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RESEARCH ARTICLE

Acute Effect of KinesioTaping on Technical Skills of Wheelchair Basketball Players

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Abstract
The purpose of this research kinesiology taping (KT) is to increase the blood and lymph circulation under the skin and provide the athlete with a comfortable movement capacity. For this purpose, we aim to examine the effect of KT on the shoulder and supraspinatus muscles of wheelchair basketball players on the technical skills of athletes. Ten male wheelchair basketball players between the ages of 20 and 40 participated in the study. In the study, kinesiology tape was applied to the shoulder and supraspinatus muscle regions of the athletes. To evaluate the effect of KT regional shooting (2p), tourniquet, slalom, and sprint tests were applied before and after taping. SPSS 25 statistical program was used for the analysis of the data. The significance value for the analysis was accepted as 0.05. According to the research findings, it was determined that KT was effective in the 2nd, 3rd, and 4th regions in shooting from 5 regions, and KT was also effective in 20m sprint, right tourniquet throw, and slalom skills with and without the ball ($p<0.05$). We can say that KT affects shots made from positions that see the basket from the opposite and diagonal, increasing the dribbling skill and sprint performance. During the competition, it is recommended that the athletes do it on the shoulder and supraspinatus muscle areas.

Keywords
Wheelchair Basketball, Kinesiology Tape, Shooting, Sprint, Dribbling

INTRODUCTION

Wheelchair basketball is among the popular sports branches for disabled individuals (Jekielek et al., 2021). The number of wheelchair basketball players in the world is expressed as 30,000 (Yıldırım et al. 2019). This makes wheelchair basketball a more competitive sport. However, there are many factors that affect the performance of athletes, including wheelchair basketball players, during this competition. One of them is the problems in the shoulder area. In the literature, when the injuries experienced by wheelchair basketball players are examined, it is stated that the injuries mostly occur in the shoulder region (Jekielek et al., 2021). The reason for this is that the muscles in the shoulder region are the most effective muscle groups in actions such as passing,

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shooting, rebounding, and moving the wheelchair (Karasuyama et al., 2022; Vanlandewijck et al., 2001). Excessive overhead movements increase the risk of injury to the athlete during the competition (Jost et al., 2005; Lin et al., 2018).The occurrence of the conditions that physically prevent the athlete directly affects the performance of the athlete in the competition. As a matter of fact, studies in the literature indicate that various factors such as fatigue accumulated in the muscles, cognitive unpreparedness of the athlete, and injury during the competition reduce the performance of athletes (Behm et al. 2021). Considering these situations, the muscle groups in the shoulder area should be protected and supported in order to minimize the performance decrease of the athletes during the competition in wheelchair basketball. Supporting and developing the muscle group around the shoulder plays an important role.However, a period of at least four weeks is needed to gain strength (Bompa and Buzzichelli, 2019).One of the methods used to shorten this process is the KT method, which came into our lives in a short time.

The KT technique was first developed by Dr Kenzo Kase in 1973.The main purpose of KT is to increase blood and lymph circulation under the skin.In this way, the range of motion is increased while the muscles and joints are supported.This provides positive effects such as inflammation and pain-reducing effect, nerve-muscle reduction, and performance improvement in athletes (Kase et al., 1996; Arslanoğlu et al., 2014).Researchers are developing different application methods of KT day by day, and studies on KT are increasing day by day (Çeliker et al., 2011).

When wheelchair basketball and kinesiological taping studies in the literature are examined, mostly sportive performances (strength, anaerobic and aerobic performance, flexibility) are examined (Ünüvar ve Sanioğlu, 2021; Bicici ve ark., 2012; Marrow ve ark., 20 11). However, its effects on dribbling, shooting, layup, and sprint, which are dynamics in the competition, have not been examined.The muscle groups in the shoulder area are effective in sportive performance for wheelchair basketball players.Injury and muscle fatigue affect these muscle groups, reducing athletic endurance (Garcia-Gomez et al., 2019).For this reason, our aim in this study is to examine the effect of the KT method in the shoulder area on various technical parameters such as shooting skill, layup, change of direction, and speed.

MATERIALS AND METHODS

Study Design

The research was carried out with a weak experimental design method with multiple subjects, which is one of the quantitative research methods. The sample selection in our study was determined by the convenient sampling method, which is one of the non-random sampling methods. While the convenient sampling method is a method that allows scientific research to be carried out faster, it is the situation where the researchers choose the environment or environments that the participants can easily reach (Gravetter & Forzano, 2012). The sample size of the study was calculated with a margin of error of 0.1 and a confidence interval of more than 0.8. As a result, the participation of 10 people in the 10% confidence interval is sufficient to represent the regional league universe. Ethics committee approval was obtained for the study from the Ethics Committee of Graduate Studies of Çanakkale University with decision number 22/61 dated 15.12.2022. Studies were carried out in accordance with the Declaration of Helsinki.

Participants

Ten male wheelchair basketball players between the ages of 20 and 40 participated in the study. The distribution of the physical characteristics of the athletes participating in the research is given in Table 1. In addition, the height measurements of the athletes were recorded by measuring the distance from the floor to the top of the athlete's head while on the wheelchair.

