

KINESIO - TAPING EFFECT ON EDEMA OF KNEE JOINT

(Preliminary communication)

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Abstract

A study has been conducted of patients with edema of knee joint, divided into control and experimental group. In the experimental group, in addition to the traditional methods of kinesiotherapy, is also included kinesio-taping. Studied is the effect of its application on edema of the operated knee after reconstruction of the anterior cruciate ligament in moderate-protective period. For this purpose is held a centimetria of the joint slit of the healthy and the damaged knee and are studied its changes after applied programs of kinesiotherapy on both methods. Established is the efficiency of the kinesio-taping method at the indicated pathology. The results of the conducted study confirm our supposition about the efficiency of kinesio-taping method.

Keywords: *anterior cruciate ligament, programs of kinesiotherapy, control group, experimental group, centimetria, second postoperative period, Mean value*

INTRADUCTION

At dysfunctions, due to damages of the musculoskeletal system, are identified basic symptoms, which accompany most of the disorders, such as edema, pain, muscle spasm, etc. The edema and pain, and their changes, are indicators of the effects and the applicability of the medical means. The long persistence of these symptoms, however, can slow down and limit the application of a number of rehabilitation aids, because of chronic pain and muscle inhibition (Tsang, Buxton, Guion, Joyner, & Browder, 1997).

Therefore, the reduction of edema in the soft tissue structures and the prevention of future effusions (edema in the joint cavity) are essential in the recovery process, for several reasons. Edema is a direct factor for increasing the local pressure, resulting in compression of nociceptors (sensory nerve endings, which are responsible for the pain sensation), causing pain. Joint's effusion increases the intra-articular pressure and reduces the afferent sensory activity (from the joint capsule, ligaments, etc.), which, in addition to pain, are also accompanied by muscle inhibition (Young, Stokes, & Iles, 1987).

In this regard, necessary is the rehabilitation approach to be tailored with all patofactors by planning and implementing a complex treatment, aimed at control and reduction of the patofactors. One of the tasks of kinesiotherapy is to restore the lymph circulation and to eliminate edema.

Kinesio-tape is a relatively new mean, included in the rehabilitation programs in orthopedic, neurological, sports traumas, in pediatrics, after surgery, etc. (Yasukawa, Patel, & Sisung, 2006)

Object of intervention with kinesio-tape are lymphostasis (edema), haemorrhage, myofascial strains, joint instability, pain, reflexive muscle inhibition, dysfunction of the sensorimotor and proprioceptive system (Simoneau, Degner, Kramper, & Kittleson, 1997), postural disorders, muscle imbalance, etc.

On the other hand, changes, due to aseptic inflammation of soft tissues, are related to that, that the liquids, induced by the inflammation (although, they are absorbed into the surface fascia) damage the tissues in their deep layers. These changes are having palpable detectable in diagnostics of a somatic dysfunction (Gramatikova, Nikolova, & Mitova (Грамастикова, Николова, & Митова), 2013). In a large extent, an overcoming of the referred processes can be achieved by kinesio-tape, which reveals various restorative effects, depending on where and how it is applied (Bialoszewski, Wozniak, & Zarek, 2009). These arguments have directed our attention to study of the problem about the possibilities of the kinesio-taping method in one of the aspects of kinesiotherapeutic practice.

METHODS

Aim of the study: Identifying the influence of

kinesio-taping on edema of knee joint in patients after reconstruction of the anterior cruciate ligament in the moderate-protective period.

Tasks of the study:

- Development of an experimental method of kinesiotaping for patients after knee surgery for reconstruction of the anterior cruciate ligament.
- Identifying the state of edema of the operated knee joint of patients from the control and experimental group at the beginning of the second postoperative period.
- Conducting a centimetria to the healthy knee of the patients from both groups.
- Determining the differences in the laps of the healthy and the operated knee in the groups.
- Application of kinesitherapy with kinesiotaping in the experimental group of patients and of a traditional kinesitherapy in the control group.
- Identifying the state of edema of the operated knee joint in the control and the experimental group after the kinesitherapy.
- Determining the differences in the laps of the healthy and the operated knee.
- Conducting an inspection of the nature of distribution of the studied cases and statistical processing of the empirical material (variational analysis).
- Identifying the statistical significance of the differences of the average values of the variables (*P-values*, with a probability of error $\alpha = 0,05$).
- Drawing a conclusion about the effectiveness of the applied model of kinesiotaping in patients after reconstruction of the anterior cruciate ligament in the moderate-protective period.

