Efficacy of kinesiotaping on ACL injury in kabaddi players

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ABSTRACT

Introduction and Aim: Kabaddi is a classical game in India. It is very fast, rough and tough. Body injuries are very common in it. Like many other sports, it's a vigorous body contact game. Due to the contact nature of this sport, injury was relatively common. Ligaments that is most affected by sudden movements in kabaddi is the anterior cruciate ligament (ACL). Most of the players quit playing kabaddi due to the severity of injury. There is a lot of study done using kinesiotaping for ligament injuries in various sports. But, study done on kabaddi players is comparatively less than other sports players. Knee injury is most commonly seen in kabaddi players. This study focuses on reducing pain and improving the functional ability of knee joint using kinesiotape in kabaddi players. To find the effectiveness of kinesiotaping on Anterior Cruciate Ligament injury of knee in kabaddi players.

Materials and Methods: Thirty players were selected, based on selection criteria among them 15 players were group A and 15 players belongs to group B and with the knowledge of the subjects, anterior drawer test was done to assess the ACL injury. Anterior cruciate ligament quality of life questionnaire was done on pretest followed by intervention of treatment protocol. Group A undergone Kinesiotaping with knee strengthening exercises and group B undergone knee strengthening exercise. Posttest was done after 2 weeks using anterior cruciate ligament quality of life questionnaire.

Results: There was a significant difference between two groups was improving the functional ability. In group A (kinesiotaping with knee strengthening exercise) were more effective than group B (knee strengthening exercise). This implies that kinesiotaping was more beneficial in improving functional ability.

Keywords: Kabaddi players; kinesiotaping; anterior cruciate ligament injury; knee strengthening exercises.

INTRODUCTION

Kabaddi is a traditional outdoor game played with minor variations in all regions of India. In fact in most parts of Asia. It is an ancient backyard and home grown game. Kabaddi requires tremendous physical stamina, agility, individual proficiency, neuromuscular coordination, lung capacity, quick reflex, intelligence and presence of mind on the part of both attackers and defender. In the modern time kabaddi was given the national status of a game in India in 1918. Kabaddi received international exposure during the 1936 Berlin Olympics. In 1950 the all India kabaddi federation came into existence and compiled standard rules. The Amateur Kabaddi federation of India (AKFI) was founded in 1973. Injury to the ligaments is called a sprain. An awkward step or landing on an uneven surface result in overstretching of the ligaments thus causing them to be partially or completely torn. In 1961, the India University sports control board (IUSCB) included the game of kabaddi in its curriculum, as a prime sports discipline for the students (1).

Its origin in south Asia and has spread to Iran, Japan, South east Asia, United Kingdom, Canada etc…a highly popular sport in India, it's the state game of Tamil Nadu, Karnataka, Punjab, Maharashtra, Bihar, Telangana and Andhra Pradesh. It's also the national game of Bangladesh and Nepal (2). Kabaddi is a very simple in nature, easy to organize, less expensive. Hence, they are popular game played almost in all rural and urban regions (3). Kabaddi is a strenuous outdoor intermittent sport which requires great stamina, intelligence, power in both upper and lower limbs and co-ordination with fellow players. It is basically a combative sport, played between two teams for a period of 40 minutes with a 5 minute break and requires 7 players in each team (4).

The most common injuries were muscular injuries (45.13%), skin injuries (26.96%), bone injuries (14.7%) and joint injuries (13.1%). The majority of injuries were recorded in the upper limb (41.55%), lower limb (32.77%), head, face (15.28%), trunk and neck (10.3%), ankle sprain. kabaddi is a contacts sport and involves lot of pushing, pulling, jumping and twisting actions. These types of sporting actions are leading cause of strain. A strain is characterized by the onset of symptoms such as severe pain (in case of an

