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The effect of Kinesiology Taping on spinal motion and physiological spinal curvatures. A literature review

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Introduction. **The Kinesiology Taping/Kinesio Taping (KT) method has become more and more popular in recent years. Many studies have demonstrated the application of this method in numerous fields of medicine. Despite its continuous development, several issues pertaining to the legitimacy of application and operation mechanisms of KT still need to be addressed.** **Aim of Study.** **The article is a review of literature in regarding the effects of KT on spinal motion and physiological spinal curvatures.** **Material and Methods.** **This study is based on an analysis of databases such as SPORTDiscus, Medline, ScienceDirect, EBSCOhost and Google Scholar.** **Results.** **Seven research articles corresponding to the aim of this study have been found. Four of those articles are devoted to the lumbar spinal segment, two discuss the motion of the cervical spinal segment, and one concentrates on lumbar lordosis. None of the articles included information on any negative effects of KT.** **Conclusions.** **The effect of KT on the assessed parameters is barely noticeable. Therefore, it is necessary to conduct further research regarding effects of the Kinesiology Taping method on spinal motion and physiological spinal curvatures.**

KEY WORDS: Kinesio Taping, Kinesiology Taping, spinal motion, spinal curvatures.

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What is already known on this topic?
Kinesio Taping (KT) has been widely used by physiotherapists as support treatment of various musculoskeletal disorders. It has been confirmed that elastic tapes placed over muscles and fascia can stimulate physiological functions and affect pain sensation, muscle strength and range of motion, mainly on peripheral parts of the human body. Information about the influence of KT on the spinal range of motion and physiological curvatures has been, however, limited.

Introduction

Kinesio Taping (KT) was developed in the 1970s by a Japanese chiropractor Kenzo Kase, and at that time it was most common in Asia. In Europe, KT was applied for the first time in 1998, and in Poland, 6 years later. In 2007, European KT instructors founded the K-Active Europe Association of instructors and therapists, and implemented an educational system called Kinesiology Taping based on theoretical objectives of Kinesio Taping, results of scientific research and clinical experience and work with myofascial muscle chains [1]. KT employs the primary guidelines of kinesiology and relies on applying an elastic tape called Kinesiology Tape/K-Active Tape® to the skin surface. The tape was designed to imitate skin. The most significant property

of this tape is its elasticity of about 55-60% of its initial length. It is made of top-quality cotton which guarantees evaporation and skin drying and does not contain any drugs or latex. Its adhesive properties are guaranteed by 100% acryl placed in a sinusoidal shape imitating properties of fingerprints. The acryl is activated by heat, hence the longer the applied tape is, the more adhesive it becomes. The applied tape results in lifting up the skin and increasing the space between skin and muscle. The consequence of this is an increased flow of blood and lymph fluid, which is theorized to restore the correct function of weakened muscles, remove congestions of blood and lymph fluid, decrease pain by stimulating the neurological system and correct disorders within joints. Therefore KT is considered a useful method of prevention and treatment of disorders of the locomotive system [2].

Over the last decade, the interest in Kinesiology Taping has become increasingly common. Numerous studies have been developed aimed at possible applications of this method in different fields of medical rehabilitation [3, 4]. However, their results have varied significantly. For instance, Vithoulk et al. and Avtar et al. noticed that KT applied over femoral quadriceps increased muscle force. On the other hand, Fu et al. and Lins et al. demonstrated that KT did not influence muscle function at all. Donec et al. showed that KT increased the force of hand grip, but on the other hand, Lee et al. did not notice any changes in hand grip force [5, 6, 7, 8, 9, 10].

The results of studies assessing the effect of KT on pain have been different as well. Aytar et al., Akbas et al. and Thelen et al. did not notice any significant changes in pain among patients with patellofemoral pain syndrome, mechanical neck pain and shoulder pain, while Kaya et al. and Tsai et al. demonstrated that KT decreased pain in patellofemoral pain syndrome or plantar fasciitis [11, 12, 13, 14]. Despite those differences there are possibilities of KT application in rheumatological rehabilitation, especially among patients with juvenile idiopathic arthritis and systemic scleroderma [15]. Some studies discussed possible uses of KT following a cardiac surgery, thoracic surgery, cholecystectomy, mastectomy, leg lengthening wit the Ilizarov method and anterior cruciate ligament reconstruction [16, 17, 18, 19, 20]. The results of studies on post-stroke patients and patients with multiple sclerosis showed the usefulness of KT in neurological rehabilitation [21, 22]. KT is also believed to be useful in rehabilitation of patients with diseases and disorders of the spine [23].

