



# Clinical Case Report Competition

Vancouver College of Massage Therapy

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First Place Winner

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The effect of massage on the thighs, buttock, and abdomen  
to diminish the appearance of cellulite,  
improving self esteem

# The Effects of Massage on the Thighs, Buttock, and Abdomen to Diminish the Appearance of Cellulite, Improving Self Esteem

## **Abstract**

**Objective** To evaluate the effect of massage, strengthening, and dry skin brushing, on the appearance of cellulite on thighs, buttocks, and abdomen as means of improving self-esteem.

**Methods** One female, age 24 with stage 2 cellulite on the Nurnberger-Mueller scale, appearing on the buttocks and thigh, received treatment to the right side of her body, using the left side as a control. Treatment consisted of massage, including myofascial release, Swedish techniques, and passive range of motion. The subject completed daily homecare of strengthening exercises to the right adductors and right gluteals, as well as dry brushing to the right lower extremity. 10 treatments of massage were performed over a 4 week period. Assessment was performed treatments 1, 4, 7, 10 and consisted of the Rosenberg self esteem scale (RSES) <sup>1,2</sup>, circumference of the waist, hips, and thighs, using a single tape measurement, fat thickness measurements using a caliper, over the abdomen, the ASIS, and anterior thigh, as well as photographic documentation.

**Results** There was an improvement of 7 points on the RSES. Circumference of the right thigh decreased by 0.6cm, and fat thickness over the anterior thigh decreased by 1.0cm. Cellulite appearance remained at stage 2 on the Nurnberger-Muller scale.

**Conclusion** Body contouring changed from initial to final assessment. The increased score on the RSES showed improved self-esteem, though more research is needed to determine whether it is due to improved contouring or the association of positive touch and massage.

## **Keywords**

Massage, cellulite, self-esteem, body image, women

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Cellulite is a non-life-threatening pathological condition that affects more women than men.<sup>3,4</sup> It affects 85-98% of post-pubertal females of all races.<sup>5</sup> The term cellulite is used to describe the uneven dimpling, cottage-cheese, orange peel appearance of the skin<sup>3,5</sup>, also termed the “mattress phenomenon”.<sup>6</sup> It can appear anywhere on the body that has subcutaneous adipose tissue<sup>5</sup> and is most commonly seen on the thighs, and buttocks, as well as the lower abdomen, breasts, upper arms<sup>3,4</sup> and nape of neck.<sup>5</sup>

The subcutaneous layer of the skin contains adipocytes that are separated into fat chambers by connective tissue septa that attach to the overlying dermis. Men have a thicker dermal layer, as well as crisscrossing septa, which results in smaller fat chambers, so there is little or no presentation of cellulite. Women have a thinner dermal layer and septa that run more perpendicular to the skin, yielding larger fat chambers,<sup>6</sup> making them more susceptible to developing cellulite.

With age, fat cells hypertrophy causing the fat chambers to bulge into the dermal layer.<sup>6</sup> Also, elastin and collagen fibres degenerate, losing their pliability and pull down on the dermis. The dermis itself becomes thinner and looser with age. Together, these three factors cause dimpling in the overlying skin.

Nurnberger and Muller devised a scale from stages 0-3, to classify the appearance of cellulite: Stage 0 is classified as the skin is smooth while the subject is standing or lying. Pinch test yields folds, but no mattress appearance; Stage 1 presents as the skin is smooth while the subject lies or stands, but yields mattress phenomenon when pinch test is applied; Stage 2 presents as the skin is smooth while the subject is lying down, but shows mattress phenomenon when standing; Stage 3 is classified when the mattress phenomenon is visible in both lying down and standing.<sup>6</sup>

There is no definitive explanation for determining who will get cellulite, however there are some factors that make a person more susceptible to developing cellulite.<sup>5</sup> There may be a genetic disposition, including sex, race, biotype, adipose tissue distribution, hormone receptor involvement, and peripheral angiopathy.<sup>4</sup>

