

## **Geloid Fibroedema: aesthetic treatments and the importance of nutrition**

*Gynoid Lipodystrophy: aesthetic treatments and the importance of nutrition*

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### **SUMMARY**

Inadequate eating habits negatively impact aesthetics, especially in women with disorders such as Geloid Fibroedema (GFE). Many people still do not associate a healthy diet with better aesthetic results, which contributes to the increase in problems related to inadequate diets. This study carried out a bibliographic review, consulting databases such as Google Scholar, PubMed and SciELO, with the objective of analyzing the influence of healthy diets on the aesthetic treatment of GFE. The search used the following descriptors: Gynoid Lipodystrophy AND Nutrition, Gynoid Lipodystrophy AND Diet, Geloid Fibroedema AND Nutrition, Geloid Fibroedema AND Diet, Cellulite AND Nutrition and Cellulite AND Diet. Five articles were selected that indicated that diets rich in vegetables can improve the condition, while diets rich in proteins help in weight reduction and improving the appearance of cellulite, especially on the thighs. Despite the challenges in adherence, balanced diets and weight loss are essential for treating cellulite.

**Keywords:** Aesthetics, cellulite, geloid fibroedema, nutrition

### **ABSTRACT**

Inadequate eating habits negatively impact aesthetics, especially in women who experience dysfunctions such as Gynoid Lipodystrophy (GL). Many people still do not associate healthy eating with better aesthetic results, contributing to an increase in problems related to improper diets. This study conducted a bibliographic review, consulting databases such as Google Scholar, PubMed, and SciELO, with the objective of analyzing the influence of healthy diets on the aesthetic treatment of GL. The search used the following descriptors: Gynoid Lipodystrophy AND Nutrition, Gynoid Lipodystrophy AND Diet, Fibroedema Geloid AND Nutrition, Fibroedema Geloid AND Diet, Cellulite AND Nutrition, and Cellulite AND Diet. Five selected articles indicated that diets rich in vegetables can improve the condition, while protein-rich diets help with weight loss and improvement in the appearance of cellulite, especially on the thighs. Despite challenges in adherence, balanced diets and weight loss are fundamental for cellulite treatment.

**Keywords:** Aesthetics, cellulite, gynoid lipodystrophy, nutrition.

## 1. INTRODUCTION

According to Nunes (2014), care with the diagnosis and balance of aesthetic dysfunctions become of utmost importance, inducing people to take care of themselves more often. Society is concerned with achieving an attractive appearance, seeking a better quality of life, because a healthy and well-cared for body awakens the interest of different audiences (Geraldo; Freitas; Buffo, 2015).

Some inadequate eating practices greatly influence the aesthetics of the individual, highlighting the great importance of appropriate eating habits. Due to factors such as pregnancy, hormonal changes and fat accumulation, dysfunctions aesthetics are more frequent in women, with one of the main complaints being emergence of Geloid Fibroedema (GEF), although this dysfunction also presents in thin people and adolescents (Navarro; Waideman; Silva, 2017).

Despite advances in the field of aesthetics, some individuals still do not have knowledge that adopting healthy eating habits can provide more satisfactory results in aesthetic treatments. Therefore, more and more aesthetic anomalies resulting from inadequate nutrition. Even if there is a exaggeration in vanity, it is necessary to maintain a balance in diet for good health. health, ensuring the intake of necessary nutrients that will help aesthetically and in body harmonization (Damasceno; Santos, 2016).

According to Brito *et al.* (2019), there are numerous procedures for harmonization of Geloid Fibroedema, seeking not only to treat the appearance aesthetics, but also promote physical and mental well-being. These procedures aim to not only improve appearance but also provide health benefits general well-being of the individual, seeking a balance between aesthetics and well-being.

Thus, the aim of this study is to investigate the influence of adopting diets healthy in the aesthetic treatment of Geloid Fibroedema (GEF). To this end, it will be carried out a systematic review of the scientific literature to map recent studies that examined the relationship between the adoption of adequate diets and the effectiveness of treatments aesthetics for Geloid Fibroedema (GEF), aiming to identify patterns and gaps in the

knowledge, investigating how different dietary approaches can influence the cellulite reduction.

