

THE USEFULNESS OF KINESIO® TAPING METHOD TO REDUCE THE ACTIVITY OF MYOFASCIAL TRIGGER POINTS IN THE TRAPEZIUS MUSCLE

Paweł Sip¹, Natalia Sip², Wojciech Manikowski¹

¹Department and Clinic for Rheumatology and Rehabilitation, University of Medical Sciences in Poznań, Poland

²Social Nursing Home in Ugory, Poznań, Poland

ABSTRACT

Introduction. Myofascial trigger points are very tender, painful areas in the skeletal muscle, which are sensitive to touch and cause discomfort consisting of ailments radiation to different areas of the body. There are many methods that are used in the treatment of trigger points. One of them may be Kinesio®Taping, which is a method supplementing the treatment of disorders for the proper functioning of muscles by means of special tapes – Kinesio Tex®Tape.

Aim. The aim of this study was to evaluate the effectiveness of Kinesio®Taping in the treatment of trigger points for example of the trapezius muscle in young men, amateur playing basketball.

Material and methods. The study involved 39 men aged from 18 to 32 years. Pain intensity and its radiation were examined prior to application of the tape, immediately after application, after 2 hours and after 2 days. VAS scale was used.

Results. After treatment there was found a reduction of pain intensity and the range of its radiation.

Conclusions. Kinesio®Taping is a fast and effective method for pain reduction caused by myofascial trigger points.

Key words: Myofascial trigger points, Kinesio®Taping, stress, muscle overloading

Introduction

The emotional and tissues stress are generally believed as the negative phenomenon. Both they can be considered. Due to the presence there can be distinguished the acute and chronic stress. It happens that acute stress has the positive effect for mobili-

zation, stimulates the action and allows you to cope in difficult situations (Travel i Simons 1999; Gerwin i wsp. 2004; Dommerholt i wsp. 2006). When the stress is too strong or long-lasting and unable the psychological adaptation to the situation, its effects can be seen especially in the emotional and psychological sphere (personality disorders, anxiety, depression, etc.). More and more is discussed about psychosomatic effects of stress. There are various types of ailments caused by stress which occur in various organs and soft tissues (LeMay 2005; Riggs 2007). In the physiological sphere, the physiological stress is reflected mainly in the neuromuscular system. There have been designated areas of the human body, which as a result of psychological stress begin to function improperly. These include the internal organs (stomach, intestines – with occurring the ulcer disease) and organs of the musculoskeletal system, where it is the most frequently manifested itself with the increased muscle tone. Particularly this vulnerability is applied to the muscles of the upper torso, neck, head, shoulders – they are called “stress muscles”. When muscles are stretched too long, muscle disorders arise, the effect of which is incorrect, pathological work. A number of chemical processes lead to the formation of very painful soft tissue areas – myofascial trigger points. They show tenderness, causing discomfort at high intensity and radiate to different areas of the body (Dommerholt 2006; Nicpoń 2007; Staciwa 2012).

Scientists still study the impact of different methods for reducing the negative effects of today's way of stressful life. The natural medicine becomes increasingly popular. Yoga, relaxation therapies (aromather-

apy, music therapy, breathing exercises), autogenous trainings, massages are some of the methods. The simplest physical activity seems to be also effective, like walking, running, cycling and swimming. More and more similar activities are applicable in reducing the effects of stress. One of the methods of physiotherapy, positively affecting the wide reducing of dynamic and static overloadings may be Kinesio®Taping. This is modern method, which is used in various kinds of work disorders in soft tissues, including muscles and fascia (Sikora 2007; Mikołajewska 2011).

MYOFASCIAL TRIGGER POINTS

Myofascial trigger points (MPPS) are distinctive places in the muscle, with a marked with the discrete focal inflammation, they are high sensitivity palpable, perceptible in the course of the muscle fibers as small bumps, lumps, nodules. These places in the muscle are results of overloading of static, dynamic or structural type. The muscles with the generated out trigger points are expected to undergo the inflammatory processes. No reaction to the resulting pain leads to significant soft tissue dysfunction. It is assumed that the constant state of increased tension may result in damage of overloaded muscle fibers (Manheim 2011; Staciwa 2012; Staciwa 2012). A more precise etiology is discussed below (Dommerholt 2006; Esenyl i wsp. 2000; Itoh i wsp. 2004; Fu i wsp. 2007; Otten 1988; Sanderek 2007; Simons 1997).