The presentation of cellulite is a sex-typical trait that appears in women, or in men

with abnormal level of androgens<sup>6</sup> due to the physiology of the cutaneous and subcutaneous layers of the skin. Structural changes, due to age, estrogens, pregnancy, hyperthyroidism, diabetes, corticosteroids, and free radicals<sup>4</sup> can also influence the presentation of cellulite.<sup>6</sup>

Obesity is not necessary for cellulite presentation. Physiologically, obesity is adipocyte hypertrophy and hyperplasia, whereas cellulite is structural degeneration in the cutaneous and subcutaneous layers of the skin, as well as changes in microcirculation.<sup>4</sup> Cellulite can appear in lean females, and does not necessarily appear in obese males.<sup>5</sup>

Vascular circulation changes can also affect the presentation of cellulite.<sup>5</sup> An increase in capillary hydrostatic pressure may lead to edema, which in turn compresses the vasculature, decreasing venous return. Tissue hypoxia results, decreasing the breakdown of lipids.<sup>5</sup>

Several authors have suggested that cellulite may also be caused by inflammatory factors.<sup>5</sup>

An inactive lifestyle or pregnancy can make cellulite worse.<sup>3</sup> Weight loss, diet and exercise have been cited as being the best way to improving cellulite,<sup>3,5,6</sup> though there is a lack of research to confirm.<sup>5</sup> Nurnberger states however, weight loss before the age of 35-40 is the most effective way in decreasing the appearance of cellulite because the elastin and collagen fibres can still adjust to the decreased volume of fat.<sup>6</sup> With age, the elastin and collagen fibres lose their integrity, and the mattress phenomenon may intensify.<sup>6</sup>

In conjunction with weight loss improving cellulite, a sedentary lifestyle may increase the appearance of cellulite. With a sedentary lifestyle, there is a decrease in muscles mass, and a decrease in muscular pumping. This may lead to a decreased venous return and increased stasis. This decreases microcirculation, and increases tissue hypoxia.<sup>4</sup>

Cellulite is considered by doctors to be a normal occurrence.<sup>3</sup> There is no morbidity or mortality rate associated with cellulite, so it does not require medical treatment,<sup>3</sup> yet it remains an issue of cosmetic concern.<sup>5</sup> Cellulite can make a person feel self-conscious.<sup>3</sup> A woman with cellulite may look into various treatments such as laser, radiofrequency, massage therapy, topical treatment, or liposuction.

Liposuction is an elected surgery that involves the removal of fat by suction through a cannula inserted into the subcutaneous layer.<sup>8</sup> Liposuction can help with body contouring, but may not affect the appearance of cellulite, and it may even make it appear worse.<sup>3</sup>

After liposuction, there will be pain, swelling and bruising. The candidate may need to wait a few days before returning to work and may need to wait weeks before returning to regular physical activity.<sup>9</sup> The candidate may be on medications to reduce pain, and wear compression stockings to reduce swelling. As this is an invasive surgery, the candidate will take time off work, thus resulting in lost wages. Also, since it is an elective surgery, the candidate is using resources from the health care system, for example a cosmetic surgeon, and will take up space in a health care facility. This places increased demands on the healthcare system for services that

were elective, possibly making such services unavailable to a person that required them.

Also, liposuction may result in contour irregularities, which the candidate may decide to go through a second surgery to correct those irregularities, placing further demand on the health care system.

To date, there is little scientifically proven treatment for cellulite. Most of the evidence is subjective, anecdotal, or non-existent.<sup>5</sup> Tunay et al studied three different types of massage and their affect on cellulite: mechanical massage, manual lymph drainage, and connective tissue massage.<sup>7</sup> All three modalities showed a decrease in fat thickness and an increase in body contouring.