## 2. Development

### 2.2 Theoretical framework

#### 2.2.1 Pathophysiology and clinical aspects of FEG

Geloid Fibroedema (GFE) is a metabolic dysfunction that affects specifically the subcutaneous tissue and dermis, resulting in an irregular appearance of the skin. This unwanted dermatological condition can cause emotional and psychosocial, compromising the quality of life of patients (Cruz *et al.* 2015).

Histologically, FEG is characterized by an edematous infiltration of the tissue subcutaneous connective tissue, of non-inflammatory origin, which is followed by a reaction dermal that induces fibrosis (Nascimento; Araujo, 2017). FEG is more prevalent in women, being rarely found in men. The areas of the body most affected include thighs, buttocks, abdomen, back and arms (Almeida *et al.* 2011).

The complexity of the pathophysiology of geloid fibroedema is recognized, and several theories have been proposed to elucidate it. It is currently believed that this disorder, which appears to be multifactorial, it is triggered by several causes, including changes anatomical, microcirculation dysfunction, decreased hormone production vasodilator adiponectin by subcutaneous tissue cells, genetic polymorphisms, changes in dermal connective tissue and inflammatory processes (Schonvvetter *et al.*, 2014; Tokarska *et al.*, 2018).

The pathophysiology of FEG can be divided into evolutionary stages. Initially, there is a change in the precapillary sphincter, which results in capillary ectasia, transudation and edema. This edema hinders metabolic exchanges, causing a response in the tissue connective tissue that leads to the formation of a network of fibrils. These fibrils aggregate to the fibers collagen and organize themselves into capillary arrangements, forming micronodules. With the Over time, the connective tissue undergoes sclerosis, resulting in the formation of macronodules. (Santos *et al.*, 2011)

According to Gouveia *et al.* (2018), there are a series of triggering factors, aggravating or predisposing factors. Triggering factors are related to changes hormonal changes that occur in adolescence, with estrogen being the main hormone triggering. The predisposing factors are hereditary and multiple, for



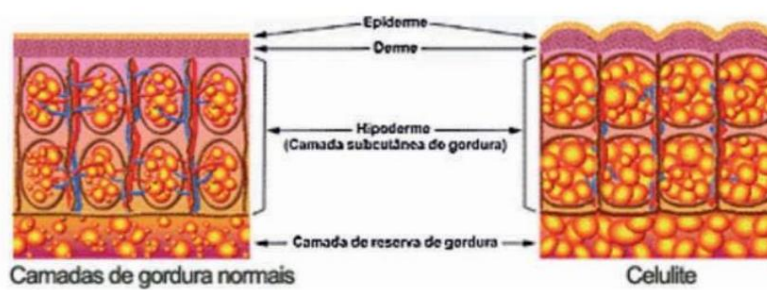
example: sex, ethnicity, body type and distribution of fat cells associated or not to lipodystrophy. Aggravating factors may be related to poor diet, stress, sedentary lifestyle, pathologies, medications and even pregnancy.

Cellulite is related to increased deposition of subcutaneous fat, especially in areas affected by hormonal factors. In areas prone to cellulite, adipocytes undergo hypertrophy (increase in size) and hyperplasia (increase in number), resulting in larger fat lobules that project into the dermis, which accentuates the irregular appearance (Tokarska *et al.*, 2018). Hormonal influences, in particular estrogen, favor the storage of fat in specific regions, such as thighs and buttocks, where cellulite is most common. (Pugliese, 2007)

Impaired microcirculation also plays a significant role in pathophysiology of cellulite. In the affected areas, a decrease in blood flow is observed capillary blood and lymphatic drainage, leading to the accumulation of interstitial fluid and metabolic waste products, which aggravates edema and tissue fibrosis. The increase capillary permeability allows plasma proteins to leak into the space interstitial, contributing to swelling and inflammation of the tissue. (Emanuele, 2013)

In addition, women have thicker adipose tissue, cells larger adipose tissue and looser connective tissue, which contributes to the formation of more pronounced protrusions. In women, the fat lobules are more voluminous and have parallel septa, while in men, the fibrous septa are smaller and arranged in oblique planes, with smaller lobes (Mirrashed *et al.*, 2004) as can be seen in Figure 1. This difference in the organization of adipose tissue between men and women can explain the predominance of “cellulite” in women (Borges; Scorza, 2016).

