



Lipedema and Nutrition: What's the Link?

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Abstract

Lipedema is a dysfunction of the subcutaneous adipose tissue (SAT), it is characteristic of women, although it is reported in rare cases also in men, it was described for the first time in 1940, with a better characterization in 1951, although this is often still confused with classic obesity. It affects the lower and upper limbs, the buttocks, usually sparing the feet and trunk. It is classified into 3 stages and 5 types, according to the anatomical area affected, 2 variants according to the shape of the tissue enlargement. The tissues are nodular to the touch and this, among other things, suggests an inflammatory phenomenon. The treatments concern surgery (bariatric and liposuction), compression garments, physiotherapy. Lipedema surgery is a specific lipedema procedure to treat the tissue enlargement. Bariatric surgery can be an option only to treat obesity when present in comorbidity (lifestyle induced or with metabolic issues). None or minimal effect on lipedema fat. An approach that is having an interesting response is the ketogenic diet (a nutritional approach that provides for a carbohydrate intake of less than 30g per day), in previous work we have demonstrated the marked anti-inflammatory and antioxidant action of this nutritional approach, which could prove effective in assist the treatment of lipedema.

Keywords: SAT; Lipedema; Ketogenic Diet; Inflammation

Introduction

Lipedema (or lipoedema) is a disabling condition and often undiagnosed or misdiagnosed, also because at the moment there is no gold standard. It is practically exclusive for women and for this reason it is assumed that it is connected to a hormonal component, confirming the appearance of symptoms with puberty or after pregnancy. It manifests itself with a nodular aspect of the subcutaneous adipose panniculus, with even painful aspects, it is often associated with obesity, but there are cases of lipedema, especially in young women in conditions of normal weight. Lipedema has not yet been recognized in the international classification of diseases (ICD) by the World Health Organization (WHO), some countries such as first Germany [1], but also Holland [2], have issued guidelines; The prevalence of lipedema has been reported to be 1-9/1000007, but this figure is certainly underestimated precisely because of the lack of certain diagnosis but also because more than one specialist

does not know the pathology [4] and associates it with simple obesity, or confuses it with other pathologies such as lymphoedema or Dercum disease, for both it is possible a differential diagnosis [5]. Lipedema is classified according to the topographical distribution of subcutaneous fat in six stages or according to an inspection-palpatory classification in four stages, in the latter, the pain in the third and fourth stages can become almost disabling [6,7]. As already pointed out, the prevalence is in women, lipedema is observed in obese men or with liver pathologies, with a testosterone/estrogen ratio unbalanced towards the latter. On the other hand, a pathophysiological mechanism has not yet been proposed.

Inflammation medium

Lipedema, particularly in the more advanced stages, has extremely altered physiology and morphology, the frequent nodular formations are a sign of a strong alteration at least of the dermis and adipose panniculus, ease of bruising, pain is often noted, more

frequently of a tension-type, is reported in almost all cases. This scenario, although not always confirmed by biochemical-clinical analyzes, highlights an inflammatory condition of large proportions [7]. The adipose tissue, but, still to be clarified whether directly or indirectly, the lymphatic tissue are involved in the outcome of the pathology, therefore the immune system is also affected by the condition [8]. It is important to remember how an inflammatory component in obesity is well established, not reported with the classic markers of inflammation, such as PCR, in fact, we speak of subclinical inflammation; adipose tissue is now, with good reason, seen as an organ in all respects, capable of producing cytokines, modifying and producing hormones, home to numerous receptors, therefore at the center of an important network of information, no longer a simple container. The correlation with the cells of the immune system makes it particularly prone to be affected and mutually influence this district [9-12]. In this context, inflammation plays a fundamental role; in the last 15 years inflammation has been having a different meaning compared to the classic one linked to the 5 characteristic signs and related to wounds or infections. The hypothesis, always more corroborated by evidence, is that inflammation should be seen as a real mechanism of signaling and communication between cells, it is a mechanism, in fact, strictly conserved, from the most basic species [13-17]. Therefore, inflammation can also be seen as a response to stressful stimuli, but also an adaptation to continuous, perhaps chronic painful stimuli [15]. On the other hand, there are still no methods available to clearly and systematically report this type of inflammation, where the classic markers are unaffected; we try to monitor the cytokines, but they don't always manage to give an idea of the situation. A possible way could be given by the evaluation of the antioxidant state, for example, our group has evaluated the possibility of the ketogenic diet to modulate the antioxidant state [18].

Treatments for lipedema

Compression garments, if compared to lymphoedema they usually have a lower compression ratio, on average half, they are used in particular on the legs, but also on the pelvis and arms if necessary, often a period of bandages is offered to then have an adequate compression garment [6,7,19].