The majority of women are dissatisfied with their bodies, defining body shape and weight as primary sources of this dissatisfaction.<sup>2</sup> This dissatisfaction has been linked to low self-esteem, social anxiety, depression, and a lowered quality of life, leading to body dysmorphic disorders and eating disorders.<sup>2</sup> If a woman focuses on the negative, her view of her body may provoke thoughts that she is “untouchable and grotesque.”<sup>10</sup> The objectification theory states that in Western culture, women are judged and mainly valued for their appearance, as opposed to their internal qualities.<sup>10</sup>

Someone with poor self-esteem and body image may seek out liposuction to decrease the appearance of cellulite. Liposuction can increase the demand on the healthcare system. There are serious consequences of body dissatisfaction, so strategies are needed to ameliorate it.<sup>2</sup>

Massage has a positive effect on body image.<sup>10</sup> If a woman has a good body image, and good self-esteem, she may be less likely to seek out invasive therapies, such as liposuction. In addition to being presented with massage that will address the physical appearance of cellulite by reducing it,<sup>7</sup> massage is able to improve body image. It can help put someone in a state of relaxation, increasing endorphins, shifting a woman's focus of a specific body part, to her body as a whole,<sup>10</sup> thus boosting her self-esteem.

The Rosenberg Self Esteem Scale was developed to measure self-esteem as either a "general favourable or unfavourable global self-attitude."<sup>1,2</sup> The test is self-administered and consists of 10 question.

There is little research on massage and self-esteem, specifically, how the body feels.<sup>2</sup> The effects of massage therapy on body image are not well known.<sup>10</sup> Also, many of the studies on body image were executed with women aged, 18-25 years old.<sup>10</sup>

The primary aim of the current study is to see the effects of massage therapy on self-esteem. It is predicted that massage therapy, including myofascial release (MFR), dry brushing and strengthening exercises to the buttock and thigh, will help to diminish the appearance of cellulite, thereby improving self esteem on the Rosenberg Self Esteem Scale by 5 points.<sup>2</sup> Also, through application of MFR, thigh circumference on the affected side would decrease by 0.5cm.<sup>7</sup> MFR will also improve distribution of adipose, evaluated by fat thickness, by decreasing 1.5cm.<sup>7</sup> Strengthening exercises will help decrease the look of cellulite on the Nurnberger scale by 1 class.

## **Subject**

This study was carried out on one woman, age 24 years with cellulite measurement of grade 2 over the buttocks and thighs according to the Nurnberger and Muller classification.<sup>6</sup> The subject is a smoker, and participates in physical activity about 4 times a week, including jogging, snowboarding, and yoga. For work, the subject is a caretaker, working about 5 days a week, as well as an assistant at a law firm doing deskwork and filing. The subject has mild asthma, but no other systemic conditions. The subject did not have a history of liposuction, dieting or recent weight loss, and had no current injuries. The subject does not take medication, except a bronchodilator during an asthma attack.

During the intake the subject stated that overall, she felt she had good self-esteem, however it waivered depending on how she felt about her body. The subject also stated that she felt self-conscious about the cellulite on her thighs and buttocks.

The subject's right side of the body was chosen to receive treatment, and the left side was used as a control. Upon completion of the study, the subject's left side would undergo the same treatment protocol if she chose. The subject was asked to maintain her normal lifestyle, and not participate in any additional physical activity than normal, or engage in dieting that would affect weight. The subject provided written informed consent to treatment.



## Methods and Materials

Over the course of 4 weeks, the subject completed 10, 45-minute treatments. Assessment was done at the beginning of the first treatment. Reassessment was done at the beginning of treatments 4, 7, and at the end of treatment 10.

For assessment, various body circumferences, photographic documentation, fat thickness measurements, and a self-esteem questionnaire were used.

Bilateral thigh circumference was measured at 30cm from the middle of lateral tibial plate, superior to the head of the fibula, at a perpendicular angle to the femur using a single tape measurement for the assessment of changes in thigh circumference.<sup>7</sup> Waist circumference was measured using a single tape measurement at the natural indentation of the waist, as determined by a lateral bend.<sup>7</sup> Hip circumference was measured through the greater trochanter, at the widest part of the hips and buttocks also using a single tape measurement.<sup>7</sup>

Body contour was measured with photographic documentation from four angles (right and left lateral, anterior, and posterior views), from a distance of 152cm, without flash.<sup>7</sup> (See Appendix 1.) The superficial changes and contour changes are a subjective measurement, but were helpful to identify changes in contour and the appearance of cellulite on the Nurnberger Muller classification scale.