acute strain), muscles spasm, swelling and cramping (5). Knee injury is the most common type of injury sustained by both raiders and stoppers/defenders, quick reflexive actions that come into play during the time period make knees highly vulnerable to injuries. No research focused on the epidemiology of knee injuries in kabaddi players has been done to date, although knee injuries are one of the commonest injuries sustained by kabaddi players (6). These quick and reflexive movements of starting, stopping, bending, twisting and changing direction exert extreme force on the knee resulting in injuries to the ligaments. Injury to ligament is termed as a torn ligament also commonly called a "sprain". Ligaments that is most effected by sudden movements in kabaddi is the anterior Cruciate ligament (ACL). The hamstrings are considered a synergist with the ACL and are able to pull the tibia posterior thereby decreasing the stress on the ACL. Finally, the hamstrings have tendons that insert on either side of the joint that can offer the frontal plane control of motion at the knee that is vital for injury prevention (7). ACL injury is classified into 3 grades, in grade 1 the ligament fibers are stretched but no tear and there will be little swelling, tenderness and stability is not affected. In grade 2 few ligament fibers were torn, little to moderate swelling, tenderness, stability is slightly affected. In grade 3 all the fibers were torn, no pain, moderate swelling and tenderness and stability is fully affected. However other ligaments can also be injured. Sudden stopping and changing direction to evade or catch the opponent player causes tremendous amount of stress on the knee. These movement creates powerful contraction in quadriceps and hamstring muscles leading to a tear in a meniscus leading to the onset of excruciating acute knee pain this type of injury is characterized by the swelling and tenderness to the knee. Improvement in strength in the anterior and posterior thigh muscles following anterior cruciate ligament reconstruction is a major focus for physical therapists, athletic trainers and other rehabilitation specialists. In general, there is a significant decrease in both extensor and hamstring muscle strength, with significant morbidity due to extensor lag (8). ACL injuries account for 50% or more of all knee injuries, making this ligament especially important in any discussion of knee injuries. Anterior cruciate ligament injuries often require surgical repair followed by extensive long-term rehabilitation (9). Strength and conditioning principles and training parameters are a necessary component of the decision making and tailoring of any rehabilitation program. This is especially important in the rehabilitation and full return to function of an injured athlete (10).

Kinesiotaping increases blood circulation in the taped area. And this physiological change may affect the muscle and myofascial functions after the application of kinesiotape. An additional theory is that kinesiotaping stimulates cutaneous mechanoreceptors at the taped area, and the stimulation may affect the ROM. The theory is that Kinesio tape and a circulatory or neurological activation is based on the tape's elastic properties, which is purported to support/enhance joint functions. Proponents of Kinesio tape state that tape convolution areas may increase the flow of blood and lymphatic fluids due to a lifting effect, which creates a wider space between the skin and the muscle and interstitial space (11). There is no adverse effects, rather than for sensitive skins.

METHODOLOGY

Thirty male kabaddi players age between 18 to 25 years, with ACL injury grade 1, 2 and with anterior drawer test positive were included. Subjects with lower limb fracture, Grade 3 ACL injury, and PCL injury were excluded. Subjects were divided into two groups by convenient random sampling method. Group A (experimental) consists of 15 subjects were given kinesiotaping with knee strengthening exercises for two weeks of duration. Kinesiotaping was applied four sessions in two weeks. Group B (conventional) consists 15 subjects were given only knee strengthening exercise for two weeks. Patient consent was obtained by explaining the project procedure and said the effect of kinesiotaping and knee exercise. The project was undergone in Dr. MGR Educational and Research Institute, Chennai. Pretest was done by measuring the intensity of pain and functional ability of knee joint using ACL quality of life questionnaire. After the cessation of the intervention procedure posttest was done using the ACL quality of life questionnaire.

Precautions for kinesiology tape

Do not apply kinesiology tape on any skin surface that is damaged or broken.

Skin patch test: On the upper part of the inner arm (at the crook of the elbow), the kinesiotaping is applied. Subjects are advised to be with the taping for up to 24 hours before a full taping and asked to remove tape immediately, if there is any skin irritation present.

ACL Kinesiotaping

Steps for tape application

- Apply two anchors to the lower third of the thigh and one anchor distal to the tibial tubercle.
- Apply the first functional strip starting on the anterolateral aspect of the distal anchor, pass with full tension anteriorly across the tibial tubercle and diagonally upwards to the proximal anchor on the medial side.

- Apply a second strip on the opposite side with the same tension
- Apply two more strips medially and laterally over the initial strips, superimposed on the inferior tails, and fanning out and overlapping by one-half, to attach to the proximal anchor.
- Lock these six strips in place with covering anchors.

Knee strengthening exercise

1. *Isometric quadriceps exercises*

Small bolster is placed under the patient's knee in supine lying, patient was asked to press the bolster for 5 to 10 seconds and relax. Repetition for10 times.

2. *Straight leg raising exercise*

In supine lying, patient was asked to raise the leg with 45° knee extended and hold it for 5 to 10 seconds and relax. Repetition for 10 times.

3. ***Prone straight leg raising exercise***

In prone lying, patient was asked to raise the leg with 45°knee extended and hold it for 5 to 10 seconds and relax. Repetition for 10 times.

4. *Calf raising exercise*

In standing ask the patient to Lift as high as on their toes and lower the heels down as much as the ankle flexibility allows. Push evenly through the entire width of the foot. Repetition for 10 times.