Distinction is made between active and persistent trigger points. Pain originating from active trigger points occurs the following direct stimulation and without an external stimulus at rest. Persistent trigger points produce the pain only during stimulation with compression. Discomfort may radiate to the principle of radiation to distant areas of the body, adding to the feeling of discomfort. These relatively non-specific symptoms often have an influence on putting misdiagnosis, which leads to the ineffective treatment. This happens because the pain comes from trigger points which can mimic the symptoms of many diseases, such as carpal tunnel syndrome, tennis elbow/golfer, bursitis, chronic headaches along with dizziness, sinusitis/ear, paresthesia of extremities, heart problems (Ciechomski 2006; Manheim 2011; Staciwa 2012; Staciwa 2012). The following table presents the list of examples of muscles with active trigger points and some pains they can cause (Ciechomski 2006).

From the point of view of proper diagnosis and treatment of trigger points, very important is the fact that the active (primary) MPPS can produce sensitive points along the topography of its radiation,

Table I. Statement of muscles with examples of ailments caused by active MPPS.

Muscle / Muscles	Area of pain
m. trapezius	Shoulder pain, occiput, V finger of the upper limb
mm. scaleni	Pain in the shoulder, numbness and second finger of the upper limb
m. sternocleidomastoideus	Pain in the ear, teeth
mm. suboccipitales	Pain in the eye
m. pectoralis major	The symptoms of angina (pain on the left)
m. pectoralis minor	Numbness in arm
m. latissimus dorsi	Pain in the spine L-S
m. supraspinatus	Tennis elbow
m. subscapularis	Carpal tunnel syndrome
m. rectus abdominis	Painful menstruation in women
m. psoas	In males – testicular pain; women-pain in the ovaries
m. gluteus medius	Sciatica from L5

which are referred to as the satellite (secondary). Adequate example would be the scalene muscles (mm. scalene). Active trigger point produces satellite pain in the greater pectoral muscle, the biceps and hand extensores. Removal of active points automatically eliminates satellite ones (Ciechomski J. 2006; Staciwa E. 2012; Staciwa E. 2012).

It is assumed that myofascial trigger points occur in the muscles, tight bands of muscles and fascias. They lead to a decreasing of the muscle strength and its flexibility, limiting the range of movement in the joints (Dommerholt et al 2006; Earls et al 2012; Manheim 2011).

KINESIO®TAPING

Kinesio®Taping is a therapeutic concept developed in the 70's of the twentieth century by a Japanese chiropractor Kenso Kase. It is a form of soft tissue therapy, which allows achieving satisfactory therapeutic results through the use of direct action with the skin specialist flexible tapes – Kinesio Tex Tape® (K-Text). These tapes, applied to the skin in an appropriate manner and according to a specific formula, support treatment in many areas of medicine, especially in orthopedics, neurology, traumatology and sports medicine. Mechanism of action with these tapes regards unloading the musculo-fascial structures, activates the damaged muscles, increase the range of motion in joints, reduces pain in the soft tissues. Kinesio®Taping is a method of sensory type, supporting the physiological processes, allowing the body to maintain

homeostasis. It affects the microcirculation, without causing circulatory embolism, skin burning or allergic reactions. Properly affixed application affects the skin, muscle, fascia, joints, superficial vasculature, the lymphatic system, the endogenous system of anesthesia. There were identified several key areas of the tapes that affect the physiology of the body:

- supporting the muscle activity – strength increase, acceleration the regeneration process, normalization of tonus in muscle fibers,
- reduction of pain – activation of an endogenous system of anesthesia, among others alpha, beta and skin fibers taking origin from receptors,
- stimulate microcirculation – removing restrictions in superficial systems,
- reduction of lymphoedema – the creation of lymphatic drainage, increasing the lymph flow velocity, removing stasis, reducing local inflammation,
- correction of joints positioning – regulation of proprioception, anatomical positioning, passive support, symmetry maintaining,
- regulation of proprioception (deep) – restoration of biomechanical motion, improving sensation from certain neuromers, permanent percutaneous local stimulation,
- regeneration of skin damage – rebuilding and increasing scars flexibility, supporting wound healing (Hałas 2010; Jaraczewska 2005; Mikołajewska 2011; Senderek 2005).

