

# Effects of Kinesio Taping® in treatment of Cellulite: Randomized controlled blind trial.

Efeitos do Kinesio Taping® no tratamento do Fibro Edema Gelóide: Ensaio clínico controlado randomizado e cego.

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## Abstract

**Introduction:** Cellulite is caused by congestion of fluid in the interstitial space generating an edematous and fibrotic disorder. The Kinesio taping is a resource consisting of an elastic bandage, placed on the skin and represent a form of intervention in the treatment of lymphedema and help in the removal of accumulated fluid. **Objective:** The aim of this study was to investigate the effects of Kinesio Taping ® in patients with cellulite. **Method:** We analyzed 24 patients with cellulite in the gluteal region (grades I, II and III), selected conventionally in Natal / RN, Brazil. The volunteers were randomly divided into two subgroups of 12 individuals - a control group (CG) and a treatment group (GKT). Both the CG as the GKT were evaluated before and after the experiment, using a specific cellulite assessment protocol and photogrammetry. Only in GKT, four applications of the bandage were made once a week, in the gluteal region. **Results:** In the findings, there was a significant reduction of cellulite grade in the CG ( $p = 0.03$ ) and GKT ( $p = 0.01$ ). However, there were no changes in the other variables assessed by the protocol in the two groups. In photogrammetric analysis, there was a significant clinical improvement in GKT, in comparison between the initial and final evaluation. The treatment notes assigned by the photogrammetry evaluators were higher in GKT ( $p < 0.01$ ). **Conclusion:** It can be concluded that treatment with KT was able to significantly decrease the grade of cellulite, so that the variables evaluated by the protocol probably not influence this process.

**Key-words:** Elastic Bandages; Edema; Esthetics.

## Resumo

**Introdução:** O Fibro edema gelóide é um distúrbio ocasionado pela congestão de líquidos no espaço intersticial gerando um processo edematoso e fibrótico. O kinesioteipagem é um recurso fisioterápico constituído por uma bandagem elástica, posicionada sobre a pele e representam uma das formas de intervenção no tratamento de linfedema e ajudaria na remoção dos fluidos acumulados. **Objetivo:** O objetivo do presente estudo foi verificar os efeitos do Kinesio Taping® em pacientes portadoras de Fibro Edema Gelóide (FEG). **Método:** Foram analisadas 24 pacientes portadoras de FEG na região glútea (graus I, II e III), selecionadas por conveniência na cidade de Natal/RN. As voluntárias foram alocadas aleatoriamente em dois subgrupos de 12 indivíduos - um grupo controle (GC) e outro de tratamento (GKT). Tanto o CG quanto o GKT foram avaliados antes e depois do experimento, por meio do Protocolo de Avaliação do FEG (PAFEG) e fotogrametria. Apenas no GKT, foram realizadas quatro aplicações da bandagem, uma vez por semana, na região dos glúteos. **Resultados:** Nos dados encontrados, ocorreu uma redução significativa do grau do FEG no CG ( $p=0,03$ ) e GKT ( $p=0,01$ ). Entretanto, não houve mudanças nas outras variáveis avaliadas pelo PAFEG em nenhum dos grupos. Na análise fotogramétrica, verificou-se uma melhora clínica significativa no GKT, no que diz respeito à comparação entre as avaliações inicial e final, além das notas do tratamento atribuídas pelos avaliadores responsáveis ( $p < 0,01$ ). **Conclusão:** Pode-se concluir que o tratamento com o KT foi capaz de diminuir significativamente o grau do FEG, de modo que as variáveis avaliadas pelo PAFEG, provavelmente, não influenciaram neste processo. **Palavras-chave:** Sistema Linfático; Bandagens; Estética.