**Figure 1**



Desenho esquemático do tecido adiposo normal e na LDG.<sup>8</sup>

Source: Gonzaga *et al*, 2014, p. 359.

According to the BIMED (Medical Image Bank) classification, the Geloid fibroedema is divided into 4 degrees, represented in the following table:

**Table 1 – FEG degrees and their characteristics**

Degrees of FEG	Clinical features
<b>Grade I</b>	Initial phase, in which the process is situated internally, but cannot be seen or sense. If the skin is pressed tightly, tiny holes will appear.
<b>Grade II</b>	In this case, the first symptoms become visible and can be felt under palpation. Irregularity in the skin relief, visible by its compression or contraction muscular
<b>Grade III</b>	There is the appearance of nodules, which do not require palpation to be seen, the skin rough, it looks like orange peel, there is a feeling of heavy legs, paleness, pain on palpation, nodules, reduced skin elasticity.
<b>Grade IV</b>	In the fourth phase, it is rigid and the skin becomes “luminous”, full of depressions, the legs become heavy, painful, swollen and a feeling of tiredness, even without exertion physical, it is evident even over clothing. Larger and more painful nodules, palpable and visible, attached to the deep planes, in addition to the appearance quite wavy skin

Source: Castro *et al.*, 2016

The table above shows the degrees of FEG (Gelloid Fibroedema), also popularly known as cellulite, and its main characteristics. It is possible to verify that the degrees evolve progressively, both in terms of manifestations clinical and symptom intensity, indicating the severity of the condition.

In Grade I, the change is initial and does not yet present visible or palpable signs. The process takes place internally, and only with compression of the skin can they be observed small, minimal holes. This phase is generally more difficult to be identified, as there are no apparent symptoms.

In Grade II, the first visible and palpable signs begin to appear. Irregularity in skin relief can be perceived by compression or contraction muscular. At this stage, it is possible to notice an advance in the process, which already affects the texture of the skin.

Grade III is characterized by the appearance of visible nodules, without the need for palpation. The skin has a rough texture, with an "orange peel" appearance. In addition, more uncomfortable symptoms arise, such as a feeling of heavy legs, pain in the palpation, reduced skin elasticity and paleness. These signs indicate a worsening of the condition, with more evident tissue involvement.

Finally, in Grade IV, the condition is more advanced and severe. The skin becomes rigid, with a "luminous" appearance, full of very visible depressions and undulations. The symptoms include heavy, swollen, and painful legs, even at rest, as well as larger, painful nodules attached to the deep planes. This phase is marked by a more severe functional and aesthetic impairment, becoming evident even above of the clothes.

The following figure shows each degree of FEG mentioned above.

**Figure 2**



Source: Migueis, 2020, p. 10

Thus, it is possible to observe that, as the degrees progress, the symptoms become more evident and uncomfortable, signaling the need for interventions early to prevent the condition from reaching more serious stages.

The following table presents the different types of FEG (Gelloid Fibroedema), or cellulite, classified according to their clinical characteristics and their conditions associated. Each type is related to specific factors such as age, composition body, lifestyle and circulatory changes, highlighting the diversity of presentations of this clinical picture.