There are distinguished six basic taping techniques using Kinesio Tex Tape®: muscular, ligamentous, fascial, lymphatic, corrective and functional. The Type of used technique, the selection of the appropriate cutting and sticking way are always individually determined after a diagnosis of physiotherapy. The therapist, after medical history collecting, assesses the patient's functional status with at least eight screening tests- after a minimum of four on the upper and lower quadrant of the body. The effectiveness of Kinesio®Taping method always should be evaluated immediately after application (Hałas 2010; Mikołajewska 2012; Schuller et al 2000; Senderek 2007; Zajt-Kwiatkowska et al 2005).

Aim

In the present article, the aim of the study was to examine the effectiveness of Kinesio®Taping method in the treatment of myofascial trigger points, based on the assessment of pain and the presence of pain projected in the form of radiation.

Material and methods

Thirty-nine males, the medical students aged 23.5 years on average (with a standard deviation of 3.5) were subjected in this study (Table II). All subjects played basketball as amateurs, regularly twice a week for 90 minutes. In the assessment of dominance side of the body prevailed right side (Table III).

Table II. Age structure of the respondents.

Age	Number of persons
16-20	9
21-30	27
31-40	3

Table III. Dominant extremity distribution.

Extremity	Number of persons
Right	34
Left	5

Tables IV and V show the distribution of pain associated with its occurrence around the shoulder girdle and the circumstances of its occurrence, declared during an subjective interview.

Table IV. Generalized, non-provoked pain in the muscles of shoulder girdle.

Pain	Number of persons
Yes	30
No	9

Table V. Circumstances of pain sensation in the shoulder girdle muscles.

The circumstances of the pain perception	Number of persons
Spontaneous	6
During movement (occasionally)	13
In the morning after waking up	6
After exercise	5

Among those feeling the pain in the muscles of the shoulder girdle, some subjects enquired the pain radiating to different parts of body. Its distribution and directions are presented in tables VI and VII, respectively.

Table VI. The presence of radiation.

Radiation	Number of persons
Yes	21
No	9

Table VII. Directions of pain radiation.

Direction of radiation	Number of persons
Temporal area / eye	6
Mandibule / ear	6
Arm	9

Some of the subjects had previously injured the shoulder area – table VIII. In all cases of injuries there were related to non-dominant extremity. They were not treated surgically, there were used conservative therapies – drug therapy, physical therapy, immobilization. At the time of the study none of the above subjects reported discomfort associated with a history of trauma.

Table VIII. The injury around the shoulder.

The injury around the shoulder	Number of persons
Yes	5
No	34

The inclusion criteria for the study participants were: possible to be provoked pains at the site of MPPS in trapezius muscle (in the dominant extremity) and the pain projection, no limitation of the cervical spine and shoulder joints mobility, normal function of the muscles at the rotator cuff, stable shoulder joints.

All subjects before studies were tested with clinical examinations of the cervical spine and the shoulder joint:

- provoking the pain and its radiations from trapezius muscles trigger points,
- measurements of the C spine ranges of motion,
- measurements of shoulder ranges of motion,
- a symptom of the falling arm,
- the front and back shoulder tests of drawer.

In all the subjects during tests there appeared the pain and its radiation caused by pressure at trigger point in trapezius muscles. The cervical spine ranges of motion measurements had scores in a physiological limit. In other tests, each time the results were negative, and therefore all individuals were qualified to the tests on the effectiveness of Kinesio®Taping method. An additional criterion for inclusion in the study of people following injury around the shoulder was the fact that these injuries involved opposite sides, while studies have been carried out on the dominated ones.

The subjects participated in a series of studies in which the pain evoked with palpation was caused by the presence of trigger points in the trapezius muscle, always on the dominant side. Researches were

carried out by the same therapist, with the same force of pressure for 5 seconds. Symptoms of pain intensity were evaluated based on the visual analogue scale (VAS ang: Visual Analogue Scale). This is a graphical descriptive scale, where the test determines the degree of pain intensity on a line with a length of 10 cm (0 means no pain and 10 cm – the strongest pain which can be imagined). The same method was applied prior to application of the tape applying, immediately after the application, after 2 hours, during which there has been effort (training) performed, and after 2 days – totally four times.