Aim of Study

The present study is a survey of available literature regarding effects of Kinesiology Taping on the spinal range of motion and physiological spinal curvatures.

Material and Methods

The study involved an analysis of bibliographic databases such as SPORTDiscus, Medline, ScienceDirect, EBSCOhost and Google Scholar. Only studies that discussed Kinesiology Taping/Kinesio Taping and its effect on spinal motion and physiological spinal curvatures were chosen for review.

Results

Among the retrieved research studies Kinesiology Taping seven studies met the criteria of the aim of the study (Table 1).

Table 1. Review of research articles about spinal motion and physiological spinal curvatures

Author	Date	KT application	Research group
Yoshida A, Kahanov L [24]	2007	motion of the lumbar spinal segment	30
Gonzales-Iglesias J, et al. [25]	2009	whiplash	41
Merino R, et al. [26]	2010	motion of the lumbar spinal segment	10
Salvat I, Salvat A [27]	2010	motion of the lumbar spinal segment	33
Lee JH, Yoo WG [28]	2011	anterior pelvic inclination	56
Castro-Sanchez AM, et al. [29]	2012	non-specific pain of the lumbar spinal segment	60
Saavedra-Hernandez M, et al. [30]	2012	mechanical pain of the cervical spinal segment	80

Four studies were concerned with the lumbar spinal segment. In their study of a group of 30 healthy individuals Yoshida and Kahanov applied the Y-shaped muscle tape over the lumbar erector spine muscle.

The tape base was not stretched within the area of S1 segment, and tape ends with a 25% tension were applied on both sides. The assessed flexion, extension and lateral flexion of the lumbar spinal segment revealed a significant increase in the range of flexion by around 17 cm. Other measurements, despite an improvement in relation to the baseline, did not reveal any statistically significant changes [24].

Merino et al. applied the Y-shaped muscle tape over the lumbar spinal segment, and the X-shaped muscle tape over the ischiocrural muscle group (the tape base was not stretched above the hollow of the *knee* together with two unstretched stabilizing ends; the remaining part of the tape was applied along the biceps *muscle* of the thigh and *semitendinosus and* semimembranosus *muscles, and ended near the* ischial tuberosity with a 25% tension). The measuring method was the sit and reach test that was carried out twice: before and 30 minutes after the application of the tape. As soon as the Kinesiology Tapes were applied, the test result increased by 2.15 cm and was statistically significant [25].

Castro-Sanches et al. also observed an improvement of flexion after applying the KT method. Their study was carried out on a group of 60 patients suffering from chronic and non-specific pain in the lower spinal segment. Those patients were divided into two equal subgroups. The test variables included functioning impairment, pain and the range of motion. When analysing changes in the flexion of the lumbar spine segment, the experimental subgroup, in which the "star shape" taping pattern was used (4 I-shaped tapes with a 25% tension with the crossing point in the location of pain perception), reported a better improvement than the control subgroup. However, the result was statistically non-significant [26].

Other authors who evaluated the effect of Kinesiology Taping on the motion of the lumbar spinal segment were Salvat and Salvat, who applied the same method as Yoshida and Kahanov and compared it with traditional sport taping and placebo application. Their study was conducted on a group of 33 healthy people. The entire group that used Kinesio Taping reported an increase in the range of inflexion motion, whereas only about 77% of the people from the other two groups recorded such an increase. These results were not, however, statistically significant [27].

Two studies described the effect of Kinesiology Taping on the motion of the cervical spinal segment. Gonzales-Iglesias et al. evaluated a possibility of KT application in patients with whiplash injuries. The test variables were pain intensity and motion of the cervical segment in all the main planes. The test group consisted of 41 patients divided into two subgroups. In the first subgroup the Y-shaped muscle tape was applied over the cervical erector spine muscles (the tape base without any tensions within the areas of Th1/Th2 segments; tape ends applied towards the cranium at the C1/C2z level with a 25% tension) together with transversally applied Web-shaped space-correction technique tapes with a 15% tension. In the other group a placebo was used. The group with KT recorded a statistical decrease in the pain perception level and an increase of the cervical motion in all directions [28].

On the other hand, Saavadera-Hernandez et al. compared the effectiveness of Kinesio Taping with cervical manipulations. A group of 80 patients suffering from mechanical and cervical pain was randomly divided into two equal subgroups. The KT application was the same as in Gonzales-Iglesias. Some significant changes were only reported in rotation motions, but those results were better in the group subject to manual therapy [29].

