

# The role of physiotherapy in cosmetology – cellulite reduction and body shaping

## Rola fizjoterapii w kosmetologii – redukcja cellulitu i modelowanie sylwetki

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### ABSTRACT

*Cellulite is an ailment of varied etiology. It is a very common condition in groups of young and elderly women and it leads to worse levels of feelings of well-being and lowers their self-esteem. Finding an effective way of cellulite reduction is still a challenge for cosmetology.*

*A main aim of this study was to show the most popular physical therapy methods which can be a way of cellulite reduction and body shaping. The second purpose was to consider the role of physiotherapists in the treatment of dermatology ailments and the process of improvement of skin condition in a group of women who have cellulite.*

*The PubMed and Web of Science databases were searched in September 2020, by using the “cellulite and physiotherapy” phrase, with a time frame from 2007 to 2020. The search came up with 51 articles. The most popular non-invasive cellulite reduction methods based on physical therapy which has been used are ultrasound, acoustics wave therapy, low-level laser therapy and transcutaneous electrical nerve stimulation.*

*Physiotherapy in connection with cosmetological treatment increases the effectiveness of therapy which is used to reduce cellulite. The authors recognize the need to extend the knowledge and scientific base in the field of using physical treatment in cellulite reduction as an independent therapy.*

**Keywords:** cellulite reduction, body shaping, physiotherapy, physical therapy, cosmetology

### STRESZCZENIE

Cellulit jest przypadłością o zróżnicowanej etiologii. Występuje najczęściej wśród kobiet, zarówno młodych, jak i starszych, prowadząc do gorszego samopoczucia i obniżonej samooceny. Znalezienie skutecznej metody redukcji cellulitu wciąż stanowi wyzwanie dla kosmetologii.

Głównym celem pracy było przedstawienie najpopularniejszych metod fizykoterapii wskazanych do stosowania w redukcji cellulitu i kształtowania sylwetki. Drugim celem było rozważenie roli fizjoterapeutów w leczeniu dolegliwości dermatologicznych oraz udziału w całym procesie poprawy stanu skóry kobiet zmagających się z cellulitem.

We wrześniu 2020 roku dokonano przeglądu bazy danych PubMed i Web of Science używając frazy “cellulite and physiotherapy” ze wskazaniem przedziału czasowego od 2007 do 2020 roku. Wynikiem wyszukiwania było 51 artykułów. Wśród najpopularniejszych nieinwazyjnych metod redukcji cellulitu opartych na wykorzystaniu fizykoterapii wymienia się: ultradźwięki, falę uderzeniową, laser niskoenergetyczny oraz prędkoenergetyczną elektryczną stymulację nerwów.

Fizykoterapia w połączeniu z zabiegami kosmologicznymi zwiększa skuteczność terapii mających na celu redukcję cellulitu. Autorzy dostrzegają potrzebę poszerzenia wiedzy i bazy naukowej w zakresie stosowania fizykoterapii w redukcji cellulitu jako niezależnej terapii.

**Słowa kluczowe:** redukcja cellulitu, kształtowanie ciała, fizjoterapia, fizykoterapia, kosmetologia

## INTRODUCTION

Cellulite is a frequent ailment in both young and elderly women, which may make them less confident [1, 2]. In the literature we can find lots of definitions of cellulite, but the most common says that cellulite is a complex defect of subcutaneous fatty tissue induced by fibrous-sclerosis changes [3]. It mainly occurs on the abdomen, thighs and buttocks where women have more subcutaneous connective tissue [4].

The symptoms of cellulite can be grouped into two categories - subjective such as feeling of heaviness, tension, spasms, paraesthesia and pain in the part of the body which is affected by cellulite and objective, such as the symptom of “orange peel” and “mattress symptom”. Those objective signs of cellulite can be recognized by ripples on the skin [4, 5].

Because of the occurrence of those symptoms four stages of cellulite are highlighted. First, the mildest one, when there are slight observable objective signs of cellulite only after holding the fold of the skin. Second, when during sitting and standing the skin is smooth but after holding the skin fold recesses are observed. Third, when the skin looks smooth when lying down, but when standing huge nodules, recesses and folds appear on the skin layer. And the last, fourth one, which is seen as a disease. The fourth one is characterised by painful nodules which are present in every position of the body [4, 6, 7].

