

## Kinesio Taping Lymphatic in Breast Cancer Postoperative: Review

### Kinesio Taping Linfático no Pós-Operatório de Câncer de Mama: Revisão

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#### Abstract

Breast cancer is the second most frequent in women and lymphedema of the upper limb homolateral to surgery is the main complication arising from the breast cancer treatment. The aim of this study was to identify evidence and systematically review the effectiveness of Kinesio Taping (KT) in the treatment of upper limb lymphedema in the postoperative period of breast cancer. Research was conducted to find scientific papers on Kinesio Taping lymphatic in Latin American and Caribbean literature (Lilacs) and PubMed; from January 2007 to January 2017 in appropriate order, using Boolean logic, with the “AND” and “OR” connectors. Although KT therapy proved to be effective in reducing lymphedema Grade II and III in women after breast cancer treatment in 50% of the articles discussed in this review, the rest of the articles, with a larger population, such efficiency was not found. At this time, KT does not seem to be an effective option to replace traditional “Multiple Layer Therapy” in the “Complex Decongesting Therapy” protocols in the treatment of upper limb lymphedema. Thus, we judge the need for further research on the subject, as there is no solid evidence-based conclusion about the effectiveness of Kinesio Taping in this context.

**Keywords:** Breast Neoplasms. Lymphedema. Physical Therapy Specialty.

#### Resumo

O câncer de mama é o segundo mais frequente na população feminina e o linfedema de membro superior homolateral à cirurgia é a principal complicação decorrente do tratamento de câncer de mama. O intuito deste estudo foi identificar evidências e revisar sobre a efetividade da Kinesio Taping no tratamento do linfedema de membros superiores no pós-operatório de câncer de mama. Foi realizado uma busca de artigos a respeito da Kinesio Taping linfática; na literatura da América latina e do Caribe (Lilacs) e na PubMed no período de Julho de 2008 à julho de 2018 empregando a lógica booleana, com os conectores “AND” e “OR”. Embora, a terapia por KT se mostrou eficaz no tratamento para reduzir o linfedema Grau II e III em mulheres após o tratamento de câncer de mama em 50% dos artigos discutidos por esta revisão, no restante dos artigos, com maior população, não foi constatado tamanha eficiência. Neste momento, a KT não parece ser uma opção eficaz para substituir a “Terapia de Múltiplas Camadas”, tradicional, nos protocolos de “Terapia Complexa Descongestiva” no tratamento do linfedema de membros superiores. Dessa forma, jugamos a necessidade de mais pesquisas sobre o tema, pois, não há uma conclusão sólida baseada em evidências sobre a eficácia da Kinesio Taping neste contexto.

**Palavras-chave:** Neoplasias da Mama. Linfedema. Fisioterapia.

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#### 1 Introduction

Considered a public health problem, breast cancer (BC), requires potentized attention by part of the population research aiming at the prevention and rehabilitation of the world female population where the incidence of this type of cancer is greater; excluding only the cases of non-melanoma skin cancer. Both in industrialized and in developing countries the breast malignancy (NMM) is one of the main causes of cancer deaths and the incidence of BC is higher in developed countries<sup>1</sup>.

In the Brazilian territory, unfortunately, the estimate of the distribution of new cases and the mortality rate due to BC accompany the number of incidences in the world, being the most frequent type of cancer in the female population. 59,700 new cases were estimated for the year 2018; estimate that

remained for the year 2019 characterizing 56.33 cases per 100 thousand women. The distribution of these new cases and deaths due to this disease is well diversified in Brazil. The Southern (73,07/100 thousand), Southeast (69,50/100 thousand) and Central-West regions (51,96/100 mil) have a higher frequency of BC. In contrast, the Northeast (40,36/100 thousand) and North (19,21/100 000) have the lowest rates<sup>2</sup>.