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## INTRODUCTION

The Gynoid lipodystrophy (GL) is commonly known as "cellulite", is an inflammatory disease of connective tissue, which occurs due to circulatory changes and generates changes in the amorphous ground substance. This process culminates in the accumulation of edema and fibrotic nodules, which will favor the formation of skin and possible soreness relief, particularly in the buttocks, thighs and abdomen.<sup>(1-6)</sup>

The dermato-functional physiotherapy falls in the evaluation process of the GL and may use the Assessment protocol for gynoid lipodystrophy developed in Brazil and named as Protocolo de Avaliação do Fibroedema Gelóide (PAFEG) validated by some authors,<sup>(3)</sup> which is a tool for collecting personal information, physical, morphological and functional. In addition, physical therapy works in prevention as well as treatment of GL, with the goal of improving local circulation and reduce fibrosis, through features such as manual lymphatic drainage, endermologie, ultrasound, iontophoresis, eletroli-poforese, pressure therapy, among others.<sup>(7,8,9)</sup>

However, more recently, functional elastic bandages have been used in the treatment of circulatory and skin changes, such as edema and scarring.<sup>(10,11,12)</sup> The Kinesio Taping (KT) is a technique of applying elastic bandages, which has been used on a large scale. Theoretically, the bandage was developed to adapt optimally to the human skin, and according to the adopted voltage, generate various benefits which are explained in a general way by stimulation of skin receptors.<sup>(13,14)</sup>

Although it is a widely used technique at present, there is little scientific evidence about its possible effects and, moreover, the existing results are controversial.<sup>(15)</sup> Greater still is the lack of scientific research on the effect of KT in dermato-functional pathologies, especially with regard to GL.

Some studies bring good results regarding the use of KT to reduce edema, without tension applied and in form of a "web", by directing the banding towards the lymphatic return.<sup>(16,17)</sup> Therefore, based on these theories, the objective of this study is to investigate the effect of KT on GL, comparing morphological and functional aspects of the affected region, before and after treatment with the wrap, using PAFEG as an evaluation method.

## METHOD

### Research characterization and sample

This is a randomized, blind, controlled trial, which was held in Clinica Biofisio (Natal / RN). The study was approved by the Ethics Committee of the Universidade Potiguar under protocol number 098/2011 and all participants signed an informed consent.

The sample consisted of 24 women, aged between

20 and 30 years and weighing between 50 and 70 kg were selected by non-probability convenience in Natal / RN. Sedentary women, use of contraceptive drugs, which had grades I, II and III of GL, which were not during pregnancy were included in the study. The patients were randomly allocated into two groups, a control group (CG), with 12 women, mean age  $24.16 \pm 7.00$  years and mean weight  $65.12 \pm 19.97$  kg; and a group treated with Kinesio Taping (GKT), composed of 12 women, mean age  $33.33 \pm 7.29$  years and mean weight of  $75.31 \pm 18.45$  kg.

The following exclusion criteria were adopted: to present sensory disturbances; have an allergy to the adhesive bandage; submit hormonal disorders; and give up or do not show the treatment. However, there was no sample loss during the study.

### Procedures

The reviews were conducted by different researchers, two investigators who were responsible for implementing the PAFEG and the photographic record; and two other researches who performed the application of KT in the treated group, to ensure blinding of assessments. In both groups, evaluations were made before and after the experimental procedures. Furthermore, it is noteworthy that the same experiments were performed in both groups, except for the application of KT, which was only intended for GKT.

Initially, all participants, both the CG and the GKT, were subjected to an evaluation by the PAFEG, in which it was collected identifying information, history, classification of GL, cirtometry of the hips, handgrip test and tactile sensitivity test, related to posterior-lateral hip region. It was also verified, the weight of each women.

Then the cirtometry of the hips were collected with a simple tape measure, so that three measurements were performed in the middle third of the thigh in the lower limb with records greater degree of GL. For analysis of measures was considered to be the arithmetic mean of the three records.

The handgrip test was performed manually, generating a pressure in places of high concentration of GL in order to verify the pain level of each patient, classified as: absent, weak, uncomfortable, agonizing and excruciating pain. The tactile sensitivity test was performed using the Semmes-Weinstein test (common esthesiometer), with the colors green - 0.05 g; Blue - 0.2 g; Purple - 2g; and dark red - 4g), denoting the local skin sensitivity to issues of protective sensation and light touch. Each result was recorded in an individual evaluation form.