5. *Knee flexion exercise with weights*

In standing, the patient is asked to bend the knee with weight cuff.

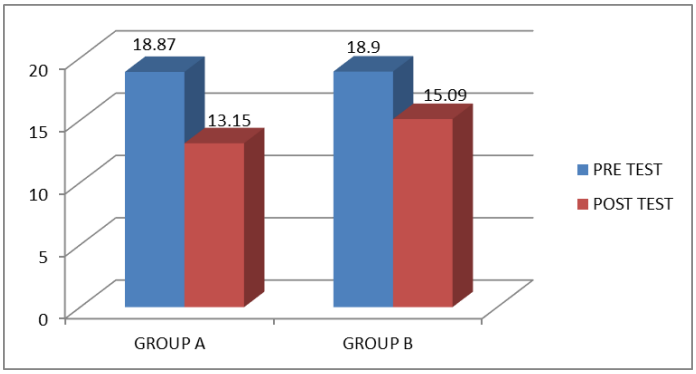
Data analysis

Table: 1 Comparison of ACL quality of life questionnaire score between group A and group B.

ACL Quality of life questionnaire	Group A		Group B		"T" Test	Significance
	M	SD	M	SD		
Pre test	18.87	3.11	18.30	1.50	0.64	0.526*
Post test	13.15	1.62	15.09	0.99	3.93	0.000***

*- P > 0.05; ***- P ≤ 0.001

The above table reveals the Mean, Standard Deviation (S.D), independent t-test, degree of freedom (df) and p value of the ACL quality of life questionnaire score between group A and Group B in pre-test and post-test weeks. This table shows that there is no significant difference in pre-test values of the ACL quality of life questionnaire score between group A and group B (*P > 0.05). This table shows that statistically highly significant difference in post-test values of the ACL quality of life questionnaire score between group A and group B (***- P ≤ 0.001).Both the groups show significant decrease in the post test Means but Group A which has the lower mean value is more effective than group B.



Graph 1: Comparison of ACL quality questionnaire means value between the Group A and Group B

RESULTS

The statistical analysis was done using SPSS SOFTWARE. On comparing the mean values of GROUP A (kinesiotaping with knee strengthening exercise) and GROUP B (knee strengthening exercise) on ACL injury using ACL quality of life questionnaire, both the groups showed improvement in functional ability of knee joint in the post test mean value 13.15 and 15.09 respectively. The p value is ≤0.001GROUP A shows more significant than GROUP B with a mean difference of 1.94. Hence this study rejects null hypothesis and accepts alternative hypothesis.

DISCUSSION

Kabaddi is a combative team game, played with absolutely no equipment, in a rectangular court, between two teams of seven players on the ground each side. Players of defensive and offensive side team encounter push and pull, sudden change of directions, fall, turns, very quick movements several times. Particularly raider has to play against seven defenders. Hence a Kabaddi player must have to develop physical fitness abilities such as cardiovascular fitness, explosive strength, movement speed, balance, flexibility, agility and muscular co-ordination.

The injuries associated with the kabaddi players were the skeletal and soft tissue injuries knee injury is the most common, type of injury sustained by both raiders and stoppers/defenders while the commonly injured ligaments are the anterior cruciate ligament, posterior cruciate ligament, medial and lateral collateral ligaments, medial and lateral menisci.

Murray *et al.,* concluded that kinesiotape applied to the anterior aspect of the thigh could significantly enhance the joint active range of motion (12). Kelly *et al.,* concluded that quadriceps strengthening had improved restoration of more optimal quadriceps neuromuscular function and increased demand on the quadriceps during physical activity (13). The application of kinesiotaping aims to give free range of motion in order to allow the body's muscular system to heal itself biomechanically by alleviating pain, facilitating lymphatic drainage by microscopically lifting the skin which increases the interstitial space there by reduces the pain and pressure in that area and also it provides a proprioceptive effect. This study finds the beneficial effects of kinesiotaping in anterior cruciate ligament injuries in kabaddi players (13). Myklebust *et al*., showed that the risk of injury was reduced among those who completed the anterior Cruciate ligament injury prevention program (OR, 0.06; CI, 0.01-0.54; p=0.01) compared with this who did not. That it is possible to prevent anterior cruciate ligament injuries with specific neuromuscular training (14). Lafave *et al*., concluded that results of the study added more validity, reliability, and responsiveness for the ACL-QOL. The ACL-QOL has completed 8 of 9 COSMIN criteria (15). Kyung *et al.,* concluded that Four-week preoperative exercise may produce many positive effects post reconstruction surgery, including faster recovery of knee extensor strength and function, as measured by single-leg hop ability (16).

