



# Exercise-Based Approaches to the Treatment of Cellulite

Behzad Taati<sup>\*</sup>, Maryam Khoshnoodnasab<sup>1</sup>

<sup>1</sup>Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Rasht, Iran

**Corresponding Author:** Behzad Taati, PhD Student, Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Rasht, Iran. Tel: +98-9354511284, Email: taati.behzad@yahoo.com

Received August 2, 2018; Accepted November 16, 2018; Online Published March 15, 2019

## Abstract

The presence of cellulite in women, as an unacceptable cosmetic condition related to skin and subcutaneous tissue, is a growing issue worldwide. Having a sedentary lifestyle is one of the most important factors regarding the formation of cellulite. However, only a limited number of scientific studies have been done to investigate the possible effects of exercise training on cellulite improvement. This focused review aimed to summarize the available evidence on this subject and provide a road map for conducting future exercise-based research on how to treat cellulite.

**Keywords:** Cellulite, Endurance Training, Resistance Training, Therapeutics

**Citation:** Taati B, Khoshnoodnasab M. Exercise-based approaches to the treatment of cellulite. Int J Med Rev. 2019;6(1):26-27. doi:10.29252/IJMR-060105.

## Introduction

Cellulite (also known as edematofibrosclerotic panniculitis or orange peel syndrome) can be defined as unfavorable changes of the skin and subcutaneous adipose tissue, commonly on the pelvic region (specifically the buttocks) and abdomen. With this condition, the semblance of the skin changes, appearing like an “orange peel” or “cottage cheese”.<sup>1,2</sup> Cellulite was first described in 1978 as a sex-related condition in the structure of skin and subcutaneous tissue.<sup>3</sup> It is a widespread disorder in adult females compared with males; as some degree of cellulite has been reported in approximately 85% of women over the age of twenty.<sup>2</sup> Indeed, it has been confirmed that the perpendicular nature of the fibrous septa in women is the main reason for the appearance of cellulite as a rippled formation is created, while these fibers in men have an oblique orientation and prevent such unaesthetic alterations.<sup>4,5</sup>

Subcutaneous fat, fibrotic dermal septa, dermal laxity, and muscle atrophy all are parts of the multifactorial pathophysiology of cellulite. Several factors also affect the formation and aggravation of cellulite that include hormonal changes, a genetic predisposition to abnormal fat deposition, family history, weak muscle structure, inflammation, stress, poor eating habits, and a sedentary lifestyle.<sup>6-9</sup> Cellulite, an undesirable cosmetic problem, can lead to considerable distress for women, specifically younger women, and potentially impair their self-esteem and quality of life.<sup>1,8,10,11</sup> Thus, investigating effective and suitable methods for the control and treatment of cellulite is highly important. Although exercise and weight loss have been proposed as means of improving cellulite,<sup>9</sup> few studies to date have examined the role of exercise training in treating cellulite. In the present study, all available data concerning different exercise modalities

was reviewed and summarized. Recommendations for future well-designed investigations are also outlined.

## A Summary of Routine Clinical Options for Cellulite

There is a wide range of different therapeutic regimens to treat cellulite. They can be summarized as mechanical stimulation (device-based or manual massage), energy-based devices (radiofrequency, laser and light, acoustic wave therapy), topical agents (methylxanthines such as aminophylline, theophylline, and caffeine), minimally invasive subcision techniques, and injectable options (dermal fillers such as calcium hydroxyapatite, active biologic agents such as collagenase).<sup>4,12,13</sup> Despite these multiple therapeutic options, no clearly proven procedures exist.

## Endurance Training and Cellulite

Today, nonpharmacological treatments receive more attention in the world, and a variety of proposed noninvasive methods for the treatment of cellulite includes weight loss using calorie restriction, massages, the use of topical creams, oral supplements (weight-management supplements), phototherapy with infrared waves, and shockwave therapy alone or in combination with some kinds of exercise training.<sup>7,8,10,11</sup> Regular running,<sup>8</sup> cycling,<sup>10</sup> or resistance training<sup>11</sup> can help improve the appearance of cellulite through controlling body weight or increasing muscle strength. In this context, Paolillo et al. examined the effects of a new noninvasive method including infrared-LED (850 nm) plus endurance training on a group of 25–55 years old women.<sup>8</sup> Twenty Caucasian women were randomly allocated to the control group (treadmill training) or the LED group (treadmill training plus phototherapy) and performed 45

minutes of running training per session at intensities between 85% and 90% maximal heart rate ( $HR_{max}$ ), with or without phototherapy, twice a week for 12 weeks. LED devices were placed at a distance of 15 cm from each participant, and the average power density on the volunteers' skin was 39 mW/cm<sup>2</sup>. The results showed significant reductions in saddlebag and thigh circumferences as well as cellulite only in the LED group. The authors concluded that these therapeutic effects are due to the increased metabolic activity and preventing the increase of body fat. However, the net effect of phototherapy is not clear in this study because of the absence of a phototherapy-only group.