**Table 2 – Clinical forms of FEG**

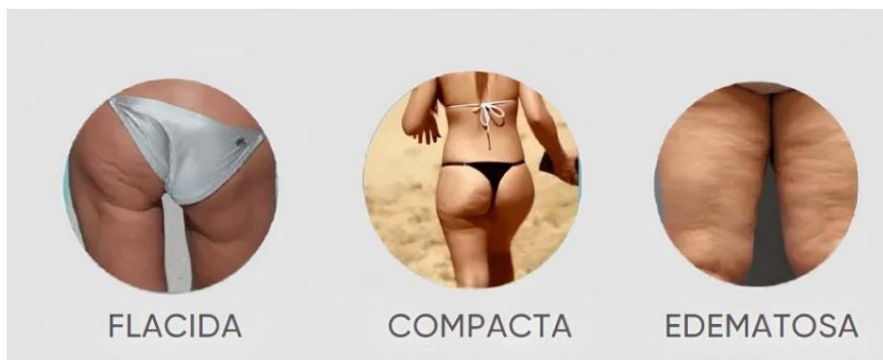
<b>Hard</b>	Identified in physically active, thin or overweight young people weight. After palpation with finger rolling, the region does not present mobility. It has an "orange peel" appearance, hardened and with little vascularization.
<b>Flaccid</b>	Observed in individuals over 30 years of age who have lost weight without associated muscular activity, presenting little muscle mass developed, circulatory deficit, varicose veins and feeling of heaviness.
<b>Edematous</b>	Found in women of any age or weight, with circulatory imbalances and users of contraceptive methods based on of hormones. Presents edema to digital pressure.

<b>Mixed</b>	Found in different parts of the body, representing variations of previous types.
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Source: Borges; Scorza, 2016

The clinical forms can be seen in the following figure:

**Figure 3**



Source: Migueis, 2020, p. 12

The classification of FEG types described above reinforces the complexity of this clinical picture, which can vary significantly depending on the conditions individual to each patient. Correct identification of the predominant type is essential to direct treatment strategies, which should be customized to address the specific factors involved, such as structural changes, muscle deficit, retention fluids and circulatory failure. Furthermore, this categorization highlights the importance of early interventions and healthy lifestyle habits, such as the practice regular physical exercise and control of hormonal and circulatory factors, to minimize the progression of FEG and improve the quality of life of affected individuals.

#### 2.2.2 Aesthetic treatment of Geloid Fibroedema (GEF)

Therapies for Geloid Fibroedema (GEF) are divided into two groups: invasive and non-invasive. In invasive therapies, the injection of substances is used biologically active, often with a mixture of active ingredients that act on pathophysiology of this condition, such as phosphatidylcholine and sodium deoxycholate, with the

prospect of obtaining better results. Non-invasive therapies do not involve the injection of substances into the tissues. These include techniques such as massage and devices electrotherapeutics, which act on the affected regions through thermal and non-thermal mechanisms thermal, producing physiological effects in the treated body area (Perez *et al.*, 2018).

The choice of therapeutic options available for Geloid Fibroedema (GFE) depends on the level of tissue involvement, being selected after an evaluation careful clinical examination by a qualified professional.

Aesthetic therapies for FEG are numerous and range from modalities conventional, such as topical cosmetic applications, massages/lymphatic drainage, phototherapy, therapeutic ultrasound and radiofrequency, to invasive approaches such as subcision, mesotherapy and carboxytherapy. These treatments aim to improve the aesthetic appearance of the skin and maintain the response to treatment for as long as possible. The choice of the most appropriate therapy should consider the degree of severity of the condition and be defined together with the health professional (Borges; Scorza, 2016).

The table below presents the main treatments used by beauticians to treat FEG:

**Table 3 – FEG treatments performed by beauticians**

<b>Lymphatic drainage</b>	Non-invasive technique that consists of draining excess interstitial fluid from a stagnant area through slow, gentle, rhythmic maneuvers in the direction of the lymph nodes. The goal of this technique is to improve lymphatic circulation, reduce edema, and eliminate metabolite residues, among other benefits.
<b>Microneedling</b>	Minimally invasive technique performed with microneedle pens and/or rollers, which uses a system of several thin, disposable needles that are joined together in rows. This technique consists of the controlled application of these microneedles into the skin, promoting the formation of small channels that stimulate the production of collagen and elastin. The goal is to improve the appearance and texture of the skin, and can be used to treat various conditions, such as Geloid Fibroedema.
<b>Ultracavitation</b>	It is a procedure that was discovered from the investigation of the results obtained by the ultrasound wave in fat cells. Ultracavitation acts in a non-invasive way, using only the ultrasound wave to generate cavitation and fragmentation of fat cells, without the need for injections.