In reference to the treatment for BC, it is constituted in loco-regional particularities (surgical techniques and radiation therapy and/or systemic) where chemotherapy and hormonotherapy are used. Usually these conducts are associated in pairs or even more approaches are used according to observance of the severity of the clinical signs (size and location of the tumor) by the medical team. Due to late diagnosis of the disease surgical techniques are widely

used since the choice of therapy correlates with the severity and the commitment of the tissues in question. The surgical procedures are divided into two groups: conservatives (quadrantectomy) in which a segment of the breast is subjected to resection in conjunction with the axillary lymph nodes and/or sentinel lymph nodes or radical (mastectomy), non-conservative, where the breast is totally removed by along with radical axillary emptying preserving or not the muscles adjacent to the breast. The radiotherapy, chemotherapy and hormone therapy are therapeutic procedures indicated to prevent the occurrence of metastasis and/or local recurrence and are indicated according to the characteristics of the tumor and the patient<sup>3</sup>.

The prognosis is considered good when the disease is diagnosed at an early stage, however, the disease is often detected late, leading to greater morbidity, since that, at the time later, more radical treatments are needed. In consequence many complications can occur ipsilateral to the surgery, among them the upper limb lymphedema; chronic edema resulting from the interruption of the lymphatic pathway, in this case, due to the withdrawal of the axillary lymph nodes<sup>4</sup>. In summary, the edema is characterized as an accumulation of liquid abundant in plasma proteins in the interstitium. Its formation occurs when the lymphatic flow is incapable of transport it either by excess of lymph or impairment of lymphatic system<sup>5</sup>.

The incidence of lymphedema is between 8-30% of the treated patients, and that is not linked solely to the type of surgery performed, but also to other therapeutic procedures: radioactive radiation, chemotherapy and hormone therapy. The removal of the lymph nodes is the main cause followed by adjuvant radiotherapy and axillary inflammations prolonged after the surgeries, because, they stimulate fibrosis inside the axilla what causes lymphatic stasis and severity of edema in the upper end once that they cause the closure of the lymphatic vessels<sup>6</sup>.

It is also possible to observe the occurrence of pathological adipose tissue proliferation in the subcutaneous tissue of the limb affected by the lymphedema. This tissue, sick, causes adhesions and fibrosis in the site, corrupting the lymphatic system making it less flexible. The mechanisms described above act based on the system of feedback and mutual stimulation; retaining wildly the lymph, then the lymphedema may reach an irreversible stage, if not treated<sup>8,9</sup>.

Finally, the lymphedema of the upper extremities causes loss of lymphatic function, limb deformities, muscle fatigue and loss of function, and possible psychological changes that will directly reflect negatively on the patient's self-esteem<sup>10,11</sup>.

The conservative procedures that aim to improve the patient's health status related with the morbidities caused by lymphedema are extended to the care of the physiotherapist, since there is no causal treatment for lymphedema of the upper limbs. The physiotherapeutic approaches are numerous, but

the well-documented studies are few. Among the therapies: intermittent pneumatic compression (IPC), multilayer compression therapy TCM and manual lymphatic drainage (MLD). This conservative approach has the aim of reducing the production of liquid in the interstitium reducing the edema and, finally, encourage the lymph mobility<sup>12-14</sup>. To achieve these objectives the main physiotherapeutic approaches is known as complex decongestive therapy (CDT) which includes four components: manual lymphatic drainage, skin and nails care, compression bandage and therapeutic exercises<sup>14</sup>.

