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Effect of Dynamic Taping on Jumpers's Knee Among Basket Ballplayers: Parallelarmtrial Study

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ABSTRACT

BACKGROUND: Jumper's knee is also called Patellar tendinopathy, which is most common in athletes, caused by repetitive jumping activities in sports and the prevalence of jumper's knee 25% to 32% in basketball. In Patellar tendinopathy pain will present over the anterior or inferior of knee. Dynamic tape is also called biomechanical tape it's used as a mechanical resistance which reduce the load on tendon, the tape is also four directions stretch with resistance and recoil (stretch is more than 200%) with no rigid end There are many managements and treatment are available for patellar tendinopathy. In this study will gives effective treatment protocol in jumper's knee among basketball players.

OBJECTIVE: To analyses the effects of dynamic taping on jumper's knee in basketball players and usage of dynamic tape to achieve the reduction of pain.

METHODS: The total participants are 60 and participants are divided into two group. There are Group A and Group B.

Group A was treated by dynamic tape and Group B was treated by ultrasound therapy and stretching. This treatment is given for the 2 weeks and after that using outcome measure the data analysis was done.

CONCLUSION: In this study shows that Dynamic tape and Ultrasoundtherapy & stretching is significantly effective in the management of jumper's knee. In comparison between dynamic tape and UST+ Stretching, the dynamic tape has more significant effect and useful technique for treating jumper's knee.

Keywords: jumper's knee, dynamic tapping, patellar tendinopathy, ultrasound therapy and stretching.

INTRODUCTION

JUMPER's KNEE

Jumper's knee is also called Patellar tendinopathy, which is most common in athletes, caused by repetitive jumping activities in sports – usually seen in basketball, long jump, volleyball and hand ball. The prevalence of jumper's knee has ranged from **25%-32%** in basketball. The prevalence of patellar tendinopathy in **nonelite athletes ranges from 11.8% to 14.4% and up to 53% of athletes** with anterior knee pain[8]

In patellar tendinopathy the **pain is over the anterior surface of the knee**. It is characterized by pain which is localized to the **inferior pole of the patella** and the pain will elevate by the loading and

increase with the use of knee extensor musculature, especially in store and release of energy in patellar tendon. The small tears are usually caused by repetitive stress on the patella or quadriceps tendon. (**Like frequent jumping on hard area or surfaces**)[3]

Jumper's knee can be classified in 4 stages:

Stage1: Pain increases after activities.

Stage2: Pain during an activity, but still the players is able to perform without limitations. Stage 3: Pain that might limits activities.

Stage4: Complete rupture of the patellar tendon that may require surgical repair.**[3][5]**

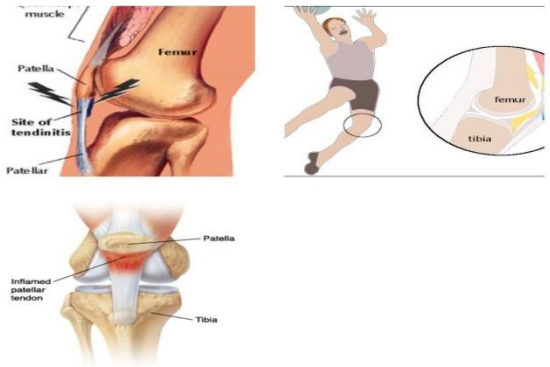


FIG1: Patellar tendinopathy

DYNAMICTAPING:

Dynamic tape is a therapeutic taping which is a strongly elastic tape with different grades of strength, stretch and recoil.

Dynamic tape is also called as biomechanical tape which is used to management of musculoskeletal conditions. Alteration in kinetic and kinematic factors can be identified and also addressing such factors can reduction of pain and improve joint function.

Taping can be used as a mechanical resistance/decelerator or it assists the motion which will reduce the load on the tendon similarly to a dynamic splint while generating the force externally and can protect or gradually reduce the loading on the injury, overloaded or weak tissue[6]

The dynamic tape is made up of **visco-elastic nylon and Lycra blend materials** that can stretch in all **four directions with strong elastic resistance and recoil** with larger degree of stretch (**the stretch is more than 200%**) and also there is no **rigid endpoint.** It's primary mode of action such as mechanical (i.e.deceleration of eccentric work, load absorption, assistance of movements) [7]

FIG2: Dynamic tape

The dynamic tape comes in two widths of 5cm and 7.5cm with an extra width of tape that increase the amount of load absorption is possible. A greater potential of loading absorption can be created by laminating two layers of dynamic tape prior to application, so it's called power band. The recent test on

7.5 cm width powerband that shows the dynamic tape can absorb up to 12-13 kg or more force through the range. To increase the load absorption dynamic tape can be applied [9]

The tape to more closely mimic as a function of the target muscle. Dynamic tape is applied on the muscle or joint in the shortened position so that will be lengthening forms, the dynamic tape stretch and resists, thereby absorbing load and provide the deceleration force to reduce the eccentric demand on the muscle. Once deceleration force is complete and shortening commences, the elastic potential energy is converted into kinetic energy to assist the transition to the concentric contraction.

