International Journal of Scientific Advances
ISSN: 2708-7972
Volume: 3 | Issue: 2 | Mar - Apr 2022 Available Online: www.ijscia.com
DOI: 10.51542/ijscia.v3i2.26

Effect of Kinesio Taping with Fascia Manipulation Technique on Superficial Back Line Over Hamstring Fascia to Increase the Range of Motion – An Observational Study

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ABSTRACT

Superficial Back Line is one of the first lines dissected and researched over the fascia as a connective tissue. The Superficial Back Line (SBL) connects and protects the entire posterior surface of the body like a carapace from the bottom of the foot to the top of the head. Strain, tension (good and bad), trauma, and movement tend to be passed through the structure along these fascial lines of transmission leading to soft tissue mal-alignment resulting in somatic and mechanical dysfunction. A forward bend with the knee's straight links and challenges all the tracks and stations of the Superficial Back Line. Kinesio Taping application with fascia manipulation correction technique helps in the correction and realignment of the collagen fibres found predominantly in the fascia system responsible for tensile strength and force transmission. Observational finding with clinical data collection reveals pre and post KT application over the hamstring fascia suggest its effectiveness in realigning the fascia fibres to increase the range of motion of forwarding bend movement.

Keywords: kinesio taping; fascia; superficial backline; range of motion

INTRODUCTION

Kinesio-Taping (KT), developed by Kase et al. in the 1970s, is a popular taping. [1]This popularity is due to the structure and uniqueness of the tape, which is similar to that of human skin anatomy and structure. [2] which can be stretched along the longitudinal axis yet allows free movement of the taped body area. The sinusoidal wave pattern present in the tape mimicking to that of skin helps in providing the mechanical decompression on the superficial structures. [2] [3] Other features of KT, such as its being light weight, latex free and anti-allergenic or able to feature fashionable colours and patterns, water resistant may also be a marketing strength which has augmented the propensity to use KT. [1] [4]

A common use is in flexion related lower back pain and restriction of ROM. [5] Lower back pain is a common disorder with a high recurrence and lifetime prevalence. [6] The condition represents a large socioeconomic burden to the healthcare system and society more generally due to the costs of treatment and time lost from work. [6] The cause of back pain remains unclear in over 80% of cases, even though some common spinal disorders related to LBP have been defined. [7]

Fascia[8] as a connective tissue and system [9] has been recently studied and discovered and found to have wide connection with CNS and ANS [10] resulting in pain [11]and dysfunction. [12] [13] [14] [15]

Thomas Myers discovered Superficial back line at the first exploration of the anatomy trains concept [16] that connects the plantar fascia to head, has withstood the test of multiple embalmed and fresh fascial dissection. [17] not every anatomy trains line has withstood this scrutiny. [18]

Several researchers find the role of fascia of interest and utmost significance in musculoskeletal disorders, [19] [20] owing to its potential to influence muscular activity.[21] Research from the past decade has been able to point towards the part played by fascia in numerous musculoskeletal dysfunctions, [22] [23] as the force transmission goes through skeletal muscles throughout the body via epi and perimysium, [24] and are indirectly linked to each other by fascial tissue forming a network with some specific patterns [25] [26]. Also, high density of contractile myofibroblast is present in the perimysium. [27] [21] [19] These conceptual patterns were later named 'myofascial meridians' by Myers (2009), as a means to better understand the mapping of the fascial system. [17] Fascia can adapt well to tensile stress due to the fibres contained, but irreversible tissue changes begin to occur if the fibres are stretched about 3–8%, which can contribute to unspecific back pain (creep effect). [28] [29] Young individuals were found to have thicker fascia in the lower limb. [30] Micro-injuries can activate the fibroblasts of the fascia and increase its stiffness, limiting the possible range of movement. [15]

Albeit these reviews and trials yield positive evidence for the existence of fascial connectivity and continuity, several aspects need further clarification and in-depth analysis. [31] [32] The research still need high quality randomized controlled in-vivo trials and biomechanical studies to ascertain the above findings as most of the current studies are either in non-randomized format or with inadequate methodological quality that prevents the generalizability of the results. [33] [34] [35]Definitely, it is of utmost significance to explain the functional importance of the myofascial chains as the ability for strain transition represents the decisive criterion to legitimize treatment of meridians. [17] [36] [37]