Fat thickness was measured bilaterally with a single caliper measurement at 3 different places while the subject was standing.<sup>7</sup> Abdominals were measured at a superior orientation at 2cm lateral to the umbilicus.<sup>7</sup> Hips were measured at an oblique orientation directly over the anterior superior iliac spine (ASIS).<sup>7</sup> Thighs

were measured at the halfway point between the base of the patella and the ASIS (landmark was arbitrarily chosen); for this subject, the distance between the base of patella and ASIS was 38cm, therefore the thickness measurement on the anterior thigh was taken at 19cm from the base of the patella.

Subject's self esteem was evaluated using the Rosenberg Self Esteem Scale questionnaire.<sup>1,2</sup> (See Appendix 2.)

Treatment consisted of massage therapy to the subject's right side. First, myofascial release was performed on the lumbar region, gluteals, medial, lateral and posterior thigh, and triceps surae. Swedish techniques were performed to the gluteals, thigh, and leg, as well as passive range of motion of the knee. Myofascial release was then performed on the abdomen, and anterior thigh. Swedish was performed on the anterior thigh and leg, as well as nodal pumping to the inguinal lymph nodes, and passive range of motion of the hip.

For homecare the patient was asked to perform dry skin brushing daily in the morning, brushing the right abdomen, lumbar area, gluteal area, thigh, leg, and foot, for 2-4 minutes for the duration of the case study. The patient was also asked to do strengthening exercises to the right adductors and right gluteals, to be completed daily, 10 repetitions, for the duration of the case study. (See Appendix 3.)

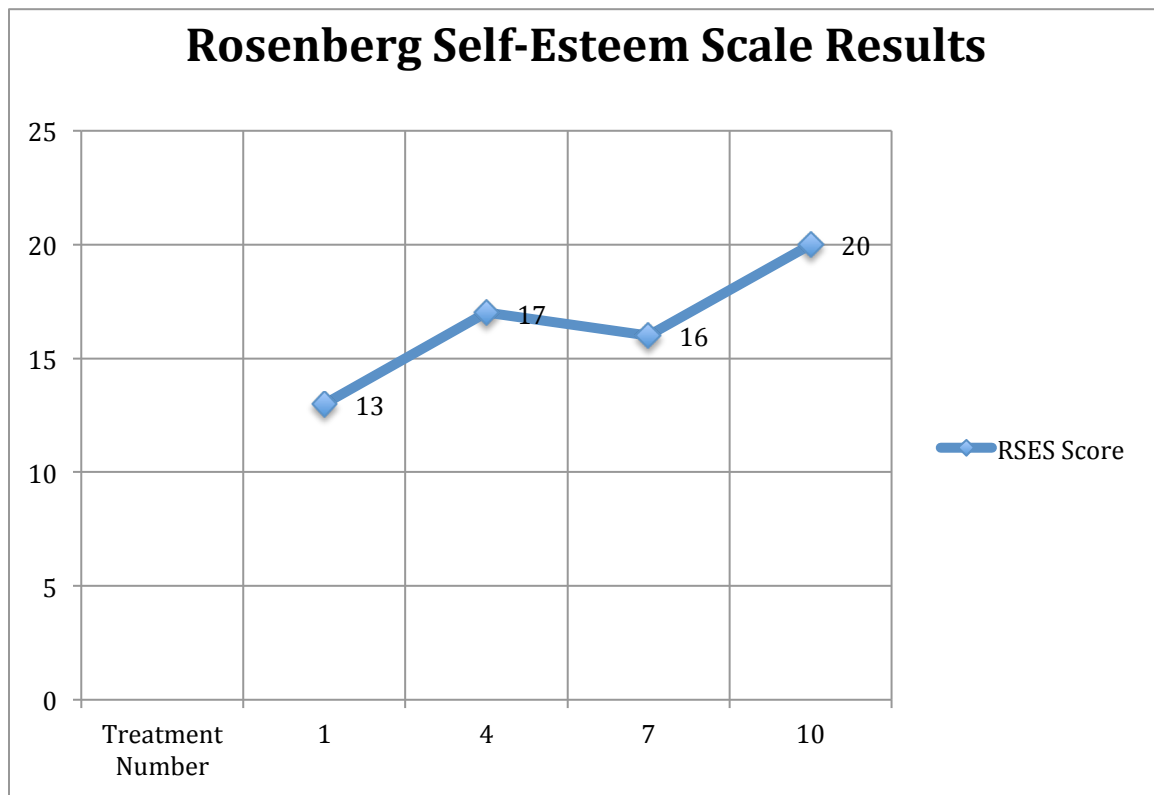
## **Results**

The Rosenberg Self Esteem Scale (RSES) was graded using the Likert format<sup>11</sup>, assigning a number from 0 to 3 to each option. For example: Strongly