Table 1. Distribution of Physical Characteristics of the Athletes Participating in the Research.

	N	Min.	Maks.	X±SS
Age (year)	10	20,0	40,0	28,5±7,63
Height*(cm)	10	135,0	163,0	150,9±9,75
Weight (kg)	10	58,0	75,0	67,9±5,17

*Athlete's height when sitting in a chair.

Tests and Procedures

In the research, regional shooting (2p), layup, slalom, and sprint tests were applied to evaluate the effect of kinesiology tape application on the athletes. In the regional shot test, 10 shots were taken from the points that see the hoop from 5 different points from a distance of 4.225 meters from the hoop, and the number of basket was noted. Athletes were given 50 seconds for 50 shots

(Uzun and Pulur, 2018). The slalom test ends the test by coming back to the starting point by passing through the 5 slalom bars placed 1.5 m apart after the starting line, with or without the ball (Molik, Kosmol et al., 2010; Soylu et al. 2021).

Layup test throws turnstile by turning around the slalom bar at a distance of 4.225m from the hoop and advancing to the hoop.Then, he takes the ball, turns around the slalom bar and moves to the basket again and throws the layup (Figure 1).For this test, the athletes were given 5 shots and 30 seconds of time. The same test was performed on both the right and left sides.

The sprint test was carried out with the help of a two-door photocell on a flat parquet floor with a distance of 20m between the start and finish line (Molik et al., 2010).

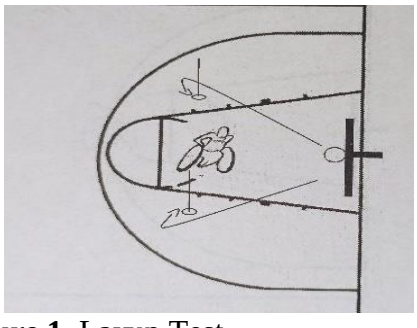

Figure 1. Layup Test

Kinesiotaping Aplication

Kinesio® Tex GoldTM FP, U.S.A. was used as kinesiology tape. While the participants were in the standing upright position, taping was applied to the skin cleaned with alcohol. The first kinesiology tape was cut in the form of a Y tape and was prepared for the supraspinatus muscle facilitation technique. The Y-cut tape is adhered to the greater tubercle of the humerus without tension. The first piece of the tape was adhered to the upper edge of the scapula with 15-25% tension, while the second piece was finished at the spina scapula. The second kinesiology tape was cut in the form of a Y tape and prepared for the facilitation technique for the deltoid muscle.The Y-cut tape is adhered to the acromina without tension.The first part of the Y tape was taken to the shoulder extension with 15-35% tension and adhered obliquely to the anterior part of the deltoid muscle, while the second part of the shoulder was horizontally abducted and applied towards the posterior part of the deltoid muscle.Two parts are joined on the subdeltoid bursa (Baltacı, 2020).In order to maximize the adhesion of the tapes, the tapes were heated by rubbing immediately after application (Figure 2).KT application was carried out in the presence of a specialist physiotherapist.

Figure 2. Kinesiologytaping

Statistical Analysis

SPSS 25 statistical program was used for the analysis of the data. As a result of the normality analysis, it was seen that the data were normally distributed (+1,-1). As a result, the Paired-Sample T test, which is one of the parametric tests, was used. The significance value for the analysis was accepted as 0.05.

RESULTS

Wheelchair basketball players' shots from 5 regions were tested before and after KT. Accordingly, while significant differences were detected in Region 2, Region 3 and Region 4 ($p<0.05$), no significant differences were detected in Region 1 and Region 5 ($p>0.05$) (Table 2).According to the significant difference, it was observed that the hit rate of the athletes' shots increased after KT.

Wheelchair basketball players' layup, slalom and sprint performances with and without the ball were tested before and after KT. Accordingly, while significant differences were detected in the right layup, with the ball and without the ball slalom, and 20m sprint tests ($p<0.05$), no significant difference was found in the left layup ($p>0.05$) (Table 3).According to the significant difference, it was seen that after the KT, the athletes made positive contributions to the right layup, slalom skills with and without the ball, and 20m sprint performances.

Table 2. Analysis of Regional Shots of the Athletes Participating in the Research Before and After KT.

	KT	N	X±SS	t	P
1. Region	Before	10	4,4±1,505	-1,861	,096
	After	10	4,9±1,663		
2. Region	Before	10	4,2±1,398	-4,392	,002*
	After	10	5,7±1,418		
3. Region	Before	10	5,20±1,398	-6,091	,000*
	After	10	6,5±1,178		
4. Region	Before	10	4,10±1,370	-3,000	,015*
	After	10	5,10±1,449		
5. Region	Before	10	3,80±1,873	-,958	,363
	After	10	4,50±2,068		

*p<0.05. KT: Kinesiotaping

Table 3. Tunike, Slalom and Sprint Test Analysis of the Athletes Participating in the Research Before and After KT.