The most common cause of formation of cellulite is an incorrect lifestyle which includes smoking, coffee and alcohol drinking and low physical activity. The most important thing in cellulite reduction is a lifestyle change and preventative strategies such as high physical activity and a balanced diet. However, methods of cellulite reduction such as physiotherapy are very important. And it is necessary to select an effective method of reduction and treat (in the case of 4<sup>th</sup> grade cellulite) skin changes [4, 6, 7].

There are a few theories about the formation of cellulite. The most common – hormonal theory, says that cellulite is caused by estrogens which extend blood vessels and enable liquid transport from them to intercellular space. If there is too much of this liquid we can talk about edema. It leads to proliferation of fat cells and lipogenesis. The consequence of that is growth of fat cells and water retention which we can see as cellulite [8].

Circulatory theory says, in common with hormonal theory, that cellulite is caused by disturbance of water management. The beginning of the problem is in microcirculation disorders which lead to metabolic disturbances, edema of the fat cells and, as a consequence, expansion of protein fibres and induration in the form of cellulite cusps [8].

Other theories about cellulite formation are the theory of adipocyte receptors and the theory of operating units, but they are not as well examined as hormonal and circulatory theory.

The consequences of cellulite are mainly connected with psychological and acceptance problems but it could also, in an advanced 4 stage, cause painful lumps under the skin layer [1, 9]. In 2012 46 volunteer women were tested to check the psychological discomfort connected with the occurrence of cellulite. This study shows that 78,3% of the volunteers examined felt embarrassed by their cellulite and felt compelled to seek treatment. Given that in our population around 85% of women struggle with cellulite, this result could prove the relevance of finding a safe and effective way to reduce it [1, 4, 5].

There are two types of methods of removing cellulite. One includes invasive and the second - non-invasive methods. Every method of physical therapy which is described in this article is included in the non-invasive therapy group. The most popular of them are: low-level laser therapy, high-intensity focused ultrasound and extracorporeal shockwave therapy [10].

## MATERIALS AND METHODS

The PubMed and Web of Science database in September of 2020 was searched using the following terms: “cellulite and physiotherapy”, with a time frame from 2007 to 2020. It came up with 46 articles in Pubmed and 5 in Web of Science. Summarizing we read 51 abstracts. After that the authors excluded articles which were only about invasive methods of cellulite reduction and about other physiotherapeutic methods which are not physical methods such as kinesitherapy. The authors rejected 22 articles and used: 10 articles to describe the problem of cellulite, 9 articles to describe ultrasound, 3 articles to describe Low-Level Laser therapy, 5 articles to describe Shock wave therapy, 2 articles to describe TENS. The article selection is presented on figure 1.

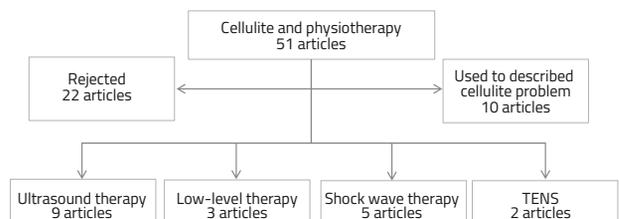


Fig. 1 Article selection  
Source: own study

## AIM

The purpose of this study is to collect and describe methods of physical therapy which are used in cosmetology to reduce cellulite, improve tissue tension and body shaping. The second purpose is to start a dialog about the usefulness of physiotherapists in cosmetology.

## PHYSICAL THERAPY METHODS

### Ultrasound

Ultrasound is one of the most popular non-invasive methods in cellulite reduction and body shaping. This technology uses acoustic waves which are above audible waves. They heat up tissues and make them damaged, which leads to regeneration of the cells. That makes skin more elastic, changes body shape and, as a result cellulite [11]. Through its thermal and vasodilatory effects, ultrasound induces lipolysis and a reduction in localized fat. Lysis of adipocytes is induced by cavitation and thermal damage [12]. In most of the literature we can see two types of ultrasound described: microfocused and high-intensity focused ultrasound. Micro focused ultrasound is shown as better for skin tightening and high-intensity focused ultrasound is described as better for body shaping and reducing cellulite. There are many articles and examinations concerning the use of high-intensity focused ultrasound in case of body shaping than cellulite reduces, but in both cases there are positive opinions [11].