The application was to stick the tape on the surface of muscle (Kinesio Tex Tape®). Depending on the analgesic effect there were 1, 2, 3 or 4 slices of tapes. Stages of sticking the tapes are presented on figures 1-4.

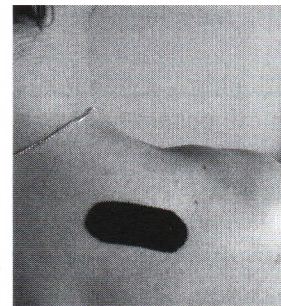


Figure 1. Ist application stage.

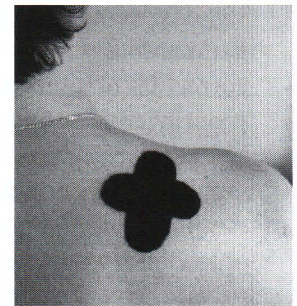


Figure 2. IInd application stage.

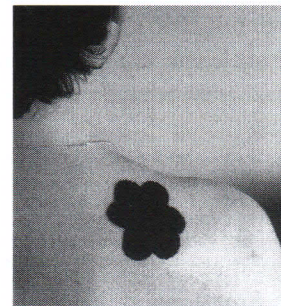


Figure 3. IIIrd application stage.

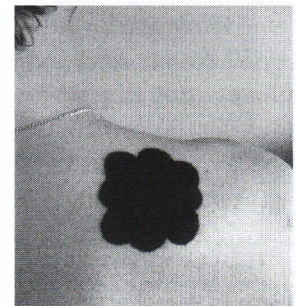


Figure 4. IVth application stage.

The radiation of pain occurrence was also assessed. For this assessment of radiation there was used the picture of muscle, where the range and direction drawn.

Results

The pain prior to application of the K-TEX® tape, immediately after application, after 2 hours and after 2 days was evaluated.

Prior to application, the minimal pain was 4, and maximal 9. On average, the pain was rated at

6.28 with a standard deviation of 1.27. Medial value was sixth. The pain immediately after the application has been assessed for min. 2 and max. 7; an average of 4.82 with a deviation at 1.21. A detailed schedule of pain distribution prior to the application and immediately after is shown in figures 5 and 6.

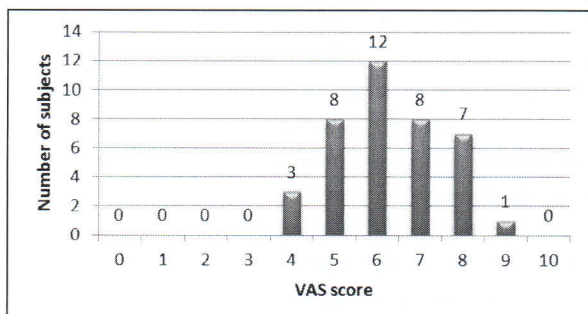


Figure 5. Pain assessment prior to application.

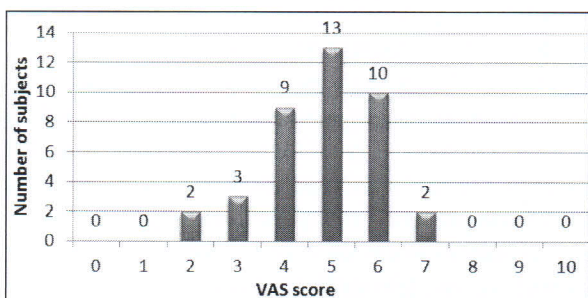


Figure 6. Rating of pain immediately after application.

After 2 hours of application the rated pain was on average 4.71 with a standard deviation of 1.36 (Figure 7), it ranged from 1 to 8, and after 2 days it was on average 4.85 with a range of 1.48 (Figure 8), with values min. 2 and max. 8.

The following figure 9 shows a linear plot of mean pain values recorded from all four measurements.

It was noted that as a result of the application the K-TEX® tape, the level of pain was reduced. The lowest mean value was obtained during the third measurement, while during 2 and 4 they were similar each other. The greatest difference was obtained immediately after tape application.