AIMS:

This study is aims to know the effect of dynamic taping on jumpers'knee in university level basketball players

METHOD OF COLLECTION OF DATA:

Study design: Parallelarmtrial study.
Study type: Intervention study.
Study population: University-level basketball players.
Studysetting: OPD clinic Dayananda sagar college of physiotherapy Bangalore.
Source of data: University level basketball players.
Sampling method: Convenient sampling. Sample size: 60 subjects.
Study Duration: 6 months.

SELECTION CRITERIA:

Inclusion criteria:

- Age: Between18to30 years.
- Gender: Male and female.
- University level basketball players.
- Anterior knee pain.
- Patellar grind test positive.

Exclusion criteria:

- Non-Basketball Athletes.
- Knee surgeries.
- Previous knee fracture.
- Skin allergies.
- Openwounds.
- Patient with the cardiopulmonary disease.
- Recent knee joint injury.

MATERIAL REQUIRED:

- Screening form.
- Data collection form.
- Consent form.
- VAS scale.

- VISA-P-patellar tendinopathy questionnaire.
- Dynamic tape.
- Scissors.
- Pen.

OUTCOME MEASURES:

- VAS scale.
- VISA-P questionnaire.

VISA-P QUESTIONNAIRE:

Method of use: This questionnaire carries eight questions, that covers three domains they are

- Pain
- Functional status
- activity

Reliability: VISA-P has very good reliability has a good test-retest (r=0.93).

Validity: VISA-P score shows significantly between the percy and conochie's grade of severity (r=0.58; p<0.001) [12]

VAS SCALE:

Visual analogue scale can be presented in graphic rating scales. It is the one of the pain rating scales. The pain VAS is a unidimensional measure of pain intensity used to record the patients' pain progression, or compare pain severity

The vas contains **80.6% sensitivity** and **61.1% specificity** and

Numerical rating presented **Sensitivity of 81.9%** and **specificity of 57.6%** [13]

Reliability: The reliability has been shown to be good (r=0.94, p=0.001).

Validity: In the absence of gold standard for pain, criterion validity cannot be evaluated (r=0.71 and 0.62 p=0.99).

PROCEDURE OF STUDY:

Participants between 18– 30 years of age are approached and the purpose and procedure of the study will be explained to them. Appropriate consent was been taken from the participants and baseline data including demographic data was be recorded. The study was conduct in a clinical setup for both male and female basketball players**.**

The candidate was allocated into two groups. That is Group A & Group B. Group allocation was done by using convenient sampling and single blind allocation was done.

After the allocation of the group:

- Group A – was treated by dynamic tape.
- Group B – was treated by ultrasound & stretching.

In the beginning, the presence of anterior or inferior knee pain has been assessed. If the pain is present, was performed screening test that is patellar grind test and VAS scale data was be recorded. If positive, the treatment was given. Group A was treated by dynamic taping. (Before dynamic taping, patch test was done). The dynamic taping treatment was given on first day and then after 3 days (4 sessions) till 2weeks [10]

TAPINGTECHNIQUE:

FIG3:TapingtechniqueonJumper'sknee

Dynamic taping on patellartendon

Objective: Inhibitory.

Position: Patient in supine lying or long sitting

Direct techniques: The dynamic tape is applied indirect technique (knee extension technique), that is in long lever arms, over the joints and movement arms

The tape is applied from insertion to origin on patellar tendon
Thetapingbeginsfrommid-shinoftibiauptomid-thighwithananchor.30secondpressand holdwillbeappliedafterthetaping.Theboxingtechniquesaroundtheareaofpatellaisdone by using V anchor to reduce to maximum load on the tendon [11]
The group B was treated by ultrasound and stretching every alternate 2 days for 2 weeks

ULTRASOUND			
Ultrasound head		**1MHZ**	
Mode		**Continuous Mode**	
Duration		**8 minutes**	
Intensity		**1 ampere**	
STRETCHING			
MUSCLE	**REPETITION**	**SETS**	**HOLD**
Quadriceps	**5 repetitions**	**2 sets**	**10secholds**
Hamstring	**5 repetitions**	**2 sets**	**10secholds**

Table1: Method of application

This intervention is given forthe2 weeks.
Each candidate should fill the VISA-P scale before starting the intervention and it will be reassessed at the end of the 2 weeks.
VAS scale was taken before and after the treatment[10]

All these procedures are done under the supervision of dynamic tape practitioner Dr Humair Ahmed B M

