوجهيه ونقاط الالم العضلي الليفي. تقنيه موليغان وتقنية التثبيط العصبي العضلي المتكاملهقد يقللا من شدة الألم ويحسنو من وظيفة الرقبة **.الاغراض** : 1-التحقيق من مدي فعالية برنامج العلاج المتعدد الذي يتكون من موليغان (سناغ، ناغس) مع تمارين الثبات مع آلام الرقبة المزمنة الغير

محددة على شدة الألم و وظيفة الرقبة 2-التحقيق من مدي فعالية اضافة تقنيةالتثبيط العصبي العضلي المتكاملة إلى برنامج العلاج المتعدد على شدة الألم ووظيفة الرقبة **.الطريقة**: ثلاثون مريضا يمثلوا الدراسة يعانون من آلام الرقبة المزمنة الغير محددة (١٥ إناث و ١٥ ذكور)، تراوحت أعمارهم بين ١٨ إلى ٢٦ سنة.و تم تقسيم المرضى إلى ثلاث مجموعات متساويةوهم أ و ب و ج و تلقت المجموعةأ تقنيه موليجان مع تمارين الثبات وتلقت المجموعة ب تقنية التثبيط العصبي العضلي المتكاملة التي تتكون من الضغط الافقاري والافراج الموضعي وتقنية الطاقة العضلية بالاضافة لبرنامج العلاج المتعدد وتلقت المجموعة ج تمارين الثبات وتم استخدام مقياس التماثليه البصريه ودليل الاعاقات العنقيه لتقييم شدة الألم ووظيفة الرقبة على فترتين (قبل العلاج، بعد العلاج) قبل وبعد 6 جلسات من خلال اسبوعين**.النتائج**: وقد اظهرت النتائج وجود فروق ذو دلالات احصائيه داخل الثلاث مجموعات (ا-ب-ج) في مقياس التماثليه البصريه حيث كان مقدار التحسن داخل كل مجموعه (62.5%-82.53%-36.2%) علي التوالي. وايضا مقدار التحسن في دليل الاعاقات العنقيه داخل الثلاث مجموعات(38.6%-60%- 10.2%) علي التوالي. وقد اظهر التحليل الاحصائي بين المجموعات انه لايوجد فروق ذو دلالات احصائيه في مقياس التماثليه البصريه قبل العلاج. كما اظهرت انه بعد العلاج لا يوجد فروق ذو دلالات احصائيه بين المجموعات (ا-ب) (ا-ج). ولكن قلت قيمه مقياس التماثليه البصريه في المجموعه (ب) بالمقارنه مع المجموعه (ا). اظهرت النتائج انه لايوجد فروق ذو دلالات احصائيه بين المجموعات في دليل الاعاقات العنقيه قبل العلاج. كما اظهرت بعد العلاج انه يوجد فروق ذو دلالات احصائيه بين المجموعات (ب-ا) (ب-ج). ولكن لايوجد فرق بين المجموعات (ا-ج) في دليل الاعاقات العنقيه. **الاستنتاج**: برنامج العلاج المتعددالذي يتكون من موليجان (سناج، ناغس)وتمارين الثبات عمل علي تحسين شدة الألم و وظيفة الرقبة. إضافة تقنية التثبيط العصبي العضلي المتكاملة الذي يتكون من الضغط الاقفاري والافراج الموضعي وتقنية الطاقة العضلية لبرنامج العلاج المتعدد الذي يتكون من تكنيك موليجان (سناغ، ناغس) مع تمارين الثبات عمل علي تحسين وظيفة الرقبة.

الكلمات داله: ناغس ، سناج ، تقنيةالتثبيطالعصبيالعضليالمتكاملة

الملخص

الموجات البلانارية مقابل الموجات الريديالية على السليولايت بعد شفط الدهون

د/ اسراء هانى رستم

قسم العلاج الطبيعى للجراحة ، كلية العلاج الطبيعى ، جامعة القاهرة

الخلفية:السليولايت هو تغييرفى سطح الجلد يمكن أنيؤديإلى مشاكل جمالية وصحية. شفطالدهون يسبب تفاقم في مظهرالجلدالمدمل والسليولايت.

الغرض من هذه الدراسة: المقارنة بين الموجات البلانارية مقابل الموجات الريديالية على السليولايت بعد شفط الدهون

الوسائل : تم تقسيم ستين مريضة من النساء تعانى من السليولايت الدرجة الثالثة بعد شفط الدهون عشوائيا إلى مجموعتين متساويتين فى العدد (المجموعة الأولى البلانارية و المجموعة الثانية الريديالية). وتضمنت طريقة التقييم تحديد درجة السليولايت الموجودة وقياس سمك الجلد لكل مريض. تلقت المجموعة الأولى الموجات البلانارية مرتين بالأسبوع لمدة 12أسبوع ،بينما تلقت المجموعة الثانية الموجات الريديالية مرتين بالأسبوع لمدة12 أسبوع.

النتائج :أظهرت نتائج هذه الدراسة تحسن كبيرفي درجة السليولايت الموجودة وقياس سمك الجلد في مجموعة الموجات الريديالية مقارنة بمجموعة الموجات البلانارية.

الاستنتاج: تم استنتاج أن الموجات الريديالية كانت اكثرفعالية علاجية من الموجات البلانارية في السيطرة على السليولايت عن طريق خفض درجة السليولايت وتحسين مظهره.

كلمات البحث: السليولايت،العلاج بالموجات الصوتية،الموجات البلانارية،الموجاتالريديالية.