One study described the effect of Kinesio Taping on the anterior pelvic inclination. Lee and Yoo studied a group of 56 healthy people divided into two subgroups with and without Kinesiology Taping. In the subgroup without KT, measurements were carried out before and directly after a 30-minute slump test. In the subgroup with KT an additional measurement was made directly after applying the tapes, but before a hung-down position. The following taping techniques were applied: I-shaped taping technique over the erector spine muscles in the lumbar spinal segment (the tape base without any tension in the area of the spina iliaca posterior superior; the end 30 cm above with a 15-25% tension); and the I-shaped tape over the internal abdominal oblique muscles (the tape base without any tension in the area of the spina iliaca posterior superior; the end in the area of the xiphoid process with a 15-25% tension). The subgroup with KT reported a significant increase of the anterior pelvic inclination directly after applying the tapes. This increase was maintained despite a 30-minute slump position and was not recorded in the subgroup without Kinesiology Taping [30].

Discussion

The effect of the Kinesiology Taping method on the spinal motion and physiological spinal curvatures has not been thoroughly studied yet.

Four studies concentrated on the lumbar spinal segment. Their results differ from one another, which makes it impossible to determine precisely the effect of KT on the motion of this segment. Furthermore, the method of evaluating the motion based on a linear measurement seems to be inadequate because the entire back superficial muscle tape was tested. Hence, it remains unknown whether the range of motion increased within the spine area or the hip joints. Moreover, only one study assessed the effect of Kinesio Taping on many more motion directions than flexion. Unfortunately, the result of this evaluation was negative, hence the aspect of the motion in other planes remains unclear [24, 25, 26, 27].
Two studies were devoted to the cervical spine. The measurements were made with a goniometer in all the motion planes. Unfortunately, the obtained results were too small, and it is more probable that they derived from a decrease in pain perception rather than from a mechanical effect caused by KT [28, 29].
Moreover, the effect of Kinesio Taping on the motion of the thoracic spinal segment remains unclear. Authors do not even describe any methodology of the tape application within the area of this segment [2].
The most promising study focused on the effects of KT on the anterior pelvic inclination. The increase of the angle of the pelvic inclination was shown to affect the increase of lumbar lordosis. However, it is unknown what happens to other spinal curvatures [30].
The present study poses further questions rather than achieves its aim. It is unknown whether Kinesiology Taping actually enhances spinal motion. Undoubtedly, the fact common for most of discussed studies is the use of muscle technique. However, the tape itself can be placed on a patient's body in two different directions: from proximal to distal or vice versa. Since all the studies described only one direction, i.e. proximal to distal attachments, the influence of the reverse is unknown.
Authors who concentrated on, inter alia, the motion of the lumbar spinal segment used only the Y-shaped taping technique with ends on both sides of the spine. Most probably, they decided to implement this technique because it was described in both the Kinesio Taping book and training materials. However, the muscle technique can be also performed by using the I-shaped taping technique on both sides, or even the Y-shaped taping technique on both sides. Another problem is the patient's initial position before applying the tape. The muscle technique requires a patient to be in a position, in which muscle fibres are stretched. The Kinesio Taping methodology provides for inflexions forward in order to stretch the erector spine. However, the aforesaid studies show that this exercise may only affect the range of inflexion. Therefore, the use of combined motions of waist inflexions together with its rotation or lateral inflexion or together with its rotation and lateral inflexions may be worth considering. The final aspect refers to tape tension. In all the aforesaid studies, a tape with a 25% tension of was considered to be a therapeutic tape. There is no empirical explanation how other variables of tape tension may affect the studied parameters, which is another aspect worth further investigations.
It is necessary to conduct further research that would finally result in determining the effect of Kinesio Taping on the spinal motion and spinal curvatures, and thus determine its possible application in selected spinal malfunctions and diseases.

Conclusions

1. Kinesiology Taping/Kinesio Taping may have some positive effect on the improvement of spinal motion and physiological spinal curvatures.
2. It is necessary to conduct further research on the effect of Kinesiology Taping/Kinesio Taping on the spinal motion and physiological spinal curvatures.
3. It will be necessary to apply more reliable and trustworthy methods that evaluate these two discussed parameters.
4. It will be necessary to apply research using control groups, including placebo groups, on healthy people and people with various malfunctions.

What this study adds?

This review describes results of recent studies on the impact of KT on the spinal range of motion and physiological curvatures. It shows that this area is not well known and it should be clarified how various KT applications could be used to support treatment patients with specific and unspecific spine disorders.

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