	KT	N	X± SS	t	P
Right Layup	Before	10	4,20±,632	-3,000	,015*
	After	10	4,70±,483		
Left Layup	Before	10	4,30±,674	-1,809	,104
	After	10	4,70±,483		
Slalom With The Ball (sec)	Before	10	12,99±1,136	4,165	,002*
	After	10	12,63±1,294		
Slalom Without The Ball (sec)	Before	10	14,16±1,323	2,909	,017*
	After	10	13,78±1,611		
20m Sprint (sec)	Before	10	7,13±,703	3,055	,014*
	After	10	6,81±,833		

*p<0.05. KT:Kinesiotaping, sec:second

DISCUSSION

In our research, we aimed to examine the effects of KT on technical skills. For this purpose, shot shots from 5 different regions, which are 4.22m away from the basket, were examined. According to the research findings, 2-3-4. Kinesiology tapes affected the shots fired from the regions. But there was no difference in Regions 1 and 5. It is thought that the reason for this is that the athletes do not have the possibility of throwing by hitting the backboard. Because the athletes made most of their shots by hitting the backboard during the test. When we examined the right and left tourniquet shots again, KT affected the right tourniquet skill. It didn't affect the left.

KT provides advantages to athletes in many ways. Facilitation, increase in muscle strength, decrease in pain, and increase in range of motion are observed in the area where KT is applied (Li et al., 2023; Ünüvar and Sanioğlu, 2022; Sanchez et al., 2012). On the other hand, it is stated to be effective in features such as strength, motor unit activity, and muscle strength (Li et al., 2022; Ünüvar and Sanioğlu, 2022; Nunes et al., 2021). Mülazımoğlu et al., (2018), "Four-week training with shoulder kinesio-tape" significantly increased the shooting accuracy of athletes. The effect size of this increase in the average shooting score was found to be large. However, there are studies in the literature stating that they do not have positive effects on motor activity, pain, and strength (Martonick et al., 2020; Kalichman et al., 2016). KT also plays a role in preventing injury (Li et al., 2023; Çeliker et al., 2011). Although KT is a subject that is constantly being researched, there is no definite information about the effects of KT on technical skills. In terms of KT techniques and benefits, it is argued that KT especially prevents disability, reduces pain, and increases range of motion. In addition, it is known that the tension of kinesio taping varies according to studies. In this direction, 0-10% band tension for myofascial effects, 10-15% for muscle inhibition, 15-25% for muscle relaxation, 25-35% for correction, 50-75% band tension for ligament-tendon correction and mechanical correction techniques, 75- 100% mechanical correction and ligament correction techniques are applied at the beginning and end of

the tape with 5% cm 0% tension (Ünüvar and Sanioğlu, 2022; Kase et al., 2003). We applied 15-25% tension to the KT to facilitate movement and increase performance.

When the effect of KT on slalom and sprint performance was examined, there was an effect of KT on slalom skills with and without the ball and 20m sprint tests. This was an expected effect. Because dribbling and sprinting skills have important for teams in wheelchair basketball. As a matter of fact, athletes do a lot of dribbling and sprinting during the competition. The upper extremity muscles are actively working for the athletes to push their wheelchairs. The shoulder and back muscles are the most worked muscle groups. Increasing muscle fatigue has negative effects on the technical skills of athletes. This reduces shooting success and sprint performance. For this reason, the effects of KT on sprint and agility characteristics are extensively studied in the literature. Dowall et al., (2015) state that lower extremity KT (basketball, volleyball, track and field athletes) has a positive effect (Dowal et al., 2015). Yoshida and Kahanov (2007) state that KT can increase the range of motion (Yoshida and Kahanov, 2007). When the range of motion is considered in terms of wheelchair basketball, it has a positive effect on the movement of the wheelchair. Because the wider range of motion allows the athletes to produce better torque from the wheelchair. This has positive effects on both slalom and sprint skills.

This research was limited to 10 wheelchair basketball players. This hinders the dissemination of research results in general. Only 2-point shots were evaluated to determine shooting skill. Because 3-point shots are both few and difficult shots in wheelchair basketball. As a matter of fact, it is very difficult for athletes who have a high obstacle level to shoot 3-pointers. There is no specific test for tourniquet throws. That's why we adapted this test ourselves. This creates a limitation on the validity of the test.

According to the results of this study, we can say that KT may have positive effects on the technical skills (shooting, dribbling, sprinting) of wheelchair basketball players in the competition. More research is needed to reach a definitive conclusion.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by the Çanakkale Onsekiz Mart University (ÇOMU) Graduate Education Institute Ethics Committee (Approvel Nummer: 22/61).

Author Contributions

Study Design, AŞ, KÇ; Data Collection, AŞ, MÜ, KÇ; Statistical Analysis, GÖ, ÖA, KÇ; Data Interpretation, AŞ; Manuscript Preparation, AŞ, KÇ, GÖ, ÖA; Literature Search, MÜ, KÇ, GÖ. All authors have read and agreed to the published version of the manuscript.

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