In the first moment, was also performed photographic record of the posterior regions, anterior and lateral hip in all participants in both groups, with a digital camera (Kodak - 8.0 megapixels) for photogrammetric analysis, based on another study.<sup>(18)</sup> In addition,

each participant received a booklet, developed by the authors of the research, with general guidance on prevention and treatment of GL (proper diet, use of specific cosmetics, exercise, lifestyle, manual lymphatic drainage technique and indications for physiotherapy dermato-functional).

Specifically, for women of GKT group, Kinesio Taping was applied in the form of "web".<sup>(19)</sup> The bands were cut into four different parts, being placed with minimal tension (0-15%) on the right and left gluteal regions with medial anchoring of wraps just above the gluteal fold (posterior side of the hip), covering the region of the gluteus medius and greater trochanter (lateral side of the hip), and anchoring it previously in the region of the iliac spines, as shown in Figure 1.

In GKT group, the bandage was applied once every seven days for a month, totaling four applications. Thus, the participants were asked to remain as long as possible with a bandage until it loses its elastic and adhesive capacity, so that it became unusable.

At the end of the KT applications, the patients in both groups were subjected to a new assessment by PAFEG with cirtometry of the hip and application of grip and tactile sensitivity tests. In addition, we performed a new photographic record of the anterior, posterior and lateral hip regions.

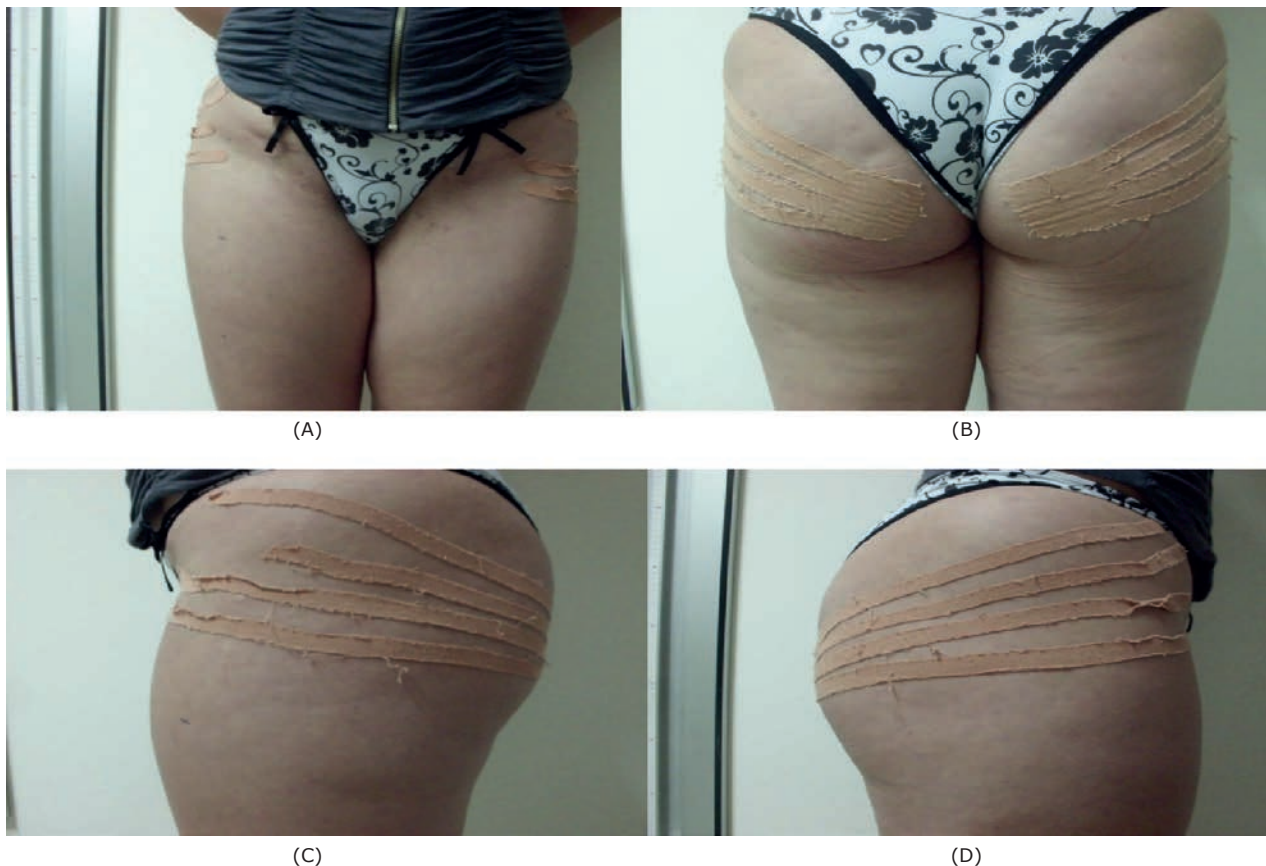
The photographic records of each patient were analyzed by photogrammetry (without identifying groups) held for nine evaluators skilled in the art, for comparison of pre and post-treatment. The photogrammetric analysis was based on qualitative criteria, so the evaluators were asked about the clinical improvement of the GL patients, whose responses corresponded to "yes" or "no". In addition, we asked the evaluators to attribute scores for the outcome of treatment, on a scale of 0 to 10 points.