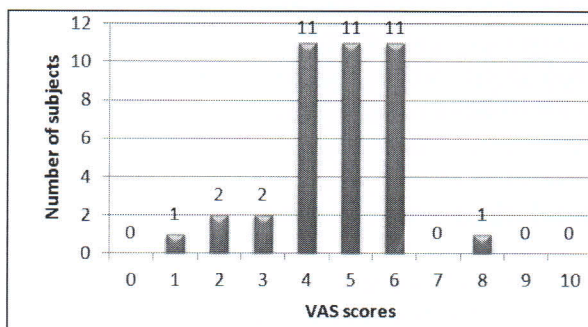


Figure 7. Pain scoring 2 hours after application.

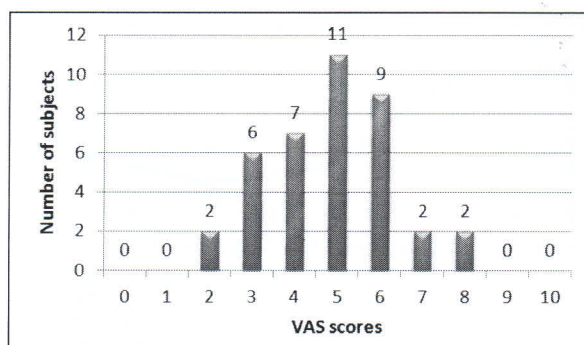


Figure 8. Pain scoring 2 days after application.

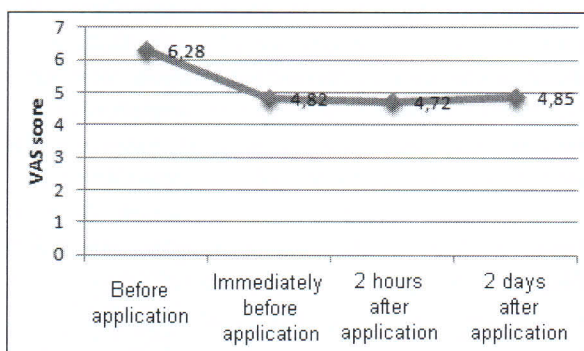


Figure 9. The average value of pain in each test.

The aim of the statistical analysis was evaluation the phenomenon, that tapes application the diminished the pain level. A hypothesis H_0 was undertaken that there are not differences in the level of pain before and after K-TEX® tapes where applied. H_1 alternative hypothesis was that the average level of pain sensation was smaller after the application of the tapes. Using the test comparison of the two expected values (expected value is the average level of pain before and after applying the Kinesio®Taping) it has been proven the efficiency of tapes with probability 0.95. After performing all tests H_0 was rejected and H_1 was accepted.

In addition, the assessment has been subjected to radiation of pain caused by compression of the trigger point. Evaluation was performed prior to application of the tapes, immediately after application, after 2 hours and after 2 days – the same as the pain. The radiation was sensed by all 39 examined subjects. Comparison of the number of respondents who reported radiation during tests is shown in figure 10.

Moreover the analysis included the relationship between pain intensity and pain radiation. It was noted that the radiation occurs more frequently with the phenomenon, that the higher the pain is. The pain was less intensive, the less radiation occurred or disappeared completely.

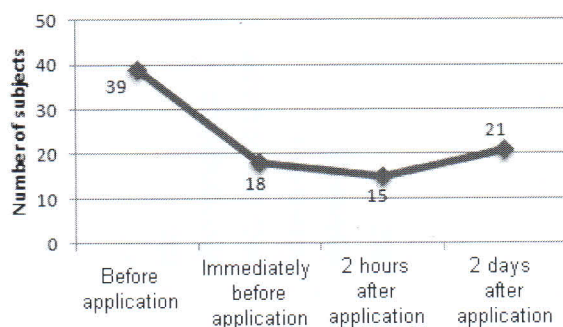


Figure 10. Pain radiation during particular tests.

There was examined the relationship between the number of applied tapes and the analgesic effect – a decrease in the level of discomfort. Pearson correlation coefficient showed a weak negative correlation (0.3) – the more tapes have been applied, the lower was the level of pain reported by the subject in the VAS scale.

The study noted overall reduction of pain caused by MPPS. The greatest analgesic effect was observed after 2 hours of application – the lowest mean level of pain, but the greatest difference in the perception of pain was observed immediately after application. After two days from the application, the level of pain increased 2 hours after taping, however, it did not exceed the output level. Radiation of pain was also reduced during the applied therapy. The analgesic effect was closely related to the number of applied tapes in one application – using of more tapes had the greatest effect.