agree (SA) was assigned a 3, agree (A) was assigned a 2, disagree was assigned a 1, and strongly disagree was assigned a 0. Items 2, 5, 6, 8, and 9 were reversely score.<sup>1</sup>

On initial assessment, the subject scored 13/ 30 on the RSES. On second and third reassessments, the subject scored a 17 and 16 respectively. On final assessment, the subject scored 20/ 30, as seen in Figure 1.

Figure 1. Rosenberg Self-Esteem Scale Results



Circumference of the waist decreased from 92.0 to 91.0cm from first to last treatment, as did circumference of the hips from 113.5 to 111.2cm respectively (Table 1). The circumference of the affected thigh decreased from first to last treatment, initially measured as 72.0cm, and 68.6 on final assessment. The circumference of the unaffected left thigh also decreased form 71.0cm on initial

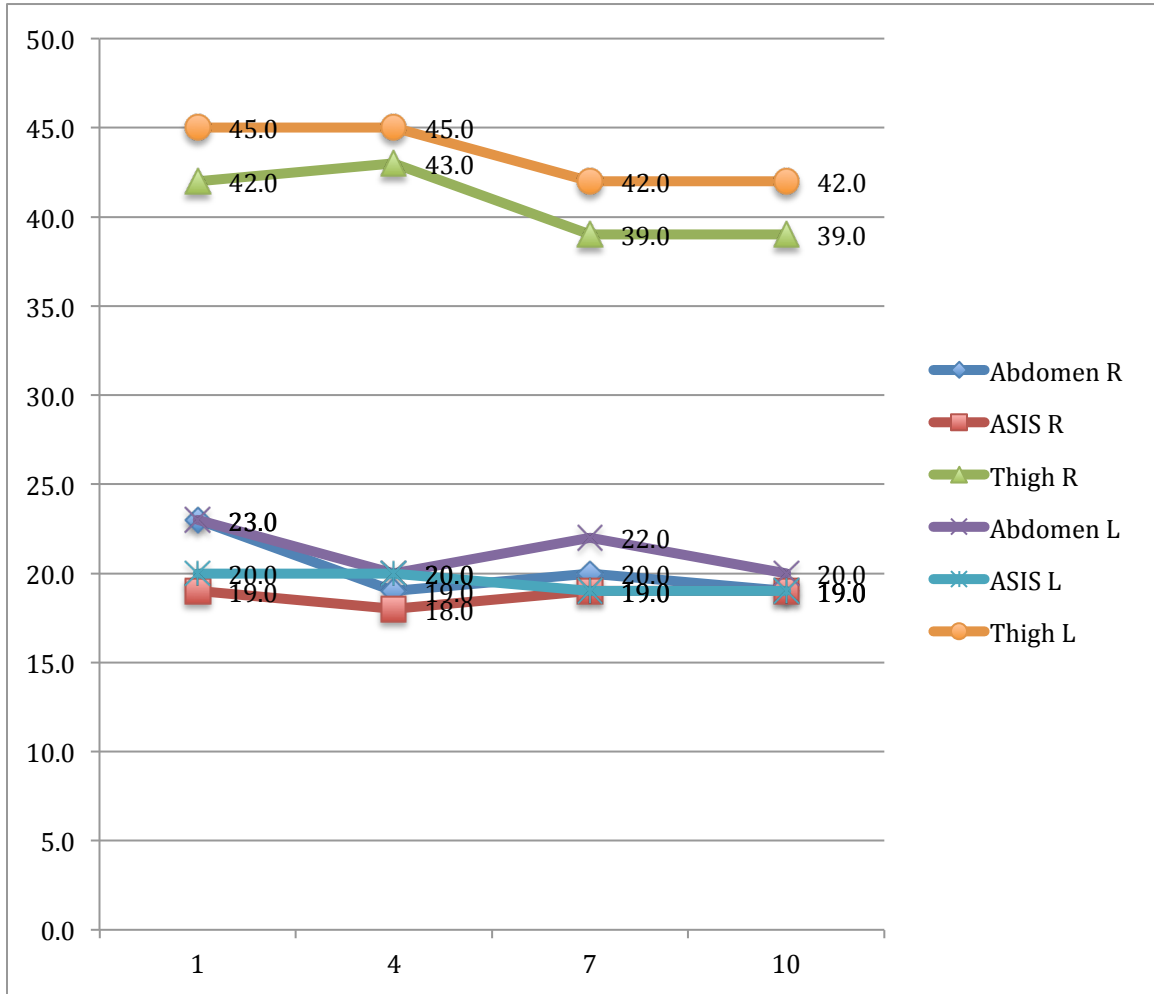
assessment, to 68.2cm on final assessment. Waist-hip ratio decreased by 0.01 from initial to final assessment.