#### Data Analysis

For data analysis, SPSS version 19 was used. Initially, we performed the Kruskal-Wallis test in order to verify the normality of the data. For weight and hip measurements variables, we used the "t" test for paired comparison intra-group (pre and post-treatment) and "t" test for independent comparison of inter-group data (post-treatment). For the other variables, this comparison was made using the Wilcoxon and Friedman tests, respectively. It was considered a significance level of 5%. The findings of the survey and the correlation between variables were presented in tables and graphs.

#### RESULTS

Regarding the level of GL evaluated by PAFEG, it was observed a reduction in the frequency of individu-



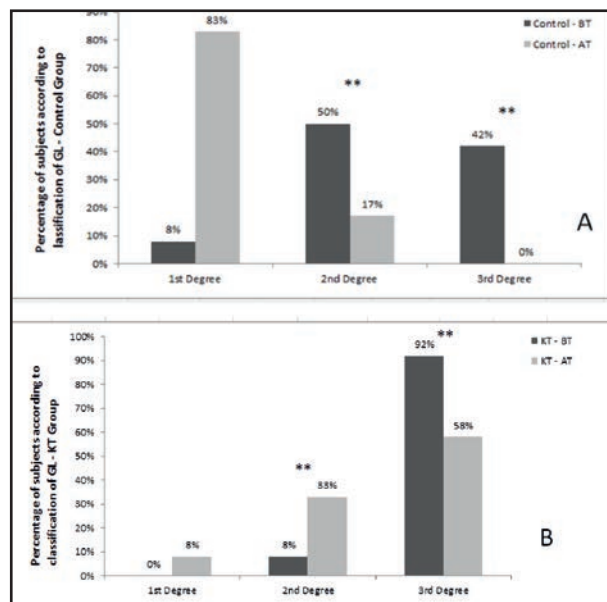
**Figure 1.** View of the placement of Kinesio Taping in position: (A) Anterior; (B) Posterior; (C) Left; e (D) Right of gluteal region.

als with grade II and III, both CG and the GKT as described in Figure 2 (A, B). A more specific analysis of the data indicated that there was a significant reduction in the GL degree (intra-group) after intervention in both groups ( $p = 0.03$  for the control group and  $p = 0.01$  for the treated group) with respect to the values obtained at baseline. However, when comparing the results between the groups, no significant difference was observed ( $p = 0.09$ ).

Regarding the measures of body weight, it can be observed that there was a reduction in both groups, however, the results revealed no statistically significant differences ( $p > 0.05$ ), both when comparing the pre- and post-treatment for CG and GKT as well as when a comparison was made between the groups. The body weight data are show in Figure 3 (A).