Manual and mechanic therapies, even if not well established from a scientific point of view, the treatments that have as their objective the action on the fibrotic part due to lipedema, are widely used, among these, you can certainly include massage therapy in particular that which works on deep tissues, but also shock wa-

ves and radiofrequency; as well as the Graston technique, some techniques related to traditional Chinese medicine, the Pneumatic Compression Devices (PDC) or the Complete Decongestive Therapy (CDT) [6,19].

Physical activity would be appropriate but, it should be better characterized as it should never cause an inflammatory phenomenon.

The effectiveness of the treatments seen above certainly lies in two effects, the decrease in inflammation, which, according to our idea, is central to the management of lipedema, plus by acting in this way, the tissue that is present in an altered architecture is remodeled.

Bariatric surgery is effective in terms of weight loss, shedding adipose tissue but not lipedema adipocytes; liposuction surgery, on the other hand, effectively removes high volumes of adipose tissue, including that with altered physiology and consequently decreases systemic inflammation [6,19].

All the interventions are however united by a decrease in inflammatory stimuli, our idea is that this can be an important reading key.

Nutrition and nutritional supplementation

At the moment there are no scientific papers that can suggest a nutritional regimen suitable for lipedema.

Even if the RAD protocol (Rare Disease Disorders) [19] is recommended, in fact, it is not a protocol but more a combination of nutritional advice, which often does not have a solid scientific basis, it is recommended to avoid gluten as well as milk, but not there is no proven correlation of the inflammatory action, as well as the intake of omega3, which should be understood as DHA and EPA, not as linolenic acid (chemically part of the omega3 class, but without anti-inflammatory effects). It makes sense to abstain from soy and foods that could contain estrogen, given that the hypothesis of estrogen dependence is plausible, while there is no direct correlation with cholesterol [20].

Another successfully used program is the ketogenic diet, a nutritional program that provides a particularly limited intake of carbohydrates (< 30g per day or less than 10% of the total calories), with a variable ratio between protein and fat based on the target. In one of our works [18] we have shown that, in obese subjects,

the ketogenic diet not only allows an important and healthy weight loss but also has an anti-inflammatory effect; in the second part of the study we operated with a low-carb diet (< 100g per day of carbohydrates, with particular attention to the glycemic peaks) and this allowed to maintain the anti-inflammatory state and a moderate weight loss. So our hypothesis is that the ketogenic is more effective, indeed often the other diets are completely ineffective because it manages to have an anti-inflammatory effect, due in particular to the total absence of glycemic peaks, which is known through the consequent synthesis of AGEs has a proinflammatory action (with the subsequent production of free radicals) [20-22], therefore probably the pillar of an effective diet for lipedema is not to feed the inflammation already present, therefore to limit or avoid hyperglycemia absolutely, as regards the other inflammatory stimuli should be contextualized case by case, for example in case of gluten sensitivity, gluten should be almost completely eliminated from the nutritional program [23], in the same way, if there is lactose intolerance, because this could have an influence on the intestinal microbiota and therefore be a pro-inflammatory stimulus [24].

From the point of view of food supplements, there is often confusion about the use, and the choice is made anecdotally [25]. As highlighted in a review evaluating the use of food supplements in the management of type II diabetes [26], it would be useful to use fiber, possibly from food, but also supplements capable of limiting inflammation, therefore certainly omega3 fatty acids, or better DHA and EPA, also of vegetable origin (from algae for example), they are in fact able to regulate the synthesis of prostaglandins, regulating them towards an inflammatory action, but they also have a beneficial effect directly on soft tissues and connective tissue in particular [27-29]; all supplements that improve the anti-oxidant state, such as vitamin C, which may be little present in a ketogenic diet scheme, it should be included as support; to also consider N-acetyl-cysteine (NAC), but also a pool of polyphenols and anthocyanins that they have been shown to be very useful in improving the response to free radicals [30-32], including diosmin [6], often used in support of lipedema; they should be considered absolutely, precisely for the management of the effects of inflammation, for the better reason in a ketogenic scheme that provides for the limited or absent use of fruit and allows only some vegetables.

Conclusion

Lipedema is a disorder still to be characterized in-depth, however, the presence of a strong inflammatory component seems evident, which consequently evokes the production of free radicals; this condition is at least in part the explanation of the effectiveness of the treatments carried out and the failure of some nutritional schemes, which are effective, for example, in the treatment of obesity. So our idea, which obviously should be confirmed by comparative studies, corroborated by instrumental verification techniques, for example, soft tissue ultrasound, but also by innovative techniques such as the screening of miRNAs, recently operated on biopsies [33], but to be evaluated even on circulating ones, as they can be related, for example, to the antioxidant or inflammatory state [18,34], is that the nutritional management should pass absolutely from strict glycemic control (at least in part with ketogenic protocols, also alternating with protocols that provide for more substantial carbohydrate quantities), particular attention to food intolerances and support of food supplements that moderate the inflammatory and pro-oxidant action.

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