Table 1. Circumference Measurement (in centimeters)

<b>Treatment</b>	<b>1</b>	<b>4</b>	<b>7</b>	<b>10</b>
Waist	92.0	92.0	90.0	91.0
Hips	113.5	113.9	113.2	111.2
Right Thigh	72.0	71.5	69.9	68.6
Left Thigh	71.0	70.0	69.3	68.2
Waist-Hip ratio	0.810572687	0.8	0.8	0.8

All fat thicknesses on the right side decreased or remained constant from initial to final assessment as seen in Figure 2. All fat thicknesses on the left side decreased from initial to final assessment as well.

Figure 2. Fat Thickness (in centimeters)



Fat thickness on the abdomen decreased by 4cm on the right and 3cm on the left. The distribution of fat remained constant over the right ASIS, whereas thickness decreased by 1cm over the left ASIS. The fat thickness on the right thigh decreased by 1cm over the left ASIS. The fat thickness on the right thigh decreased by 3cm, and decreased by 3cm on the left side (Table 2).

Table 2. Caliper Measurement (in centimeters)

Tx	1		4		7		10	
Caliper (cm)	R	L	R	L	R	L	R	L
Abdomen	23.0	23.0	19.0	20.0	20.0	22.0	19.0	20.0
ASIS	19.0	20.0	18.0	20.0	19.0	19.0	19.0	19.0
Thigh	42.0	45.0	43.0	45.0	39.0	42.0	39.0	42.0

## Discussion

As predicted, self esteem increased by 7 points on the RSES from first to last treatment, indicating that her self-esteem improved. Women see their bodies as aesthetic objects, focusing on appearance, which may lead to body dissatisfaction.<sup>2</sup> By receiving a massage to reduce the appearance of cellulite, the subject may have had an increase in self-esteem because the perception of cellulite was that it had decreased. Alternately, increased self-esteem could be the result of getting the massage itself. In receiving a massage, a person can focus on how the body feels, instead of how the body looks,<sup>2</sup> which may yield a higher self-esteem rating. Massage yields positive effect on psychological health.<sup>10</sup>

In Western culture, the importance of appearance defines a woman's sense of self, and affects how much she will invest in her looks.<sup>2</sup> If there is an opportunity to participate in massage therapy to ameliorate low self-esteem, as opposed to a more invasive procedure like liposuction, a woman with negative body image can associate the positive touch of massage with her physical self, increasing positive thoughts about her body.<sup>10</sup> This opens up massage therapy to a new demographic of people: those that want to ameliorate their body image and self-esteem.

Registered massage therapy may also be covered by some extended health care benefits plans, whereas elective cosmetic surgery, such as liposuction, may not be. If a person with poor body image can receive and be compensated for a massage to address the appearance of cellulite, and improving their sense of self through positive touch, this is very beneficial to the patient, without placing unneeded demand on the health care system.

As self-esteem is affected by different events, the improved self-esteem may also be due to another factor that occurred in the subject's life. A journal was not kept to monitor other contributing factors, but could be done in future studies.