The aim of the present observational study was therefore to explore the effect of KT application on the fascia system as a part and as a whole system, rather than targeting individual muscle. [38] [39] which is a common practice in kinesio taping application. [40] Using a fascia manipulation technique [26] over the hamstring fascia, [41] area to be considered as a concentration of the forces of strain in performing a forward bend movement in symptomatic as well as asymptomatic individuals. [42] [21] [31] This study will provide a better understanding on how the fascia manipulation technique with kinesio taping alter the alignment of fascia fibres found in superficial back line to increase first the range of motion (ROM) [43] [44] and secondarily the pain (VAS) [44]

The objectives was to manipulate the fascia system with Kinesio taping using Fascia correction technique[4] over hamstring area of the superficial back line [17] [31]; and evaluating the changes in the range of forward bend movement when performing with and without KT. [45]

METHODS

Study design

An observational study was carried out during the education seminar of HPE UK - kinesio taping organised over different cities of India for over a year.

An average 10 participants over 40 seminars were evaluated during the course to develop the methodology and to evaluate the potential taping mechanisms over superficial back line.

90 healthy female participants, who were qualified physical therapist professionals, participated for 2 days kinesio taping seminar towards cpd education with age group between 22 – 25 yrs., with no history of lower back pain or any other chronic pain that had limited their work or daily activities, but with presentation of moderate to severe tightness of fascia [46]while evaluating the superficial back line by performing the standard evaluative test of forward bending movement in standing, while performing the movement were invited to participate in the study. [47] [48]

Marking system was used over the shin area to identify the maximum reach of the third finger over the shin while forward bending movement and difference in maximum reach with marking system was observed pre and post fascia correction technique using kinesio taping application. Measurement devices like inch tape were used to measure the distance of maximum reach pre and post taping with the ankle joint circumference (centre of line connecting medial and lateral malleoli)

FIGURE 1: A forward bend with the knee's straight links and challenges all the tracks and stations of the Superficial Back Line.
Superficial Back Line was tested pre and post application of kinesio taping.

General procedure

Data collection procedure is shown in Figure 2. Subjects were asked to perform forward bend movement in standing with knee straight to evaluate the superficial back line lumbar flexion tasks in two states (without taping and with KT) in the data collection session; the collection procedure is shown in Figure 1, 2 parameters were considered for this test, primarily focusing on Range of motion using marker over the shin area, of the intersection of third finger over shin with the measurement of the difference in range using inch tape.

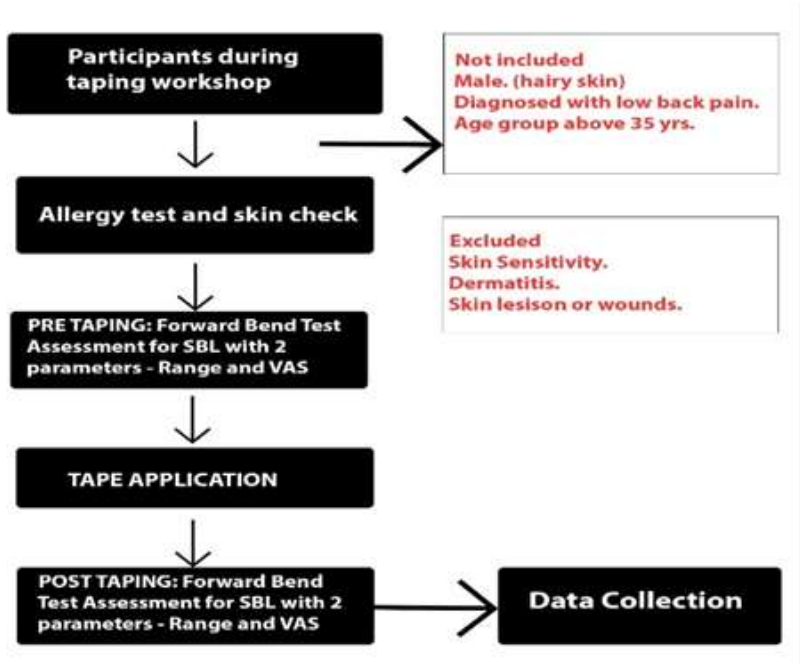

FIGURE 2: data collection

Taping procedure

Considering the biomechanical and irregular arrangement of fascial lines fibres observed in overstressed muscles, 3 Y Strip Kinesio tape was applied perpendicular to muscle orientation to manipulate the fascial line corresponding to superficial back line. Before taping, subjects' skin was checked to make sure that there was no pre-existing skin lesion over the taping area. A small piece of KT was then applied to the arm for 20 min before the trial to ensure the subject was not allergic to the tape. A connecting reference line was drawn on the skin, over the hamstring area from the gluteal folds to the centre of popliteal fossa to bifurcate the medial and lateral hamstring group. To control taping tension, the length of the taping area was measured before taping, and the tape was cut accordingly. (Figure 3) As recommended by the KT application guidelines [1] [4] while applying the tape, the recommended position was relaxed or neutral position of superficial back line i.e prone.