<b>Radio frequency</b>	Non-invasive method for treating sagging skin and improving body and facial contours. Its effects are based on volumetric heating of the deep dermis, heating the collagen and elastic fibers. The heat generated by radiofrequency leads to collagen retraction, improving the firmness and elasticity of the skin, which improves the appearance of the FEG.
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Source: BRANDÃO *et al.* 2010; Pinto, Silva and Sobrinho, 2019; BRITO *et al.*, 2019; TAGLIOLATO, 2015.

Therapies have common goals, such as: induction of lipolysis in tissue subcutaneous; improved blood flow, skin elasticity and dermal thickness; and reduction of hypertrophic connective tissue septa in the hypodermis. However, the effects are limited and temporary, and therefore results are variable.

In short, the choice of treatment should consider the patient's specific goals, budget and time availability. It is always recommended to consult a qualified professional to determine the best option based on needs individual.

### 2.2.3 Nutrition in the treatment of FEG

When there are changes in diet, there may be a change in the type of food intake. This in turn can cause an excess or deficiency of nutrients in the body, which may be related to aesthetic disorders. Most of the aesthetic dysfunctions, such as skin aging, obesity, acne, hair loss and geloid fibroedema (GEF), have a nutritional character, such as a lack of fatty acids essential, minerals and vitamins (Geraldo; Freitas; Buffo, 2015).

According to Lima (2017), excess weight is also associated with the emergence of the FEG. Because of this, it is important to maintain an adequate weight, have a healthy diet healthy accompanied by regular physical exercise, in order to ensure a reduction in appearance of FEG. Therefore, it is essential that there is adequate nutritional value to provide a considerable improvement in the treatment of FEG in existing cases.

Through the application of a clinical nutritional approach, carried out by a nutritionist, it is possible to offer clients an improvement in the cellulite condition through of a diet that is anti-inflammatory, and low in sodium, as well as having a load and reduced glycemic index. This diet aims to provide adequate intake of

nutrients and calories, helping with weight loss or maintenance and, consequently, in reducing the size of fat cells (Klein, 2015).

According to Geraldo, Freitas and Buffo (2015), excessive food intake with a large amount of sodium, it contributes to fluid retention, which can contribute for the development of Geloid Fibroedema (GFE). In addition, excessive consumption of fatty foods and foods with a high carbohydrate content with a higher glycemic index raises the formation and accumulation of fats, also favoring the emergence of EGF.

Another factor that contributes to FEG is insufficient water consumption, making it difficult to exchange fluids in the body and contributing to the retention of waste toxic to cellular metabolism (Damasceno; Santos, 2016).

The use of dietary supplements is an interesting strategy to deliver ingredients capable of improving the conditions of "cellulite". This is because, when ingested, the ingredients are absorbed and distributed directly into the thickest layer deep in the skin, the dermis, and in the subcutaneous adipose tissue, which may be related with biological changes in the affected region. In 2014, a study was published demonstrating that oral supplementation with *chokeberry* juice (*Aronia melanocarpa*) rich in polyphenols (25 mg anthocyanidins/100 g juice) for 90 days improved the morphology of the skin with cellulite, reducing the thickness of the subcutaneous tissue and edema (Savikin *et al.*, 2014).

### 3. MATERIAL AND METHOD

The present research consisted of a systematic bibliographic review study, with the aim of compiling and analyzing the existing literature on the subject. To this end, the following databases were selected: *Google Scholar*, *PubMed* and *SciELO*. The search covered articles, theses and books published in Portuguese, English and Spanish, with the keywords: "nutrition", "cellulite", "geloid fibroedema", "gynoid lipodystrophy" and "diets".

Research Stages: Initially, a search was carried out in the databases selected, using descriptors associated by Boolean operators, such as "AND" and "OR" to refine the results. Then, the titles and keywords were read. The key of the articles found to identify the most relevant ones for the research. The inclusion criteria were: articles, theses and books published in the last ten years, with

the following descriptors: Gynoid Lipodystrophy AND Nutrition, Gynoid Lipodystrophy AND Diet, Geloid Fibroedema AND Nutrition, Geloid Fibroedema AND Diet, Cellulite AND Nutrition and Cellulite AND Diet.