Along with improvement of self-esteem, circumference of the waist and hip both decreased from initial to final assessment. The circumference of both thighs also decreased: the right circumference had a difference of 3.4cm and the left circumference decreased by 2.8. This is larger than the 0.5cm predicted.<sup>7</sup>

The left side of the subject's body was used as control, and did not receive treatment or homecare. This is why there was a larger decrease in circumference of the right thigh by 0.6cm. This post-treatment measurement is greater than the hypothesized difference of 0.5cm. The difference in circumference is not due to the fact that the subject is losing weight as no weight-loss techniques were implemented. However, this would be known with more accuracy if body weight was monitored; for future studies, measuring body weight would contribute to the control.

Massage can increase blood and lymph circulation, helping to remove toxins, as well as reduce excess fluids in the tissue.<sup>3</sup> In areas of cellulite, blood flow is 35%

lower than unaffected areas.<sup>4</sup> The decrease in right thigh circumference could be a result of improved circulation, provided by the massage.

Fat thickness measurements on the right abdomen had a larger decrease than the left side by 1.0cm. Over the ASIS, the right side remained constant from initial to final assessment, while the left side decreased by 1.0cm. Fat thickness on the right thigh decreased 1.0cm more than on the left thigh, which matches up with the predicted 1.0cm reduction.<sup>7</sup> These changes may also be a result of the increase in circulation.

The subject initially presented with cellulite on the posterior, lateral, and anterior thighs, as well as the buttocks, that was visible when standing, but not when lying, a presentation in line with Nurnberger's stage 2 cellulite.<sup>6</sup> As seen in the photographic documentation, Appendix 1, there is still visible dimpling of both affected and unaffected sides when standing. The skin does appear smoother, and to have better contouring on the right side. This is a subjective measurement, and may be examiner biased. Though photographs were taken in a controlled environment, with the same device, and from the same distance, photographic documentation is not precise.<sup>5</sup>

The subject was asked to perform dry skin brushing daily, for 2-4 minutes or until hyperemia appeared on the abdomen, buttock, and thigh, for the length of the study. The brisk, circular movements, of dry brushing are used to directly stimulate circulation of the skin.<sup>6,12</sup> Since decreased circulation may contribute to the appearance of cellulite,<sup>5</sup> dry brushing was used to help increase the circulation daily to the affected areas.



The subject was asked to do 2 exercises daily for homecare to tone the adductors and the gluteals on the right side. There are several benefits to exercise: circulation, weight, and skin tone. Exercise helps to improve circulation of the blood and lymph,<sup>6</sup> which may be decreased with cellulite. Exercise also helps a person to maintain or decrease in weight.<sup>6</sup> Lastly, a good tone to underlying muscles can have a positive effect on the tone of the skin.<sup>3,6</sup>

There are several limitations to this study. First, the study may not be reproducible on a different demographic of women because the skin goes through structural changes with age,<sup>6</sup> so an older woman may not yield the same results. Second, a woman with negative thoughts about their body may not seek to participate in massage therapy.<sup>10</sup>

Also, the treatments were not performed on set intervals. If treatment was given more frequently (i.e., every other day), results for body contouring, circumference and fat thickness may have been greater, as seen in previous studies such as the one by Tunay et al.<sup>7</sup>

The RSES has been used in other studies to measure self-esteem and how it relates to body image. Similarly, RSES was used to measure self-esteem in this study, however in the future, more questionnaires may give a better measurement of self-esteem. Having scales that relate to appearance and self-esteem versus body functionality and self-esteem, may lead to a more accurate break-down of the source of the poor self-esteem, and if it is related to the physical body.

In addition to a more detailed self-esteem measurement, circumference and fat thickness were taken as a single measurement. In future studies, assessment

should be done with three measurements, and the average of those three recorded. This will help to reduce examiner error.

Photographic evidence and thigh circumference are not precise measurement.<sup>5</sup> To measure cellulite, a more accurate method would be to assess the adipose layer with ultrasound or MRI.<sup>5</sup> This however, requires the proper equipment, and specialized staff to operate the equipment, and may not be financially viable.