Contraindications of using ultrasound are tumours and conditions after their surgical removal, pregnancy, active tuberculosis processes, haemorrhagic diathesis, circulatory failure, heart rhythm disturbances, implantation of an artificial pacemaker, peripheral blood supply disorders, thrombophlebitis, acute inflammatory processes and fever, incomplete bone growth, states after X-ray therapy, the presence of metal foreign bodies in the tissues, significant degree of vegetative neurosis and neuralgia of unexplained origin [13, 14]. That makes ultrasound less universal than low-laser therapy.

Lots of articles talk about the results of connections between ultrasound and some medications (which are called mesotherapy) or between ultrasound and radiotherapy. Both of them give positive effects and prove that ultrasound is a good way to reduce cellulite [15-17].

There are proofs that ultrasound could be used in reducing fat tissue by ultrasound cavity therapy which has gained popularity recently. Because of the connection between fat tissue occurrence and cellulite presence we can deduce that there is also an indirect influence of ultrasound cavity therapy on cellulite reduction but the authors did not find any research about that in sufficiently large examined groups [18].

### Acoustic wave therapy (AWT)

Acoustic wave therapy also known as shock wave therapy is a non-invasive therapy consisting of the propagation of mechanical waves into the tissues. This therapy started as a non-invasive way for kidney stone fragmentation. Now this method is used by more than 90% of the world as a leading method for treating kidney and urethral stones, furthermore it is used for cellulite reduction.

Mechanical energy is transformed from electrical energy by the piezo effect. Then mechanical energy in the form of shock waves becomes a means of bringing therapeutically effective energies to locally limited places in the body. Shock waves selectively affect acoustical interfaces (connecting two media, each with a different density, eg. oil/water or stone/tissue) and pass through homogeneous elastic tissue without damage. Additionally Shock waves are effective as a means to increase local blood circulation and metabolism. Additionally AWT seems to have a high antibacterial effect [19-21].

A combination of acoustic waves and cryolipolysis is called Ice-Shock Lipolysis. Acoustic wave therapy causes remodelling of the collagen fibers. Cryolipolysis is a non-invasive method used for the localized destruction of subcutaneous adipocytes, with no effects on lipid or liver marker levels in the bloodstream. This combination causes the programmed death and slow reabsorption of destroyed adipocytes. It is possible that this combination is an ideal alternative to liposuction for patients who require only a small intervention or are not suitable candidates for surgical approaches [22].

In 2017 Hexsel et al. did research in which 30 women aged between 20 to 60 years presenting moderate or severe cellulite degrees according to the Cellulite Severity Scale underwent 12 sessions of AWT. 25 women completed the study. Research showed that 12 sessions reduced cellulite. Moreover, observable effects of treatment were seen after 6 sessions [20].

Contraindication of acoustics wave therapy are disorders of coagulation, large diameter vessels in focal area, organs containing air in the focal area, infections in focal area, tumours in focal area, epiphyseal cartilage in focal area, areas near the spinal column, pregnancy, direct shock wave application to nerves, cardiac pacemaker [23].

### Low-Level Laser therapy (LLLT)

Low-Level Lasers are non-invasive pieces of equipment which emit power from 1 to 6 mW to tissues. The light which is emitted by a laser affects on cells and tissues. The photoreceptors of the respiratory chain absorb the light and, as a result, production of adenosine triphosphate (ATP) is increased. There are also changes observed in the composition and properties of biological membranes. This change leads to an acceleration of the exchange of electrolytes between the cell and the environment. Changes can be found in the membrane structure of red blood cells, platelets, nerve cells as well as mitochondria and other cell organelles. These changes may activate desirable biological reactions. Another effect of using a Low-Level Laser on the human body is the activity of macrophages increasing, granulocytes neutralisation and the phagocytosis process stimulation. Lasers also

affect tissues and increase blood flow which results in better electrolyte exchange between the cells. Moreover there is a significant improvement in the micro problems which leads to expanded lymphatic vessels [13].