Furthermore, only clinical and observational studies that involve women of any age, non-pregnant and with any degree of fibroedema geloid (FEG). First, the titles and abstracts of the selected articles were read for an initial assessment of content and relevance. Those who did not meet the inclusion criteria were excluded and the articles that remained in the selection were read in full and analyzed. The main findings were organized and presented in a summary table, facilitating the visualization and comparison of data, aiming at contextualization of the evidence found in light of existing literature.

#### 4. RESULTS AND DISCUSSION

16 articles were found that met the title and keyword criteria, However, only 5 met the inclusion standards, being considered only those that were published in the last 10 years, are open access and have carried out practical studies with women who have any degree of geloid fibroedema. The Selected articles were organized into a table presented below.

Table 4 – Selected articles

Author/Year	Objectives	Protocol	Results
Souza <i>et al.</i> , 2022	To assess the quality of life of women with cellulite and their eating habits	Thirty women were assessed using a food frequency questionnaire to investigate the consumption of certain food groups, in addition to the Celluqol® questionnaire, which assesses the quality of life of people with cellulite	It was concluded that the eating habits of women with gynoid lipodystrophy were relatively balanced, and cellulite had little influence on their lifestyle.
Soares, 2019	Analyze the risk factors associated with cellulite and its effect on quality of life	A total of 184 adolescents aged between 12 and 18 years, with an average age of 15 years, participated in the study. The following variables were evaluated: family genetic, gynecological and hormonal history, level of physical activity, nutrition, body composition and anthropometry; in addition to the severity of cellulite and its impact on quality of life.	The variables that proved to be significant as risk factors for cellulite were: BMI ( $p < 0.001$ ), time since menarche ( $p = 0.037$ ), proportion of carbohydrates in total energy ( $p = 0.006$ ), daily consumption of

			water ( $p = 0.037$ ), family history ( $p = 0.003$ ) and weekly physical activity level ( $p < 0.001$ )
Roe <i>et al.</i> , 2018	To evaluate the effectiveness of a multidisciplinary treatment for non-infectious cellulitis.	A multidisciplinary treatment was carried out with 20 women over 18 years of age, with normal weight and non-infectious cutaneous cellulitis (edematous-fibrosclerotic panniculitis). The program included diet, physical activity and the use of gel with active ingredients for cellulite.	All 20 participants showed an improvement in the degree of cellulite, in addition to a reduction in body weight and in the circumference of the abdominal and shoulder areas. thighs.
Marques <i>et al.</i> , 2016	To evaluate the influence of a controlled diet on body composition and improvement of cellulite in adult women.	Thirty-two healthy women, aged 25 to 40 years, participated in a 3-month study, following a controlled diet.  Assessments were performed at the beginning and end of the period, covering four parameters: 1) cellulite severity (photonumeric scale); 2) anthropometric measurements; 3) skin elasticity (Cutometer®); and 4) collagen density and dermis-hypodermis interface (ultrasound – DermaScan®). Data were statistically analyzed using paired t-tests, Wilcoxon and Pearson correlation.	Only 14 participants completed the study.  Despite the reduction in the photonumeric scale scores, no significant difference was observed in the degree of cellulite severity.  There were significant reductions in body measurements, while skin elasticity remained unchanged.
Hexsel, 2015	To evaluate the effect of three different diets on cellulite at different levels.	Forty-three eutrophic women, aged 18 to 40 years and with moderate to severe cellulite, were randomized into three dietary regimen groups, all with the same total caloric value but different macronutrient contents.	Diet group 1 had reduced carbohydrates, diet group 2 had high protein, and diet group 3 followed a normal macronutrient pattern.  Patients who followed diet 2, which was high in protein, experienced the greatest weight loss compared to those who followed the other diets.  Furthermore, a decrease in the degree of cellulite was observed only in this group, suggesting that the positive effect of the diet on cellulite may be related to weight loss. On the other hand, the low-carb diet did not have a significant impact on the patients' weight or the degree of cellulite.

Source: Author's research.