A new method for lymphatic drainage was created by Doctor Kenzo Kase, therapist and academic Japanese teaching. He devised a sealant tape to prolong the stimuli conducted in their care, since the tape is waterproof and can remain on the patient's skin for a period of up to five days. This technique called Kinesio Taping (KT), by himself, has become popular among the athletes and therapists in musculoskeletal injuries. According to Doctor Kenzo there are six concepts for mastery of the technique in question; the so-called corrections (mechanical, fascial, ligaments, spatial, functional and lymphatic/circulatory) that may be caused by different forms of application ('X' and 'Y', 'I' or 'Hand fan') and the different degrees of stretching of the tape, which has a similar weight as the properties of human skin and may reach 140% of stretching. The author describes numerous advantages and applicability of his technique, among them, according to Kenzo, after an appropriate application respecting a small stretch between 10 -30% of the tape on the skin; there is an elevation of the skin by increasing the space between the dermis and fascia causing improvement of microcirculation that promotes activation of the local lymphatic drainage<sup>15</sup>.

## 2 Development

### 2.1 Methodology

The present text sought to objectively conduct a literature review, using the Boolean logic, with the connectors "AND" and "OR" regarding the effectiveness of KT for the treatment of upper limb lymphedema in the postoperative period of BC. It was intended to seek articles about this in the literature of Latin America and the Caribbean - Lilacs and in the PubMed database in the period from July 2008 to July 2018. And, to this end, a protocol was developed that praised search strategy, eligibility criteria and their results. The objective was to analyze the results of each article individually seeking the effectiveness of the technique in question and secondarily to assess the methodological quality of the manuscripts.

For the search in the PubMed database the following combinations of descriptors and key words in the area of health were used: "Postmastectomy" OR "Post-Mastectomy" OR "Postoperative" OR "Post-Quadrantectomy" OR "Quadrantectomy" OR "Breast Surgery" OR "Withdrawal of Breast" OR "Mastectomy" OR "Treatment" "Surgical Treatment" OR "Lymphatic therapy" AND "Breast Cancer"

OR “Breast Carcinoma” OR “Breast Neoplasms” OR “Malignant Neoplasm Mammary” AND “Lymphedema” OR Lymphoedema OR “Lymphatic Edema” OR “Edema” OR “Oedema” OR “Swelling” OR “Swell” OR “Tumescence” OR “Intumescence” OR “Tumefaction” AND “Kinesio Taping” OR “Athletic Tape” OR “Kinesiology Taping” OR “Lymph Taping” OR “Lymphotaping” OR “Kinesio Taping®” OR “KT Tape”. Then the same combinations for the Lilacs database in language appropriate to the database in question were verified.

The selection of references was performed through a careful, investigative, analytical and interpretative reading by two researchers. The amount of texts from this selection in electronic databases, above, were read in full and an index card system was elaborated for each of them, the abstract spreadsheets of the index card system were analyzed critically and reflectively; only the original articles that were totally available, in free access, in English or Portuguese language and which brought as main theme KT in the treatment of lymphedema of the upper limbs in the postoperative period of breast cancer took part in this research. 04 articles were used. The latest survey conducted in electronic databases was 10th of July 2018.

### 2.1.1 Inclusion criteria

The studies were selected by the following inclusion criteria: 1) The population studied included female patients affected with malignant mammary neoplasia undergoing any surgical intervention for total or partial extraction of the breast; 2) the patients demonstrated subsequent upper limb lymphedema after surgery; 3) specific times for monitoring had to be documented; 4) KT in the treatment of lymphedema of the upper limbs used as the main technique; 5) due to being considered a relatively high level, only randomized and controlled studies took part in this study.

### 2.1.2 Exclusion criteria

The exclusion criteria consisted of: 1) patients who present with edema of the upper limbs not related to resection of breast cancer after breast malignancy; 2) Children; 3) men; 4) KT not appearing as a treatment of lymphedema of the upper extremities; 5) results without reported methods of evaluation or follow-up times.