Petti et al. tried to determine the efficacy of a combined approach for the simultaneous reduction of cellulite and lipodystrophy. For this purpose researchers used laser-assisted cellulite therapy and laser-assisted liposuction in a combination. Sixteen patients with cellulite Grade II and Grade III accompanied by mild and moderate lipodystrophy of the lower body received one therapy. The effect of the therapy was measured by comparison of photos before and after therapy and by patient satisfaction. Satisfaction was high for both physicians and patients. Researchers established that this combined approach is an effective and safe single stage procedure [24].

Savoia et al. studied a combined cellulite reduction. They connected LLLT and Vibration Therapy. The research group was 33 patients aged 18-64 with localized adiposity or fibrous cellulite. Patients had one session per week for a total period of 6 weeks. The research confirms the effectiveness of this combined therapy [25].

It is commonly accepted that LLLT does not have side effects. The course of neoplastic disease and epilepsy are only limits which are placed in literature [13, 14, 26].

A lot of studies show Low-Level Lasers as examples of effective non-invasive methods of cellulite reduction but in fact there are few studies about the effect of Low-Level Lasers in cellulite therapy. Unfortunately, these studies are only about combined therapy and there was not a study found which described the effectiveness of Low-Level Laser as only therapy.

### **Transcutaneous electrical nerve stimulation (TENS)**

Transcutaneous electrical nerve stimulation is not a direct method of cellulite reduction but it is a method which can enhance the carboxytherapy effect [27].

Carboxytherapy is a therapy based on carbon dioxide injections [28]. Pain is the main factor limiting its use. The invasive method of anaesthetics consisting of injections may present toxic effects related to the dose applied and the extent of systemic absorption, such as local erythema, rash, and edema. That is why non-invasive anaesthetic methods such as TENS may be safer.

The mechanism of TENS action is explained in the gate control theory of pain. This theory suggests that the stimulation of the A-B afferent fibres activate local inhibitory circuits in the dorsal horn of the spinal cord, preventing the entry of nociceptive impulses conducted by A-D and Type C fibres to reach higher cerebral centres [29].

In 2018 Salada et al. did research on 84 women aged between 18 and 44 with regular menstrual cycles, without previous experience with carboxytherapy and TENS. They

were divided into 3 groups: a control group, active TENS and placebo TENS. Then they were subjected to carboxytherapy. 75% of the active TENS group members displayed mild pain intensity, whereas placebo TENS (81% of group members) and control groups (67% of group members) had pain of moderate intensity [27].

Contraindication of TENS are purulent inflammation of the skin and soft tissues, egzema, fever and spastic paralysis [13, 14].

TENS is not a way to reduce cellulite but it can replace other methods of analgesia and eliminate pain which is the main factor limiting the use of carboxytherapy. It may make for more effective and useful carboxytherapy. That is why TENS appeared in this article.

### **DISCUSSION**

Cellulite is an aesthetic issue which can cause psychological and social problems. Unfortunately, there are no studies which focus on physical therapies as independent ones. Most studies search for the best reduction effect in combination with other methods, therefore it is not possible to state by how much the effect of cellulite therapy is caused by physical methods and how much by the surgical part of combined therapy. Moreover in the literature there are no articles which compare physical therapy methods in cellulite reduction. So in this article we cannot state which method would be the best. It is more complicated because even if the authors stated which methods are better there is a new problem that there are 4 stages of cellulite which are described in the introduction of this article. Every stage is different so the effectiveness of using physical methods for each stage may differ. It means that ultrasound may act in various ways on the 1. stage and on 4. stage. Also, this problem is not described in the literature.

Physical therapy is one of the ways of treatment in dermatological disturbances such as psoriasis or shingles. Because it is used to treat diseases of the skin and connective tissue there is good reason to think that it could be also helpful in cellulite reduction but this thesis should be reviewed [30].

Śliwiński considers hydrotherapy, iontophoresis, sonophoresis, electroporation, shock wave therapy, radio frequency, electrostimulation as cellulite treatment but he does not divide them into single therapy and combined therapy which would be necessary to evaluation the effectiveness of physical methods in cellulite reduction [30].