According to the study by Souza *et al.* (2022), the classification of changes in daily habits showed that most participants are not bothered by cellulite, even maintaining unhealthy eating habits. The frequency questionnaire food revealed that, although many consume vegetables and legumes daily, this The same frequency applies to sugar consumption.

Excess sugar is converted into energy reserves, increasing fat body and aggravating geloid fibroedema. In contrast, the nutrients in vegetables, such as potassium, iron and silicon, can help in the treatment of this aesthetic condition, with functions ranging from fluid balance to improving microcirculation (Damasceno *et al.* 2016).

Carbonated drinks can also make cellulite worse, due to carbonic acid, which hardens the fibers. The weekly consumption of fats and *fast foods* was observed, and these diets favor the appearance of cellulite by increasing lipid storage and capillary resistance. In addition, the consumption of processed foods, which has become common due to stress and lack of time, contributes to fluid retention and formation of edema, as they have a high sodium content, making it difficult to exchange fluids and favoring geloid fibroedema (Lima, 2017).

In the study by Soares (2019), it is concluded that a diet rich in carbohydrates influences the occurrence of cellulite. The increase in lipogenesis, caused by estrogen and prolactin, in combination with high-carbohydrate diets and lipolytic resistance, results in adipocyte hypertrophy. This condition, together with hypertrophy and peri-adipocyte hyperplasia, contributes to the formation of micronodules, leading to edema and vascular congestion. Thickening of the septa causes an appearance padded in the affected areas, as described by Avram (2004).

In the study carried out by Roe *et al.* (2018), the degree of cellulite was reduced by all areas, and 90% of participants showed a reduction of at least one degree. Cellulite on the abdomen disappeared in all women who initially had it presented. Most individuals with cellulite in the buttocks (70%) finished the treatment with Grade 0. A decrease in weight and a reduction in abdominal perimeter, with exclusive loss of body fat. Significant reductions in the thickness of the skin and hypodermis were recorded, as well as an increase in



echogenicity of the dermis in 18 of the 20 patients. Tissue reduction occurred mainly on a low-fat ketogenic diet, which promoted ketosis physiological. In this state, the body obtained energy from the fatty acids released by the adipose tissue, resulting in lipolysis. This lipolytic effect was enhanced by the use of an anti-cellulite cream containing caffeine, which stimulates circulation and has lipolytic properties. The cream also contained L-carnitine, which transports fatty acids fatty acids to the mitochondria, where  $\beta$ -oxidation and energy production occur, in addition of phosphatidylcholine, which favors the hydrolysis of triglycerides in adipocytes.

The study carried out by Marques *et al.*, (2016) was a therapeutic intervention, open, non-randomized study involving 32 healthy women aged 20 to 40 years. Participants who were eutrophic or overweight (according to BMI) were included and visible cellulite on the buttocks, grades II or III according to the Nurnberger-Muller classification. Pregnant or lactating women, women with venous, arterial or chronic diseases were excluded. or mental, in addition to those who have undergone aesthetic treatments for cellulite in the last 6 months.

At the first visit, participants completed a 24-hour dietary recall. hours for qualitative analysis of the dietary pattern, reported physical activity, use of oral contraceptives and history of pregnancy. They received oral and written about a controlled diet to be followed for 3 months. The diet aimed to maintain the nutritional balance, focusing on increasing antioxidants and food consumption fresh, limiting processed foods, saturated/trans fats and carbohydrates simple. The macronutrient distribution was 55-65% carbohydrates, 20-35% fats and 10-20% protein. Whole foods, animal and vegetable proteins were recommended, legumes and vegetables as much as you want, in addition to the daily consumption of red fruit juice and vegetables. Alcohol, sugar and sweets were banned. (Marques *et al.*, 2016)

Of the 32 women who started the study, only 14 completed it, resulting in a dropout rate of 56% (18/32). The main reason for dropout was not adherence to the proposed diet (10 women). Other reasons included absence from the last evaluation (7 women) and an unexpected pregnancy (1 woman). There was no difference significant increase in initial BMI among participants who completed the study ( $24.5 \pm 3.1$  kg/m<sup>2</sup>) and those who dropped out ( $28.4 \pm 6.8$  kg/m<sup>2</sup>), indicating that BMI did not influence the dropouts. (Marques *et al.*, 2016)