Discussion

There is more and more work proving the effectiveness of the evaluated method. However, researches of the effectiveness of trigger point therapy using K-TEX® tapes are still relatively small.

The confirmation of the Kinesio®Taping method effectiveness was confirmed in studies carried out by Hashemirad (2013). It was proved an immediate reduction of pain after the application of Kinesio Tex Tape® in patients with a diagnosis of piriformis muscle syndrome (porifiris syndrome) when pain was measured with VAS scale. This effect was achieved by improving the muscle function by supporting the weakened fibers, improving the flow of blood and lymph circulation, stimulation of the nervous system, correction of deep proprioception. The measurements were repeated in the next three days to give the constant pain reduction effect in muscle piriformis (Hashemirad 2013).

Garcia-Muro et al (2009) in a paper on the treatment of myofascial pain of the shoulder with

Kinesio®Taping method conclude that applied tapes allow for a quick solution to the problems at the joint (reduced range of motion, functional limitations, pain), which have been successfully maintained in the subsequent days.

Zuidewind (2011) in studies of painful injections in the trapezius muscle also confirms that the Kinesio®Taping method is effective in diminishing pain by reducing inflammation and improving blood circulation and lymphatic drainage.

In a review of the work of Polish authors it was only found a general confirmation of the Kinesio®Taping effectiveness in analgesic therapy. In studies on the effect of Mikołajewska (2005, 2012) regarding to reducing the soft tissue pain in the treatment of disorders in the shoulder, lumbar spine and cervical spine pain syndromes, a positive results were reported. Also Hałas (2010) in his article reported that the use of Kinesio®Taping brings the effective impact of the work with the patient reporting the pain.

Kinesio®Taping reduces pain in the lumbosacral area in pregnant women, what is described in research of Kowalczyk-Odeyale and Hałas (2010). These same studies show the effect of Kinesio®Taping in the prevention of pain during galactorrhoea in the same group of respondents. This therapy may also provide beneficial effects on trigger points in the greater pectoral muscle, which is more often attributed to participation in the formation of blockages in the breast milk of lactating women (Kowalczyk-Odeyale et al 2010).

Confirmation of the validity of the presented method in the reduction of pain may be studies of Karczewska (2013) during evaluation of the rotators cuff syndrome.

During the trigger point therapy, Kinesio®Taping turns out to be a good method of reducing pain and its radiation. It works relatively quickly, is easy to use and does not require the specialized medical equipment. It does not limit the range of activity of the patient, does not provoke any side effects. One application can be used even for a few days, so there is not time-consuming and does not require daily visits to a therapist. Furthermore, from the viewpoint of today's lifestyle, where rush plays an important role – it is a method convenient, fast and very efficient.

Conclusions

1. Kinesio®Taping is an effective method for use in the treatment of myofascial trigger points in a trapezius muscle.

2. Kinesio®Taping reduces the symptoms, such as pain, and radiation caused by trigger points in the trapezius muscle.
3. The effectiveness of the method depends on the number of tapes Kinesio Tex® Tape applied in one application at the myofascial trigger point in trapezius muscle.