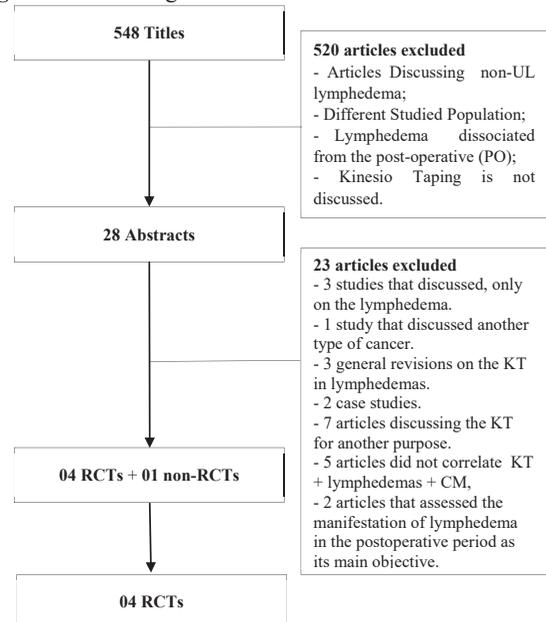
## 2.2 Result

The primary outcome for analysis was the resolution of the edema. This was defined in articles with measures of outcome. A total of five hundred and forty and eight titles of articles totally available were redeemed (Medline/548 arts; Lilacs/0 arts.) by means of a bibliographic search and were analyzed by the authors (Figure 2). Of this amount five hundred and twenty articles were excluded, for the following reasons: 1) Articles where BC was not the disease in study; 2) studies

related to the treatment of lymphedema, which are not located in the upper limbs (UULL); 3) articles discussing the topic, but not studying a specific group of patients (female PO of quadrantectomy or mastectomy); 4) articles that discuss the treatment of lymphedema dissociated from the postoperative (PO) of breast cancer; 5) articles that discuss the procedures for lymphatic drainage of the upper limbs that do not include the KT.

The remaining twenty and eight studies whose abstracted were reviewed and, of these, over twenty four articles were rejected: 3 - studies that discussed, only on the goals and challenges in the treatment of lymphedema, 1 - study that discussed another type of cancer different from BC, 3 - general revisions on the use of the KT in lymphedemas and edema, 2 - case studies considered a relatively low level, 7 - articles discussing the KT for another purpose, rather than reduction of lymphedema, 5 - Articles that discussed KT in the reduction of edemas and lymphedemas not related to BC, 2 - articles where the priority was not to evaluate the procedures for reduction of lymphedema, but its manifestation in UULL related to postoperative and to breast cancer. Of the five remaining jobs, four were randomized clinical trials (RCTs); and one was a non-randomized clinical study (non-RCTS). Results shown in Figure 1.

**Figure 1** - Flow diagram of results



UULL -Upper limbs; PO - postoperative; KT - Kinesio Taping; RCTS - randomized clinical trial; [no - RCTS] - non-randomized clinical trial.

**Source:** Research data.

A last round of exclusion was then performed where the only remaining non-randomized clinical study was excluded due to its methodology retrospective and consequent lower level of evidence. The data on the resolution of the lymphedema, as well as the methodologies used in each of the four remaining items were analyzed thoroughly and are listed in Table 1.

**Table 1** - Selected Articles

Author/year	Title	Methodological design	Goals	Results
Pekyava et al. (2014)	Complex decongestive therapy and taping for patients with postmastectomy lymphedema: A randomized controlled study.	Randomized controlled study N= 45.	Investigate the effects of Kinesio Taping® + TCD in patients with lymphedema.	Kinesio Taping® along with TCD may have a better effect in the reduction of lymphedema in the long term.
Smykl et al. (2013).	Effect of Kinesiology Taping on Breast Cancer-Related Lymphedema: A Randomized Single-Blind Controlled Pilot Study	A Randomized Single-Blind Controlled Pilot Study N= 65.	Evaluate the effectiveness of the Kinesio Taping (KT) for the treatment of lymphedema related to breast cancer.	KT seemed to be ineffective in secondary lymphedema after breast cancer treatment.
Taradaj et al. (2015)	The influence of Kinesiology Taping on the volume of lymphoedema and manual dexterity of the upper limb in women after breast cancer treatment	A Randomized Single-Blind Controlled Study N= 70.	To assess if KT can replace traditional techniques in the treatment of lymphedema of the upper limbs.	KT was not effective to reduce the lymphedema II and III. This time is not indicated to replace lymphatic decongestive therapy.
Tsai et al. (2009)	Could Kinesio tape replace the bandage in decongestive lymphatic therapy for breast-cancer-related lymphedema? A pilot study	Pilot study N= 41. Randomized Clinical Trial	Compare TCD + CP with the modified TCD + CP in the lymphedema	Kinesio tape can replace the traditional banding during the treatment for the lymphedema.