Organization of the study

Studied are 63 patients from a control and experimental group before applying kinesitherapy and after ten-days procedures of patients from hospitals in Sofia and Blagoevgrad, in Bulgaria.

Characteristic of the applied kinesio-taping method

The applied method of application of the kinesio-tape varies, according to the recommendations of Yasukawa et al., (2006), depending on the purpose: pain suppression, improving lymphatic circulation, increasing the active range of motion, improving the muscle function. This is necessary to prevent a significant increase of the intra-articular hydrostatic pressure, which contributes towards joint damages, due to stretching of the capsule and its associated ligaments. The articular cartilage violates its mechanical properties, which leads to violation of the muscle structure and function.

Therefore, the reduction of post-operative joint effusion is of particular importance for the recovery of joint's kinematics. Its chronification would lead to a reactive synovitis, damage to the joint capsule and degenerative changes of the articular cartilage.

In this regard and for realization of the aim of our study, conducted is a centimetria of the joint slit of the healthy and the damaged knee joint before the first kinesitherapeutic procedure of patients from the control and experimental group.

Follows 10-days course of kinesitherapy, as in the control group the method has been traditional and in the experimental group - also with application of kinesio-tape (applications for lymphostasis). After the last procedure, on the tenth day has been conducted a final testment – for establishing the effect of the influence of kinesio-tape on the reduction of edema of knee joint.

In the experimental group have been applied the following applications of kinesio-tape:

“FANCUT” – this application is with a very weak effort. It's used for edema, for improving the blood and lymph circulation. The impact could be over a wide area, according to the length or the number of the tape.

“WEBCUT” – also used to reduce edema, but it's stronger than ‘FANCUT’, ‘Impacts over a smaller area, in comparison with ‘FANCUT’, ‘.

The tension of the ‘Kinesio Tech’, ‘strip in edema is from 0% - 25%.

0% - onto the edges of the application, which must be with length approximately 5 cm each. Apply from proximal to distal, with tension of the tape 15% - 25%.

P to D (Proximal → Distal)

In general, the applications impact optimally up to 3 - 4 days.

RESULTS

The results of the conducted variational analysis of the empirical material show that the distribution of the results of the studied cases is normal and close to normal, which justifies the application of the used statistical methods.

The coefficients of asymmetry and kurtosis in the studied groups - before and after application of kinesitherapy are in the range from 0,02 to 1,2 (for A) and 0,04 to -0,91 (for E).

In the control group of patients

The average values of the indicator „difference in the circumference“ of the healthy and the damaged knee of patients from the **control group** during the first day of the testing - before applying kinesitherapy, is $2,16 \pm 0,19$ cm.

Identified are high values of the average deviation $S = 1,05$ cm. and of the coefficient of variation $V\%$ during the first testing in the control group – 48,7%, which variability continues to increase until the end of the procedures and reaches 61,7%.

The results also show that, due to the traditional kinesitherapy, applied in the control group, the edema of the knee of patients decreases by 29,85%, and the difference in the edema between the healthy and the damaged knee decreases to $1,51 \pm 0,17$ cm., or the improvement in absolute values is with 0,64 cm.

In the experimental group of patients

In the experimental group the average value of the difference in the circumferences in the healthy and the operated knee during the first testing is $2,67 \pm 0,21$ cm.

Again S is significant – 1,18 cm. Relatively high are the values of $V\% = 44,2$, as well.

As a result of a ten-day kinesitherapy, including kinesio-tape, too, the edema of the patients in the experimental group decreases by 63,1%, as the difference in the circumference of the knees (healthy and damaged) decreases to $0,98 \pm 0,19$ cm. In absolute values, the reduction of the edema is with 1,68 cm. However, its reduction is accompanied by an increase in the individual differences in recovery ($V\% = 110,6$), which impose strict differential approach in applying the kinesio-tape and the whole kinesitherapy, in the course of carrying out the procedures to patients.

Table 1. Mean value kinesio-taping effect on edema of knee joint

Groups	Days	
	Firs day	Tenth day
Control group	2,16	1,51
Experimental group	2,67	0,98

For verification of the statistical significance of the differences between the edema of the patients in the control and experimental group before and after kinesitherapy ,applied is the criterion of Mann Whitney for independent samples, with a probability of error $\alpha = 0,05$.