KT was applied only on one side to check the continuity property of the fascia system and its effect., Anchor of 1 block (5cm width) measurement with 0% tension were then applied medial and lateral side to the line. Tails of the Y strips were applied with fascia correction technique maintaining 45-55% of tension (to avoid recoil property of the tape) with an angulation of 15 – 20 degree with the skin. Aim was to manipulate the medial hamstring fascia to lateral side and lateral hamstring fascia to medial side, covering the hamstring area, to manipulate the superficial back line fascia, allowing more force transmission via the fascial line, which gets altered during under or over stressed muscular dysfunction. [36] [25] [32] [39] [19]

FIGURE 3: Taping application procedure.

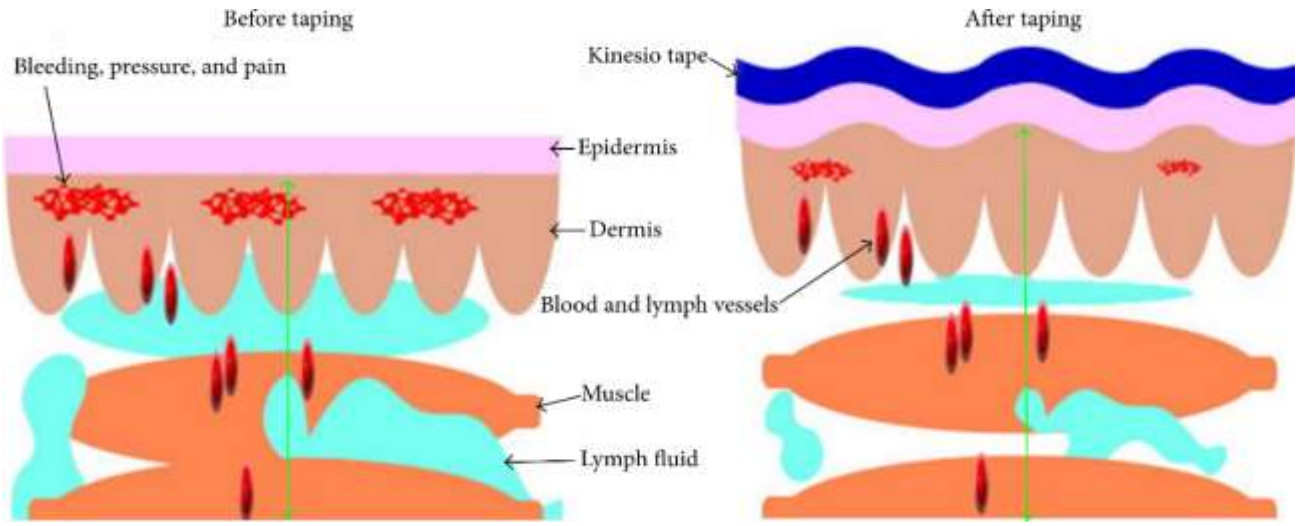

FIGURE 4: These two pictures shows the mechanism of KT application on soft tissue. Before taping and After taping.