The purpose of this study was to find a physical method of cellulite therapy and describe it but it revealed a lack of knowledge about direct impact of physical methods in cellulite reduction and usage specific methods to treat different stages of cellulite. It is necessary to carry out a study which will consist of research about physical therapy as a single therapy of cellulite reduction at different stages

of cellulite. It would show either the efficiency of physical therapy in this case or the efficiency of invasive methods without using other therapies. The idea of a study described in the previous sentence could show a way to cellulite therapy development: if it is needed to evolve invasive methods or research surrogate methods or maybe stay with combined therapy.

This study shows that nowadays physical therapy is only a part of combined cellulite therapy and it is not enough to become an independent therapy. This is only a supposition because it does not have support in literature.

## CONCLUSION

Physical therapy is used as a part of cellulite combined-therapy. These are used: Ultrasounds, Low-Level Laser, Acoustics wave and TENS as an element of effective therapy. It is needed to carry out a study which would examine physical therapy as independent way of cellulite reduction. It is also necessary to examine the influence of those methods on different types of cellulite. Those examinations are the key to proving that physical therapy could be important in cellulite reduction, because in most of the current research those methods are only a support for other, often more invasive manners.

## REFERENCES/LITERATURA

- Hessel D, Siega C, Schilling-Souza J, et al. Assessment of psychological, psychiatric, and behavioral aspects of patients with cellulite: A pilot study. *Surg Cosmet Dermatol*. 2012;4(1):131-136.
- Schonvvetter B, Bagatin E, Soares JLM. Longitudinal evaluation of manual lymphatic drainage for the treatment of gynoid lipodystrophy. *An Bras Dermatol*. 2014;89(5):712-718. doi:10.1590/abd1806-4841.20143130.
- Haneke E. Cellulite: fakty i mity. *Dermatologia Estet Spec Mag Med*. 2006;8(3):132-139.
- Gałązka M, Gałęba A, Nurein H. Cellulit jako problem medyczny i estetyczny – etiopatogeneza, objawy, diagnostyka i leczenie. *Hygeia Public Heal*. 2014;49(3):425-430.
- Sadick N. Treatment for cellulite. *Int J Women's Dermatology*. 2019;5(1):68-72. doi:10.1016/j.ijwd.2018.09.002.
- Grzeszczuk M, Garasińska-Pryciak E. Subiektywna ocena stopnia zadowolenia klientów z efektów wybranych zabiegów antycellulitowych. *Kosmetologia Estet*. 2016;5:105-112.
- Majewska E, Kowalewska B. Wiedza społeczeństwa na temat przyczyn powstawania i metod zwalczania cellulitu. *Zesz Nauk WSA w Łomży*. 2018;(72):6-20.
- Kaniewska M. *Kosmetologia. Podstawy*. Warszawa: WSiP; 2011.
- Gemza K, Surgiel-Gemza A. Wielokierunkowe działanie zabiegu karboksyterapii w walce z mechanizmami wywołującymi cellulit. *Kosmetologia Estet*. 2018;7:317-322.
- Alizadeh Z, Halabchi F, Mazaheri R, et al. Review of the mechanisms and effects of noninvasive body contouring devices on cellulite and subcutaneous fat. *Int J Endocrinol Metab*. 2016;14(4):e36727. doi:10.5812/ijem.36727.
- Juhász M, Korta D, Mesinkovska NA. A review of the use of ultrasound for skin tightening, body contouring, and cellulite reduction in dermatology. *Dermatologic Surg*. 2018;44(7):949-963. doi:10.1097/DSS.0000000000001551.
- Uebel CO, Piccinini PS, Martinelli A, et al. Cellulite: A Surgical Treatment Approach. *Aesthetic Surg J*. 2018;38(10):1099-1114. doi:10.1093/asj/sjy028.