Increasing blood flow in subcutaneous fat tissue is a therapeutic target of exercise training to increase lipolysis and accelerate local fat loss in some regions of the body; it is called "spot reduction". Because a lower body negative/positive pressure leads to changes in the peripheral blood flow, the question was raised whether exercise training with lower body pressure (LBP) can increase regional fat loss and decrease ratings of cellulite in the lower extremities of overweight women.<sup>10</sup> In a randomized controlled trial, 86 obese women were randomly assigned to one of four 12-week interventions, including a control group (no intervention), diet only group, diet plus exercise group, and a diet, exercise, and LBP group. The 3 treatment groups followed the same diet (350–500 kcal/d below the calculated energy requirements), and the 2 exercise groups additionally followed an endurance training program of three sessions of cycling per week at 50%  $VO_{2max}$  for 30 minutes, with or without LBP (an initial constant high pressure of 7.5 mm Hg for 4 minutes, followed by alternating under- and overpressure of between –15 and +15 mm Hg at intervals of 20 seconds). As expected, endurance training along with a daily energy deficit was successful in reducing body weight in all three intervention groups. However, the application of LBP to the lower extremities was especially appropriate to improve skin appearance and cellulite.<sup>10</sup> These results show that Hypoxi training may be a safe and applicable treatment for cellulite.

### Resistance Training and Cellulite

In addition to endurance training, regular resistance training using body weight has a beneficial effect on improving the photo-numeric cellulite severity scale in women aged 18–65 years. Two home-based gluteal exercises were performed with 15 repetitions per leg twice a day over 12 weeks. However, this effect was superior if the training program was combined with 6 sessions of extracorporeal shock wave therapy (0.35 mJ/mm<sup>2</sup>, 2000 impulses) at both gluteal and thigh regions.<sup>11</sup> While it appears that resistance training may reinforce the therapeutic effect of routine treatments for cellulite, to date, only one study has employed resistance training. Therefore, there is a considerable need to examine the potential role of this type of exercise.

### Conclusions

Cellulite prevalence among women is a widespread concern and it should be taken into more accurate consideration. There are multiple factors associated with cellulite, and its

pathophysiology is complex. Thus, a complete treatment for cellulite has not been well-established. Finding a comprehensive method that targets these factors can be important. Although exercise training can improve lipolysis and body composition and decrease the severity of cellulite through increased blood flow to adipose tissue, it seems that the combination of regular physical activity and other therapeutic methods (i.e., diet, infrared waves, extracorporeal shock wave, and LBP) is more effective. However, it is not known which type of exercise training (endurance, resistance, or combined training) and what duration, intensity, and frequency of exercise is optimal to achieve the best outcomes. Furthermore, there is no strong evidence to indicate which type of therapeutic method used in conjunction with exercise is more suitable and applicable. Therefore, future, well-designed, prolonged studies should be performed to determine these desired aspects.

### Authors' Contributions

BT and MK contributed equally to the study.

### Conflict of Interest Disclosures

The authors declare that they have no conflicts of interest.

### References

- Alizadeh Z, Halabchi F, Mazaheri R, Abolhasani M, Tabesh M. 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.
- Rawlings AV. Cellulite and its treatment. *Int J Cosmet Sci.* 2006;28(3):175-190. doi:10.1111/j.1467-2494.2006.00318.x.
- Nurnberger F, Muller G. So-called cellulite: an invented disease. *J Dermatol Surg Oncol.* 1978;4(3):221-229. doi:10.1111/j.1524-4725.1978.tb00416.x.
- Luebberding S, Krueger N, Sadick NS. Cellulite: an evidence-based review. *Am J Clin Dermatol.* 2015;16(4):243-256. doi:10.1007/s40257-015-0129-5.
- Pierard GE, Nizet JL, Pierard-Franchimont C. Cellulite: from standing fat herniation to hypodermal stretch marks. *Am J Dermatopathol.* 2000;22(1):34-37. doi:10.1097/0000372-200002000-00007.
- Rossi AM, Katz BE. A modern approach to the treatment of cellulite. *Dermatol Clin.* 2014;32(1):51-59. doi:10.1016/j.det.2013.09.005.
- Roe E, Serra E, Guzman G, Sajoux I. Structural Changes of Subcutaneous Tissue Valued by Ultrasonography in Patients with Cellulitis Following Treatment with the PnKCellulitis((R)) Program. *J Clin Aesthet Dermatol.* 2018;11(3):20-25.
- Paolillo FR, Borghi-Silva A, Parizotto NA, Kurachi C, Bagnato VS. New treatment of cellulite with infrared-LED illumination applied during high-intensity treadmill training. *J Cosmet Laser Ther.* 2011;13(4):166-171. doi:10.3109/14764172.2011.594065.
- Avram MM. Cellulite: a review of its physiology and treatment. *J Cosmet Laser Ther.* 2004;6(4):181-185. doi:10.1080/14764170410003057.
- Loberbauer-Purer E, Meyer NL, Ring-Dimitriou S, Haudum J, Kassmann H, Muller E. Can alternating lower body negative and positive pressure during exercise alter regional body fat distribution or skin appearance? *Eur J Appl Physiol.* 2012;112(5):1861-1871. doi:10.1007/s00421-011-2147-1.
- Knobloch K, Joest B, Kramer R, Vogt PM. Cellulite and focused extracorporeal shockwave therapy for non-invasive body contouring: a randomized trial. *Dermatol Ther (Heidelb).* 2013;3(2):143-155. doi:10.1007/s13555-013-0039-5.
- Zerini I, Sisti A, Cuomo R, et al. Cellulite treatment: a comprehensive literature review. *J Cosmet Dermatol.* 2015;14(3):224-240. doi:10.1111/jocd.12154.
- Sadick N. Treatment for cellulite. *Int J Womens Dermatol.* 2019;5(1):68-72. doi:10.1016/j.ijwd.2018.09.002.