References

- Ciechomski J.**, Techniki energizacji mięśni, Poznań 2006.
- Dommerholt J.**, Bron C., Franssen J., Myofascial trigger points: an evidence – informed review w: The Journal of Manual & Manipulative Therapy 2006;14,4:203-221.
- Earls J.**, Myers T., Rozluźnianie powięziowe dla równowagi strukturalnej, WSEiT 2012.
- Esenyel M.**, Caglar N., Aldemir T., Department of Physical Medicine and Rehabilitation and the Anesthesiology and Pain Clinic, Vakif Gureba Teaching Hospital, Istanbul, Turkey “Treatment of myofascial pertaining to or involving the fascia surrounding and associated with muscle tissue”, w: Physical Medicine Rehabilitation 2000;79:48-52.
- Fu T.**, Wong A., Pei Y., Wu K., Chou S., Lin Y., Effect of Kinesio taping on muscle strength in athletes-A pilot study, w: Journal Science Medicine Sport 2007;22.
- Garcia-Muro F.**, Rodriguez-Fernandez A. L., Herro-de-Lucas A., Treatment of myofascial pain in the shoulder with Kinesio Taping. A case report, w: Manual Therapy 2009:1-4.
- Gerwin R.D.**, Dommerholt J., Shah J., An expansion of Simons’ integrated hypothesis of trigger point formation, w: Curr Pain Headache Rep 2004;8:468-475.
- Hałas I.**, Kinesiotaping – metoda wspomagająca terapię tkanek miękkich, w: Praktyczna fizjoterapia i rehabilitacja 2010;9:23-27.
- Hashemirad F.**, The Effect of Kinesio Taping Technique on Trigger Point of Piriformis Muscle, Tehran 2013.
- Itoh K.**, Okada K., Kawakita K., A proposed experimental model of myofascial trigger points in human muscle after slow eccentric exercise, w: Acupunct Med 2004;22,1:2-12.
- Jaraczewska E.**, Metoda Kinesiotaping i jej zastosowanie w wybranych przypadkach ortopedycznych, AWF, Warszawa 2005.
- Karczewska E.**, Zespół ciasnoty podbarkowej. Zastosowanie metody Kinesio Taping w procesie usprawniania, w: Rehabilitacja w praktyce 2013;4:42-46.
- Kowalczyk-Odeyale A.**, Hałas I., Zastosowanie Kinesiotapingu w redukcji bólów kompleksu lędźwiowo-krzyżowego u kobiet w ciąży i profilaktyce nawałów mlecznych, w: Praktyczna fizjoterapia i rehabilitacja 2010;9:28-32.
- LeMay M.**, Stretching, Bauer-Weltbild Media, Warszawa 2005.
- Manheim C. J.**, Rozluźnianie mięśniowo-powięziowe, WSEiT 2011.
- Mikołajewska E.**, Kinesiotaping w terapii schorzeń barku – przykłady aplikacji” w: Praktyczna fizjoterapia i rehabilitacja 2012;24:8-14.
- Mikołajewska E.**, Kinesiotaping w zespole bólowym kręgosłupa szyjnego – opis przypadku, w: Praktyczna fizjoterapia i rehabilitacja 2012;26:18.
- Mikołajewska E.**, Kinesiotaping, PZWL, Warszawa 2011.
- Nicpoń K.**, Bóle mięśniowe i kurcze bolesne w praktyce neurologa, w: Polski Przegląd Neurologiczny 2007;3:4.
- Otten E.**, Concepts and models of functional architecture in skeletal muscle, w: Exerc Sport Sci Rev 1988;16:89-137.
- Riggs A.**, Deep tissue massage. A visual guide to techniques, North Atlantic Books, Berkeley, California, USA 2007.
- Schuller E.**, Eisenmenger W., Brier G., Whiplash injury in low speed car accidents, w: J. Musculoskeletal Pain 2000;8,1,2:55-67.
- Senderek T.** Kinesiotaping part 1, Poznań 2007.
- Senderek T.**, Breitenbach S., Hałas I., Kinesiotaping – nowe możliwości fizjoterapii u kobiet w czasie ciąży, w: Fizjoterapia Polska 2005;5:2.
- Sikora A.**, Kinesiotaping – nowa metoda fizjoterapii w Polsce, XLV Ogólnopolska i III Międzynarodowa konferencja studenckich towarzystw naukowych i młodych lekarzy, Łódź 2007.
- Simons D.G.**, Triggerpunkte und Myogelose, w: Manuelle Medizin 1997;35:290-294.
- Staciwa E.**, Wprowadzenie do terapii punktów spustowych – część 1, w: Praktyczna fizjoterapia i rehabilitacja 2012;26:34-35.
- Staciwa E.**, Elementy terapii punktów spustowych – część 2, w: Praktyczna fizjoterapia i rehabilitacja 2012;27:22-23.
- Travel J.**, Simons D., Myofascial pain and dysfunction. The trigger point manual, Baltimore, Williams and Wilkins 1999.
- Zajt-Kwiatkowska J.**, Rajkowska-Labon E., Skrobot W., Bakula S., Kinesio Taping – metoda wspomagająca proces usprawniania fizjoterapeutycznego – wybrane aplikacje, w: Nowiny Lekarskie 2005;74,2:190-194.
- Zuidewind M.** „The effect of Kinesio®Taping space-correction-technique on post-needling soreness in the trapezius muscle trigger point two”, Durban University of Technology, 2011.

Corresponding author: Paweł Sip; +48 606 369 794; pawel.sip@gmail.com