- Kasprzak W, Mańkowska A. *Fizjoterapia, Medycyna Uzdrawiskowa i SPA*. Warszawa: Wydawnictwo Lekarskie PZWL; 2017.
- Mika T. *Fizjoterapia. Podręcznik Dla Wydziałów Fizjoterapii Medycznych Studiów Zawodowych*. Warszawa: Wydawnictwo Lekarskie PZWL; 1996.
- Kapoor R, Shome D, Ranjan A. Use of a novel combined radiofrequency and ultrasound device for lipolysis, skin tightening and cellulite treatment. *J Cosmet Laser Ther*. 2017;19(5):266-274. doi:10.1080/14764172.2017.1303169.
- Sylwia M, Krzysztof MR. Efficacy of intradermal mesotherapy in cellulite reduction—Conventional and high-frequency ultrasound monitoring results. *J Cosmet Laser Ther*. 2017;19(6):320-324. doi:10.1080/14764172.2017.1334927.
- Casabona G, Pereira G. Microfocused Ultrasound with Visualization and Calcium Hydroxylapatite for Improving Skin Laxity and Cellulite Appearance. *Plast Reconstr Surg - Glob Open*. 2017;5(7):1-8. doi:10.1097/GOX.0000000000001388.
- Orga WH. Kawitacja ultradźwiękowa - w redukcji nadmiaru tkanki tłuszczowej. *Kosmetologia Estet*. 2012;1(2):123-126.
- Angehrn F, Kuhn C, Voss A. Can cellulite be treated with low-energy extracorporeal shock wave therapy? *Clin Interv Aging*. 2007;2(4):623-630. doi:10.2147/cia.s1721.
- Hexsel D, Camozzato FO, Silva AF, Siega C. Acoustic wave therapy for cellulite, body shaping and fat reduction. *J Cosmet Laser Ther*. 2017;19(3):165-173. doi:10.1080/14764172.2016.1269928.
- Kuhn C, Angehrn F, Sonnabend O, Voss A. Impact of extracorporeal shock waves on the human skin with cellulite: A case study of an unique instance. *Clin Interv Aging*. 2008;3(1):201-210. doi:10.2147/cia.s2334.
- Ferraro GA, De Francesco F, Cataldo C, et al. Synergistic effects of cryolipolysis and shock waves for noninvasive body contouring. *Aesthetic Plast Surg*. 2012;36(3):666-679. doi:10.1007/s00266-011-9832-7.
- Bachmann CE, Gruber G, Konermann W, et al. Orthopedic Shock Wave Therapy. In: ESWT and Ultrasound Imaging of the Musculoskeletal System. *Steinkopff*. 2001;(3):21-26.
- Petti C, Stoneburner J, McLaughlin L. Laser cellulite treatment and laser-assisted lipoplasty of the thighs and buttocks: Combined modalities for single stage contouring of the lower body. *Lasers Surg Med*. 2016;48(1):14-22. doi:10.1002/lsm.22437.
- Savoia A, Landi S, Vannini F, Baldi A. Low-level laser therapy and vibration therapy for the treatment of localized adiposity and fibrous cellulite. *Dermatol Ther (Heidelb)*. 2013;3(1):41-52. doi:10.1007/s13555-013-0026-x.
- Evangelista L, De Meo B, Bernabei G, et al. Ultra-Low-Level Laser Therapy and Acupuncture Libralux: What Is so Special? *Medicines*. 2019;6(1):40. doi:10.3390/medicines6010040.
- Sadala AY, Machado AFP, Liebano RE. Effects of transcutaneous electrical nerve stimulation on pain intensity during application of carboxytherapy in patients with cellulite: A randomized placebo-controlled trial. *J Cosmet Dermatol*. 2018;17(6):1175-1181. doi:10.1111/jocd.12489.
- Bunyatyan ND, Drogovoz SM, Kononenko AV2 PA. Carboxytherapy – an innovative trend in resort medicine. *Vopr Kurortol Fizioter Lech Fiz Kult*. 2018;95(5):72-76.
- Cristovam DN, Botelho S, Andrade MF, et al. Whole-body vibration in the reduction of the cellulite. *J Cosmet Laser Ther*. 2019;21(5):278-285. doi:10.1080/14764172.2018.1525750.s.
- Śliwiński Z, Sieroń A. *Wielka Fizjoterapia. Tom I*. Wrocław: Edra Urban & Partner; 2014.

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