The 56% dropout rate demonstrates the low adherence of participants to a restricted diet. In clinical studies on cellulite, it is common to have dropouts, mainly due to the lack of visible results in the short term and the lack of interest of participants in following the therapeutic proposals. (Hexsel, 2009) Although a diet controlled offers many benefits in the medium and long term, it is difficult to maintain due to individual eating habits and preferences. (Sacks *et al.*, 2009)

In the study carried out by Hexsel (2015), in which forty-three women eutrophic, with ages ranging from 18 to 40 years and presenting moderate to severe degree cellulite, were randomized to one of three diet groups with different macronutrient compositions, but with the same total caloric value, where the first group followed a low-carb diet; the second group followed a high-carb diet. proteins; and the third group adopted a normal standard diet in relation to macronutrients, it was observed that of the 43 patients included, only 19 completed the study: five in group 1, six in group 2 and eight in group 3. No differences between groups in adherence and demographics, except for average age, which was higher in patients who followed diet 2 compared to those of diet 3. Other demographic data, such as weight and degree of cellulite at the beginning of the study, were similar between the groups. (Hexsel, 2015).

Diet 2 resulted in significant weight loss over time, which was not observed in the other two diets. Patients who followed the diet rich in proteins (diet 2) had a lower average score in the degree of cellulite in the right and left glutes, compared to those who followed diets 1 and 3. However, there was no improvement in the degree of cellulite in the right and left glutes over time. of time for neither type of diet. (Hexsel, 2015).

The group that followed diet 2 showed improvement in the degree of cellulite on the right thighs and left during the study period. (Hexsel, 2015).

Patients who followed diet 2 had the greatest weight loss in compared to those who followed the other diets. Furthermore, over time, a reduction in the degree of cellulite was observed only in the thighs of patients who followed diet 2. The best effect of this diet on cellulite may be related to weight loss recorded in this group. However, the study did not show an effect significant effect of the low-carbohydrate diet on neither the patients' weight nor their



degree of cellulite. The high dropout rate in this study highlights the difficulties that patients face when following dietary regimens. Although the results have not been relevant due to the small final sample, they suggest that body weight reduction in eutrophic patients, regardless of the type of diet, can contribute to the improvement in the degree of cellulite (Hexsel, 2015).

Bernardi and Vitolo (2005) state that obesity is a difficult condition to treat. control, characterized by high rates of treatment failure and relapse, which can lead to serious organic and psychosocial consequences. Assis and Nahas (1999) highlight that 75% of patients do not follow medical advice about lifestyle changes life, including dietary restrictions. Research indicates that 95% of people with Overweight people are unable to maintain weight loss diets, returning to weight gain later. To promote effective behavior change, it is essential investigate the factors that contribute to inadequate food intake in each individual, such as the occurrence of binge eating episodes, the pattern of activity physics, events related to weight fluctuations and their implications, in addition to the thoughts, feelings and behaviors associated with weight, among other factors (Suplicy, 2007).

### **FINAL CONSIDERATIONS**

Analysis of the reviewed studies reveals that although many participants did not bothered by cellulite and maintained unsatisfactory eating habits, the excess sugar and processed foods has been identified as an aggravating factor for the condition. High consumption of sugars and fats contributed to the increase in body fat, favoring geloid fibroedema, while the intake of vegetables, rich in beneficial nutrients, has shown potential to mitigate these effects.

Additionally, evidence suggests that specific diets, such as those rich in proteins, can lead to weight loss and an improvement in the appearance of cellulite, especially in the thighs. However, the study also highlighted the difficulty of adherence to restrictive diets, reflected in the high dropout rate among participants. The results point to the need for an integrated approach that combines habits healthy eating with aesthetic interventions, recognizing that weight reduction can be a crucial factor in improving cellulite. Despite the limitations of the studies, such as small samples and high dropout, the evidence collected emphasizes the importance of

promote a balanced diet and awareness of the negative effects of inadequate diets on aesthetic health. This perspective can guide future research and clinical interventions, aiming at a more effective and sustainable treatment for cellulite.

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