There are a few limitations in regards to the homecare given. As the subject was asked to self-report completion of homecare, she may have over-reported homecare that was not completed, or she may have done more homecare than suggested.

Lastly, there are several cellulite-aggravating factors that are difficult to control: stress, diet, and exercise.<sup>5</sup> Effort was taken to standardize these contributing factors, asking the subject to continue on with their regular diet and exercise habits. No journal was taken to create a baseline of stress, diet, or exercise habits, so these factors may have changed during the study and contributed to the results. For future studies, monitoring these activities would help to monitor what factors contributed to the results.

There have been few peer-reviewed articles in the last 30 years available on massage and its affect on reducing the appearance of cellulite.<sup>5</sup> Therefore, more research is needed on this topic to see how massage can affect the appearance of cellulite. The current study showed a positive result using massage therapy to improve self-esteem. In receiving 10 massage therapy sessions, the subject's self-

esteem improved more than 50%. This opens up many opportunities in research and the effects of massage on other body image disorders. There is also opportunity to research massage and body image in men, as men with negative body image can have low self-esteem as well, which can lead to eating disorders, depression, muscle dysmorphia, and a preoccupation with muscularity.<sup>2</sup>

For future research, a before and after treatment with a control group would take multiple participants and see how massage affects their self-esteem. It would show whether the results can be seen from multiple participants.

In relating massage therapy and reducing the appearance of cellulite, it would be interesting to have a before and after treatment with a placebo. Would self-esteem improve if a subject just thinks they are receiving treatment to reduce cellulite? Also, research is needed to see what the longevity of the results of massage in reducing the appearance of cellulite.

## **Conclusion**

A woman with poor body image may experience negative feelings when her body does not meet the standards of the unrealistic cultural expectation. This could lead to a development of depression, eating disorders, or sexual dysfunction.<sup>2</sup> These negative body image attitudes need to be broken.<sup>10</sup>

As hypothesized, massage yielded an improvement in self-esteem, as well as a reduction in thigh circumference and fat thickness measurement on the treated thigh. However, there was little noticeable change in the appearance of cellulite on the Nurnberger-Muller classification scale.

The gaps in research about massage and the appearance of cellulite, as well as massage and self-esteem provide opportunity for more research in non-invasive treatment for improving self-esteem and the appearance of cellulite.

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## **Appendix 1. Photographic Documentation of Cellulite Presentation**

Please see attached file.

## Appendix 2. Rosenberg Self-Esteem Scale

Date \_\_\_\_\_

Treatment # \_\_\_\_\_

### Rosenberg Self-Esteem Scale

Respondents are asked to strongly agree (SA), agree (A), disagree (D), or strongly disagree (SD) with the following items (asterisks represent low self-esteem responses):

- |  |             |
|--|-------------|
| (1) On the whole, I am satisfied with myself.                                  | SA A D* SD* |
| (2) At times I think I am no good at all.                                      | SA* A* D SD |
| (3) I feel that I have a number of good qualities.                             | SA A D* SD* |
| (4) I am able to do things as well as most other people.                       | SA A D* SD* |
| (5) I feel I do not have much to be proud of.                                  | SA* A* D SD |
| (6) I certainly feel useless at times.   | SA* A* D SD |
| (7) I feel that I'm a person of worth, at least on an equal plane with others. | SA A D* SD* |
| (8) I wish I could have more respect for myself.                               | SA* A* D SD |
| (9) All in all, I am inclined to feel that I am a failure.                     | SA* A* D SD |
| (10) I take a positive attitude toward myself.                                 | SA A D* SD* |



### **Appendix 3. Homecare Strengthening Exercises**

#### Adductors (right side only)

Laying on the right side of the body, flex the left knee and hip, and place the foot on the ground in front of the right leg. Lift the right leg off the ground (adduction) and lower it back down.

Frequency- 1x/day, 7day/week

Intensity- 10 repetitions

Duration- 4 weeks

#### Gluteals (right side only)

Lying on the left side of the body, keep both legs straight. Lift the right leg off the left leg, but do not externally rotate at the hip (abduction), and lower it back down.

Frequency- 1x/day, 7day/week

Intensity- 10 repetitions

Duration- 4 weeks