The mean value of group A posttest (13.15) on ACL quality of life questionnaire which when compared with group B (15.09), Group A with lesser mean value are better reduction in the pain and increased functional ability. The findings of the study show that both group A and group B had improvement in functional ability and reduction of pain. Hence, group A treated with kinesio taping along with knee strengthening exercise showed more significant when compared to the group B treated with knee strengthening exercises.

CONCLUSION

With reference to the statistical analysis done from the data collected using ACL quality of life questionnaire assessment scale, it is concluded that there is a more significant improvement in ACL functional ability and pain reduction following Kinesio taping along with knee strengthening exercises. Thus, kinesiotaping is an effective non pharmacological, non-invasive therapy which helps in improving functional ability and pain reduction without any side effect and hazardous. Kinesio taping is cosmetically comfortable to the patients. It shows a drastic reduction in pain and improvement in function. So, the study strongly recommends Kinesio taping is more effective therapy in ACL stabilization in improving functional ability. Therefore, this study rejects the null hypothesis and accepts the alternative hypothesis.

REFERENCES

1. Venkateshamurthy, B. S. Common injuries in kabaddi play and their prevention with the help of biomechanics. International Journal of Physical Education, Sports and Health, 2016; 3(4): 78-81.
2. Dhillon, M. S., John, R., Sharma, S., Prabhakar, S., Behera. P. Epidemiology of knee injuries in Indian kabaddi players. Asian Journal of Sports Medicine. 2016; (in press) e31670.
3. Prabhu. A. Common injuries among kabaddi and kho-kho players – an empirical study. Int J Engg Res Sports Sci. 2014; 1(7): 1- 4.
4. Sudhakar, H., Majumdar, P., Umesh, V., Panda, K. Second to fourth digit ratio is a predictor of sporting ability in elite Indian male kabaddi players. Asian J Sports Med. 2014; 5 (3): e23073.doi: 10.5812/asjsm.23073.
5. Verma, A., Rana, D., Singh, A. To Develop Physical Profile of Kabaddi Players: The Descriptive Study. Indian Journal of Movement Education and Exercises Sciences. (IJMEES). 2011; 12: 141-151.
6. Moeini, S. M., Hojat, S., Aghaei, R. The epidemiology of some common injuries in elite male kabaddi players. Sport sciences. 2011; 2: 11-30.
7. Hewett, T. E., Ford, K. R., Hoogenboom, B. J., Myer, G. D. Understanding and Preventing ACL Injuries: Current Biomechanical And Epidemiologic Considerations - Update 2010. N Am J Sports Phys Ther. 2010; 5(4): 234 -251.
8. Murray, H. Kinesio Taping Muscle Strength and ROM after ACL Repair. Journal of Orthopedic and Sports Physical Therapy. 2000; 30: 1.
9. Joseph, A. M., Collins, C. L., Henke, N. M., Yard, E. E., Fields, S. K., Comstock, R. D. A multisport epidemiologic comparison of anterior cruciate ligament injuries in high school athletics. J Athl Train 2013; 48(6): 810-817.
10. Reiman, M. P., Lorenz, D. S. Integration of strength and conditioning principles into a rehabilitation program. 2011; 6(3): 241-253.
11. Lee, B. K., Nam, S. W. Rupture of posterior cruciate ligament: diagnosis and treatment principles. 2011; 23(3): 135-141.

12. Murray H., Husk L. Effect of Kinesiotaping on proprioception in the ankle. Journal of Orthopedic Sports Physical Therapy. 2001; 31: A-37.
13. Kelly, A., Kuenze, C., Eltoukhy, M. Impact of quadriceps strengthening on response to fatiguing exercise following ACL reconstruction. J sci. med. Sports. 2017; 20(1): 6-11.
14. Myklebust, G., Engebretsen, L., Braekken, I. H., jolberg, A., Olsen, O. E., Bahr, R. Prevention of anterior cruciate ligament injuries in female team handball players: a prospective intervention study over three seasons. ClinJSportMed. 2003; 13(2): 71-78.
15. Lafave, M. R., Hiemstra, L., Kerslake, S., Heard, M., Buchko, G. Validity, Reliability, and Responsiveness of the Anterior Cruciate Ligament Quality of Life Measure: A Continuation of Its Overall Validation. Clin. J Sport Med. 2017; 27(1): 57-63.
16. Kim, D. K., Hwang, J. H., Park, W. H. Effects of 4 weeks preoperative exercise on knee extensor strength after anterior cruciate ligament reconstruction. J Phys. Ther. Sci. 2015; 27(9): 2693-2696.