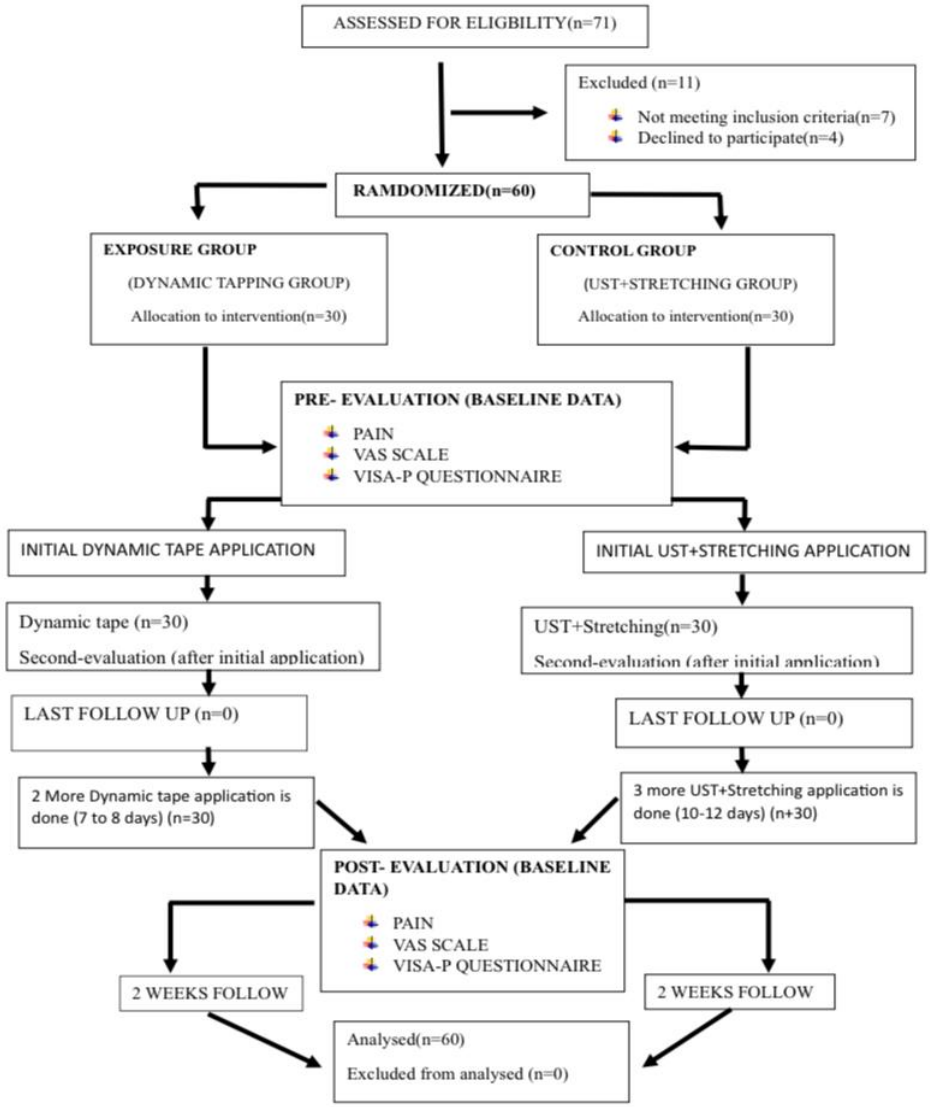


FIG 4: CONSORT CHART

STATISTICALANALYSIS

Results and Data Analysis is done by SPSS;

Table2: Comparison of PRE-VAS and POST-VAS (EXPOSUREGROUP AND CONTROL GROUP)

ANOVA(EXPOSUREGROUP)					
	Sum of Squares	df	Mean Square	F	P value
Between Groups	3.871	4	.968	3.560	.020

Within Groups	6.795	25	.272		
Total	10.667	29			
ANOVA(CONTROLGROUP)					
	Sum of Squares	df	Mean Square	F	P value
Between Groups	5.694	4	1.423	6.273	.026
Within Groups	5.673	25	.227		
Total	11.367	29			

("F"=one way ANOVA;*Significant*Exposure group) ("F" = one way ANOVA; *Significant* control group)

An ANOVA TEST was run between PRE-VAS and POST-VAS in the Exposure group. As the P<0.05, The test shows significant effect on the athletes.

(ONEWAYANOVA*P=0.020*)

An ANOVA TEST was run between PRE-VAS and POST-VAS in the control group. As the P<0.05, The test shows significant effect on the athletes.