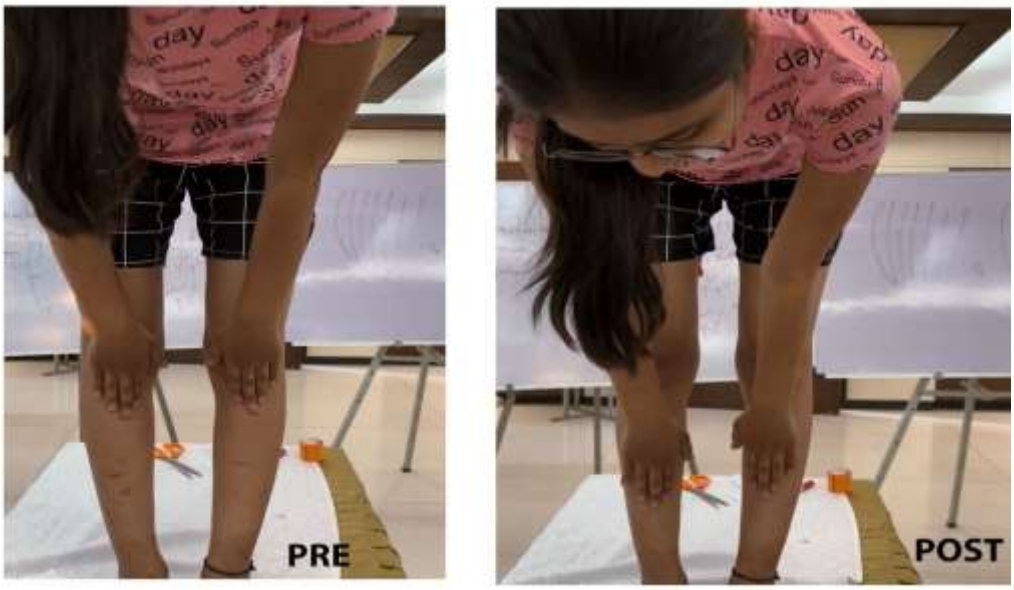

FIGURE 5: Increase in range of forward bend observed with taping application on one side

STATISTICS

Data were analysed with the GraphPad software for Windows, paired t - test was used to test differences of measurement pre and post fascia correction technique using kinesio taping application. Statistical analyses were conducted at a 95% confidence level. P value < 0.0001 was considered extremely significant.

Intermediate values used in calculations:
t=14.4212
df = 48
Standard error of difference =0.748

Group	Pre-Taping	Post-Taping
Mean	17.976	7.184
SD	4.807	4.256
SEM	0.687	0.608
N	49	49

RESULTS

There was significant difference in range of motion with the marking system and measurement of values in (centimetres) with inch tapes pre and post fascia correction techniques using kinesio taping application. Application of tape perpendicular to the orientation of the tape applied with 45 – 55 percent stretch were able to successfully manipulate the fascia fibres orientation. (figure 3). There was significant difference in range of motion of forward bend movement with application of the multiple tapes.

DISCUSSION

The aim of the present study was to observe and assess the effect of KT on increasing the range of motion of forward bend movement by manipulation of fascia of superficial back line using fascia correction techniques. Most studies concentrate on KT's effect on pain and symptoms [40] [49] [45] [3] and individual muscles. [40] however, the evidence exploring its actual mechanisms over fascia is inadequate. It was therefore likely beneficial to understand the effect of KT on the skin and sub-cutaneous tissues in asymptomatic subjects during whole-body movements, in order to understand mechanisms and perhaps what kind of patients are most likely to benefit, myofascial related LBP for example. By understanding the KT mechanisms in those without pain, we will be able to compare any tissue movement observed in people with pain. Furthermore, comparison of symptomatic responders and non-responders may help us to understand pain mechanisms and response characteristics, therefore targeting treatment better. The result of the present study shows that KT influence the Superficial fascial line to manipulate its fibres, which under stress or strain gets misalign. [28] Kinesio tape stimulate the sensory mechanoreceptors which are present in fascia leading to lowering of sympathetic tonus as well as a change in local tissue viscosity. [10] Mimicking the properties of the skin, Kinesio tapes helps in providing microscopic lifting up of the skin, creating space correction between the skin and fascia causing decompression effect. [49]Fascia correction technique with kinesio tapes were not just able to increase the range on the side of application of tapes, but was also able to influence fascia as a whole system to increase the range bilaterally, as fascia is a continuous structure and present throughout and everywhere in the human body systems. [50] [51] There was again a significant difference observed, when the tapes were applied over the most strained area or zones in the fascia lines, [52] to be more specific over the aponeurotic side at the musculotendinous junction as according to recent development and research surrounding the fascia reveals, that the tightness [53]or adhesion were mostly seen in tertiary perimysium layer i.e the fascia layer covering the neurovascular bundles which is commonly present in Musculo tendinous junction. [54] [29] By manipulation of fascia over the hamstring area to the lateral and medial side, it is hypothesis that the fascia fibre are getting corrected to its original position thereby increasing the space between the fibre and allowing more force transmission to allow through the muscular fibres where fascia connection were profoundly present. [13] [12] [36] [10]

CONCLUSION

In summary, Fascia corrective technique over the hamstring area of superficial back line were able to influence or increase the range of motion of forward bend movements. Results suggest that Kinesio tapes applied on skin with maintenance of angle of 15 – 30degree with the skin, helps in manipulation of superficial skin and superficial fascia thereby correcting the malalignment of fascial line to allow more force transmission to increase range.

CONFLICT OF INTERESTS

The author declares that there is no conflict of interest regarding the publication of this paper.

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