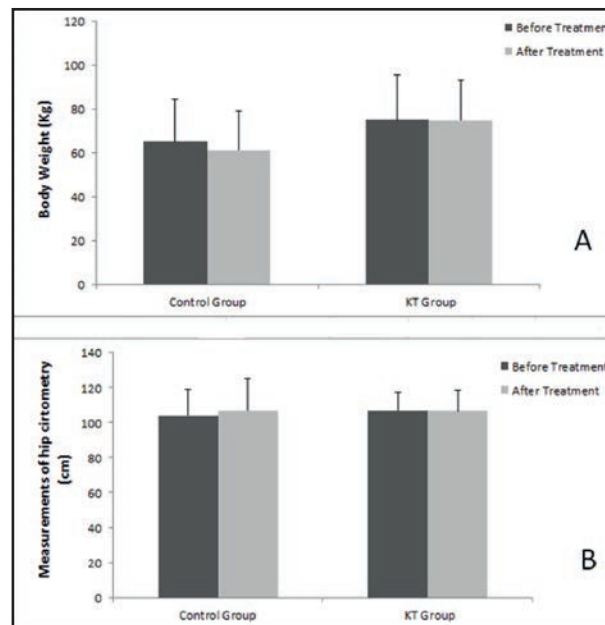
Similarly, there were no significant differences in the measurements of hip, proposed by PAFEG. Both before and after treatment in both groups and compared between groups, the differences were considered statistically irrelevant ( $p > 0.05$ ). These data are shown in Figure 3 (B).

Regarding photogrammetric analysis, the data were submitted to the description of the frequency of "yes" and "no" by external evaluators responsible, so that a greater amount of positive responses in both groups was observed, with even greater for the group treated with KT. When comparing the number of positive responses between the two groups after the intervention, there was a significant improvement in the GKT when compared to the CG, as is evident in Figure 4 ( $P = 0.003$ ).

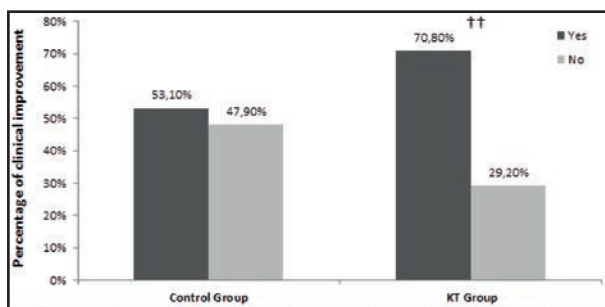


**Figure 2: A:** Analysis of GL degree in the control group, according to the PAFEG. **B:** Descriptive Analysis of the GL degree in the Treatment Group, according to PAFEG. BT= Before Treatment; AT= After Treatment. \*\* Wilcoxon test with  $p$  value  $< 0,001$ .

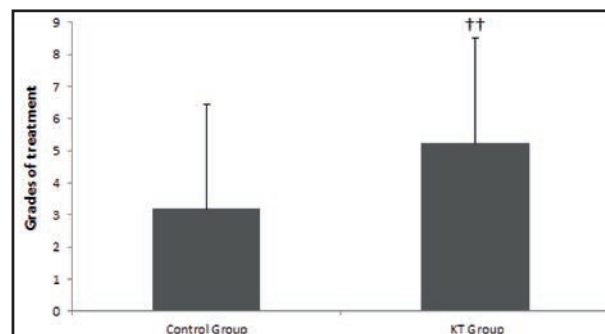
Also regarding photogrammetry, comparison of average scores given by the evaluators (assigned 0-10) for the control and treated groups was performed. It was observed that after treatment, the GKT scores higher notes than CG, as Figure 5.



**Figure 3. A:** Data analysis of body weight between groups. **B:** Data analysis of circumference of the hips measured before and after applying the tapping and between control and treated groups. **Subtitle:** There was no statistically significant difference between the groups, using the paired t test and Independent.