Source: Research data.

### 2.3 Discussion

It is important that after the specific surgical approaches for breast cancer the patient is welcomed by a therapy that has an attentive look, also for the reduction of upper limb lymphedema that is between 8-30% in treated patients<sup>6</sup>. Thus, making use of combination therapies is of paramount importance in the postoperative period of breast cancer to control the physiological changes originated from the procedures to which these patients are subjected. This review aimed to identify if the KT is effective for treating lymphedema of the upper extremities related to BC and if it might replace with security techniques to lymphatic drainage currently used in combination therapies. After a few rounds of exclusion four articles were selected for this discussion (04 RCTs).

Among the articles retrieved by this revision, Tsai et al.<sup>16</sup>, performed an RCT with the purpose of analyzing comparatively the effects of t KT versus Short Stretch Bandage (ECB). The project included 41 patients with unilateral lymphedema related to surgical treatment of breast cancer, the group with an average age of 54.6 was composed only of women whose ages comprised between 36-75 years randomly distributed into two groups: TCD where ECB and modified TCD were applied, in this, the KT tape was used as a substitute for the ECB. Tsai et al.<sup>16</sup> subjected both groups to skin care, manual lymphatic drainage for 30 minutes, pneumatic compression therapy for 1 hour and in each treatment, session was performed 20 minutes of specific exercises for upper limbs. In this study the limb volume and composition of the water of upper extremity were analyzed, symptoms related to lymphedema, quality of life and acceptance of patients to KT or ECB. And the final results suggest that KT could replace the ECB in TCD and, second, the authors<sup>16</sup>, could be an alternative for patients with

lymphedema related to breast cancer, who had little adherence to ECB. Regarding the decrease of the lymphedema Korean researchers concluded, after the first month of therapy, that there were no significant differences comparing the group TCD with modified TCD. However, they state that there was a reduction in the volume of limbs of both groups and indicate a clinical superiority of KT when analyzed the follow-up results. In addition, KT does not cause a feeling of weakness and/or loading of the limb and was a more comfortable therapy; opinion of patients, a fact confirmed by the results of the study on the quality of life. Regarding the weakness of this experiment, it was observed that the Korean authors upon applying only a compression therapy of single layer (15-20mmhg) which is not enough to treat any lymphedema and, also, the absence of an estimate of the placebo effect caused, in our opinion, a medium weakness.

Recently, in December 2014, a group of Turk researchers, Pekyavas et al.<sup>17</sup>, published a randomized clinical trial that showed positive results on the use of t KT in the treatment of secondary and tertiary levels lymphedema in patients after mastectomy, these findings are consistent to reports by Tsai et al.<sup>16</sup>. In this study there was the participation of 45 patients who were randomly distributed into three distinct groups: Group 1 - TCD + multilayer compression bandage, group 2 - TCD + KT compression bandage, and Group 3 - TCD + KT. The therapy had a duration of 10 days for all groups and measurements of the limb circumference were taken with a tape measure from the wrist up to the axilla in intervals of 5 centimeters; performed before treatment, after its completion, and a month later. The authors reported benefits in all the used therapies, and it was not noticed, for them, any difference among the groups. The authors mention that the intensity of

pain in the affected arm had decreased significantly with the applications KT in Groups 2 and 3, an event already mentioned in related articles, therefore, the KT according to Kase et al.<sup>15</sup> and Tsai et al.<sup>16</sup> raises the skin creating convolutions that extend the area of the dermis and inhibit the free nervous endings. About the shortcomings of this study, in our opinion, the treatment time was relatively small and was used a tape measure to measure circumference measures of upper limbs which may induce errors.