The P-values show that the differences in the results in the control and experimental group during the first testing are not significant ($P = 0,084$). After kinesitherapy $P = 0,021$. Therefore, the included kinesio-taping method, in the kinesitherapy`s program of patients from the experimental group, has contributed to the reduction of the edema of patient`s knee to a greater extent, as compared with the realized improvement in the control group.

DISCUSSION

The conducted study has established the possibilities of kinesio-taping method for influence on edema of the knee joint of the studied patients, after reconstruction of the anterior cruciate ligament of the knee joint.

It is found that the kinesio-taping, as part of kinesitherapy, has contributed to the faster and more significant reduction of the edema of patients in the experimental group (with 63,1%), while improvement of the indicator in the control group with 29,85% with applied kinesitherapy without kinesio-taping.

Reducing the edema, however, is accompanied by high individual differences in the results, $V\%$ varies from 44,2% to 110,6%, which requires a differential approach in applying the kinesio-taping.

The established positive effect of the method allows us to recommend its wider application in the kinesitherapeutic practice. The underestimating is a result of ignorance of its mechanisms of impact on soft tissue damages, not only of the knee joint, but also of other peripheral damages, because of the few studies on its effects.

CONCLUSION

The results of the conducted study confirm our supposition about the efficiency of kinesio-taping method and our assumption, that its application facilitates the flow of lymph and blood circulation, increases the relative space between the skin and the fascia, relieves the compression on nociceptors, resulting in improving the freedom of motion of the knee joint, and thus, it achieves natural biomechanical recovery.

REFERENCES

- Bialoszewski, D., Wozniak, W., & Zarek, S. (2009). Kinesiology Taping in Reducing Edema in Patients Treated with Ilizarov Method. *Ortopedia Traumatologia Rehabilitacja. MedSportPress*, 11(6), 46-54.
- Грамагикова, М., & Пачев, Д. (2013). Нашият опит за кинезитерапия за възстановяване на артрокинематиката на коленния комплекс при пациенти след артроскопска реконструкция на предна кръстна връзка и шев на менискус [Our experience in kinesitherapy to restore artrokinematics of knees complex in patients after arthroscopic reconstruction of the anterior cruciate ligament and meniscus. In Bulgarian.] *Сборник, Научни трудове на РУ „Ангел Кънчев”, Русе, 2013, „Здравна промоция и превенция”, том 52, серия 8.1.* (стр.71-81). Русе: Изд. център на Русенски университет „Ангел Кънчев.
- Грамагикова, М. (2014). Динамика на показателите за възстановяване на някои мекотъканны увреди на коляно [Dynamics of the indicators to restore some soft tissue damages of knee. In Bulgarian.] *Сборник с материали от XV-та докторантска научна конференция, Благоевград, 2014, „Кинезитерапия и спорт”* (стр. 19-21). Благоевград: Изд. на ЮЗУ „Неофит Рилски”.
- Glushkova, M., Popova, D., Glushkov, Iv., & Gramatikova, M. (2014). The phenomenon of “CONCORDANCE” in children`s psychological and physical development. *Activities in Physical Education and Sport*, 4(1), 44-49.
- Gramatikova, M., Nikolova, E., & Mitova, S. (2013). Nature, application and effect of kinesio-taping. *Activities in Physical Education and Sport*, 4(2), 115-119.
- Mitova, St., Popova, D., & Gramatikova, M. (2014). Aquatherapy in postural disturbances in the frontal plane. *Activities in physical education and sport*, 4(1), 29-33.
- Simoneau, G., Degner, R., Kramper, C., & Kittleson, K. (1997). Changes in ankle joint proprioception resulting from strips of athletic tape applied over the skin. *Journal of Athletic Training*, 32(2), 141-147.
- Tsang, K., Buxton, B., Guion, K., Joyner, B., & Browder, K. (1997). The Effects of Cryotherapy Applied Through Various Barriers. *Journal of Sport Rehabilitation*, 6(4), 343-354.
- Yasukawa, A., Patel, P., & Sisung, C. (2006). Investigating the Effects of Kinesio Taping in an Acute Pediatric

Rehabilitation Setting. *The American Journal of Occupational Therapy*, 60(1), 104-110.
Young, A., Stokes, M., & Iles, J.F. (1987). Effects of joint

pathology on muscle. *Clin Orthop Relat Res.*, 219(6), 21-27.

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