**Figure 4.** Comparison of the level of clinical improvement (considering the answers of the evaluators as 'yes or no') through analysis of photogrammetry. **Subtitle:** .††  $P < 0,01$  according to Friedman test.



**Figure 5.** Average grade of treatment according to evaluators. **Subtitle:** †† Statistically significant with  $P < 0,01$  Friedman Test.

Finally, the data of handgrip test, quantified by local pain perceived, no significant results were found for either the GKT ( $p = 0.248$ ) and for as little CG ( $p = 1.00$ ). Likewise occurred for the sensitivity test, in which the data found were also not significant ( $p > 0.05$ ) for either group.

## DISCUSSION

The research results showed a significant reduction in the level of GL in women of both groups, being higher in the group treated with KT. Possibly this can be attributed to the facilitator lymphatic circulation by applying the bandage without tension, in the form of "web" mechanism and towards the circulatory driver.<sup>(20)</sup>

There are two basic theories explaining reduction of edema, based on the use of the KT. The first is based on the sum of small pressures generated by the application of the banding in the direction of blood flow, favoring lymphatic return; and the second is the stimulation of skin receptors by application directly to the skin of the KT (tactile stimulation) which generates a response to increased interstitial space, facilitating blood flow and reducing the swelling.<sup>(19)</sup> While approaches have not been found on the effect of KT on GL, with regard to the lymphatic return and reduction of edema, some studies offer similar results have not yet understood about this effect.

In one study,<sup>(16)</sup> the KT was compared with an inelastic bandage in association with manual lymphatic drainage (MLD) in 41 women with lymphedema arising from breast cancer. It was observed that both resources caused significant results, although there was no significant difference between them. In another study, Bialoszewski, Wozniak & Zarek<sup>(17)</sup> compared the KT with the MLD in 24 patients with lower extremity edema caused by using Ilizarov external fixation. It was noted that KT had significant results in reducing lower limb edema in relation to the technique of MLD. These findings corroborate with the results of the present study, possibly explaining the reduction in the level of GL by decreasing local edema. However, this response can not be fully understood, since it was not used a more specific means of assessment of the local circulation.

Another important factor although there was a decrease in body weight in both groups (mainly in the control group), the data analysis showed that these results were not significant. This was already an expected effect, since, theoretically, the bandage has no effect

on adipose tissue. Furthermore, the volume of edema which would not be possibly decreased to a significant amount of weight measurements.

Similarly, no significant test for the handgrip (pain) nor for the sensitivity test results were found. Pain and sensory deficits are present in most cases, people with GL grade III, however, are not mandatory signs and symptoms, so that the small sample size may have contributed to the result. Some studies looked at the effect of KT in pain of musculoskeletal origin, with results significantly improved, especially in the acute phase of inflammation.<sup>(14, 15)</sup> However, it is not clearly described the effect of bracing on pain originating from circulatory and skin changes, such as the GL.

The study had limitations such as: the subjectivity of the measures used to quantify the pain, tenderness and photogrammetry; the variety grades of GL studied within a very small sample; low number of KT applications within a larger than recommended in the literature, ranging between three and five days time; Apart from the lack of more accurate resource assessment of circulatory and skin tissue.

Thus, it is suggested that the design of future studies to be more specific about the GL circulatory abnormalities, involving more precise assessment features, for example, additional imaging tests such as ultrasound and Doppler.

Finally, the results found in this study cannot yet be considered conclusive since the proposed evaluation of the effect of KT on GL still has little scientific support. Even the evidence on the effect of KT on the lymphatic circulation is not completely clarified in the literature. Thus, it was possible, through the methodology employed in this study to determine the actual effect of the application of KT in GL.

## CONCLUSION

The results of this study showed that the use of KT resulted in significant improvement in the classification of degree of GL (according to PAFEG) and its qualitative aspects related to treatment and clinical improvement, as assessed by photogrammetry. However, no significant differences for body weight, hip circumference, sensitivity test and handgrip test were observed.

The data showed that KT may be considering an additional resource in the treatment of GL, although its actual effects and benefits are not fully grounded in the scientific literature.

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