The findings of the researchers described so far are conflicting with the reports of Smykla et al.<sup>18</sup>, whose clinical trial used a larger population. This randomized clinical trial, single-blinded, controlled, grouped randomly and sixty five women with lymphedema, grade II and III of unilateral upper limb in three groups: group KT with twenty patients received TCD + KT, group Almost KT with 22 patients received TCD + application of plaster and a third group, CMD, with 23 patients were subjected to TCD + CMD. The treatment sessions were performed 3 times a week for 1 month. The items of the patient's evaluation included size of the limb and the percentage of edema. The authors reported that there were no significant differences ( $>0.05$ ) when comparing the results of the group with the group Almost KT i.e., in this experiment the application of KT had the same efficacy as the application of the placebo performed with adhesive plaster. The text follows stating that the reduction of edema in the TMC group was much better than the results observed in other groups. Smykla et al.<sup>18</sup>, concluded that the lymphedema of UULL related to BC is better treated with the technique of TMC and suggest that the therapy by KT is ineffective when the lymphedema is II and III degree. The weakness of the study, however, was the fact that the authors seem to ignore the methods of application of KT, that according to Kase et al.<sup>15</sup>, the creator of this therapy, the lymphatic drainage by KT Tape should be kept for a maximum of 5 days and its effect starts after 4 hours.

The most recent of all articles included in this systematic review was published in July 2015 by the authors Taradaj et al.<sup>19</sup>, whose objective was to evaluate the effect of the KT on the size of the edema of the upper limbs grade II and III after treatment of breast cancer in order to identify whether the application of KT may replace the CMD in the treatment of lymphedema. The authors distributed 70 patients with lymphedema randomly in three groups: group A - composed of 22 patients subjected to KT + pneumatic lymphatic drainage (DLP) + DLM, group B - comprised 23 patients who were treated with a placebo KT + DLP + DFM and group C - with 25 patients subjected only to standard procedure DLP + DLM + CMD. The items of the patient's evaluation included size of the limb, grip strength and movement amplitude. This group of researchers reported the need to conduct a large clinical trial and better planned to the issue in question, because, according to them, the studies on the subject conducted so far

presented methodological flaws that weaken them. According to Taradaj et al.<sup>19</sup>, this experiment was the first attempt, blind test, in the literature to compare KT for reduction of lymphedema of UULL that selected a range of specific surgeries and innovating, also, in a more precise and modern measurement with the Perometric test. The authors observed in their results relative effectiveness in reducing edema in all groups of comparison, however, concluded that the standard therapy of CMD had a greater reduction. Upon comparing the percentage reduction of the edema there was a statistically significant advantage in group C which decreased by 45.02% when compared with the groups Ae KT decreased by 22.45% and B which represented a reduction of 24.04%. And finally, these authors admit the possibility of t KT have utility in cases of soft and POSTOSAS LYMPHEDEMAS and relatively minor and state that this hypothesis requires further studies.

### 3 Conclusion

With this review, it is possible to conclude that, although KT therapy proved to be effective in reducing lymphedema Grade II and III in women after breast cancer treatment in 50% of the articles discussed in this review, the rest of the articles, with a larger population, such efficiency was not found.

At this time, KT does not seem to be an effective option to replace traditional MLT in the protocols of CMD in the treatment of Upper limbs lymphedema. For the author, t KT has no scientific backing as a technique for reduction of more robust lymphedemas, grade II and III, related to the treatment of breast cancer. Thus, we judge the need for further research on the subject, as there is no solid evidence-based conclusion about the effectiveness of such therapy.

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