(ONEWAYANOVA*P=0.026*)

Table3: Comparison of PRE-VISA-P and POST-VISA-P (EXPOSURE GROUP AND CONTROL GROUP)

ANOVA(EXPOSUREGROUP)					
	Sum of Squares	df	Mean Square	F	P value
Between Groups	128.792	9	14.310	10.519	.000
Within Groups	27.208	20	1.360		
Total	156.000	29			

ANOVA(CONTROLGROUP)					
	Sum of Squares	df	Mean Square	F	P value
Between Groups	352.950	14	25.211	1.814	.090
Within Groups	208.417	15	13.894		
Total	561.367	29			

("F" = one way ANOVA; *Significant Exposure group) ("F"=one way ANOVA;*Insignificant*Control group)

AnANOVATESTwasrunbetweenPRE-VISA-PandPOST-VISA-PintheExposuregroup

As the p<0.05, The test shows most significant effect on the athletes (ONE WAYANOVA * P=.000*)

An ANOVA TEST was run between PRE-VISA-P and POST-VISA-P in the Control group

As the p>0.05, The test shows insignificant effect on the athletes (ONE WAYANOVA * P=0.090*)

Table4: Comparison the effects of dynamic tape based on their gender (EXPOSURE GROUP AND CONTROL GROUP)

T test for exposure group					
	GENDER	N	Mean	Std. Deviation	Std. Error Mean
EXPOSUREGROUP	1	22	3.41	.908	.194
	2	8	3.50	1.069	.378

(Independent 't'- test)

Therearesignificanteffectsonmale.Whencomparisonbetweentheexposuregroupbased on their gender (Independent 't'- test)
(Male*p=0.194, Female*p=0.378)

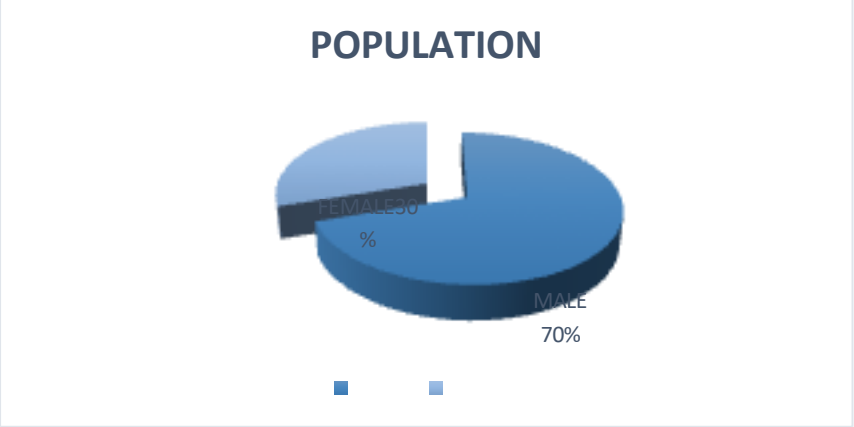
T test for control group					
	GENDER	N	Mean	Std. Deviation	Std. Error Mean
CONTROLGROUP	1	20	2.80	1.005	.225
	2	10	2.20	.789	.249

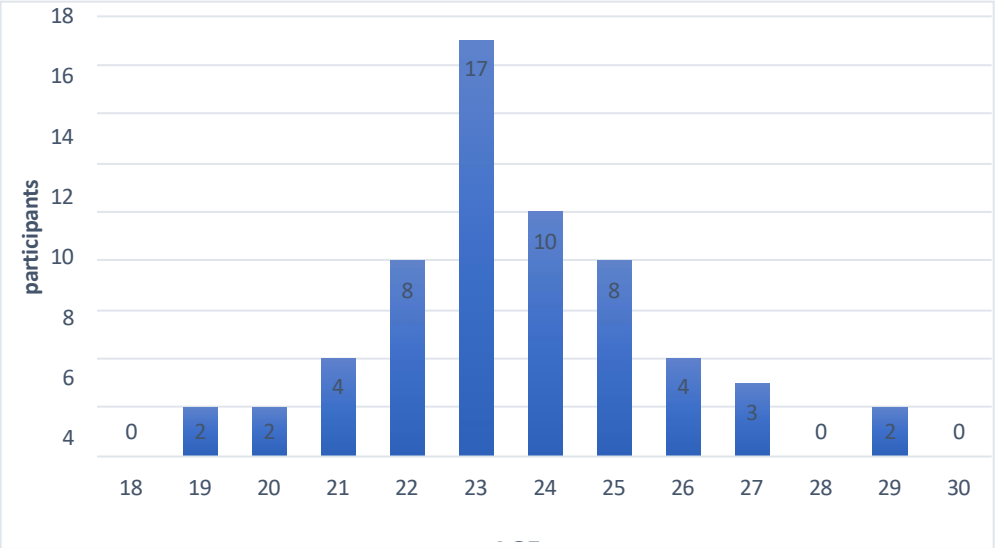
(Independent 't'- test)
There is minimal difference, hence it concluded effects is similar on both male and female. When Comparison between the control group based on their gender (Independent 't'- test)
(Male*p=0.225, Female*p=0.249)

Table5: Descriptive data

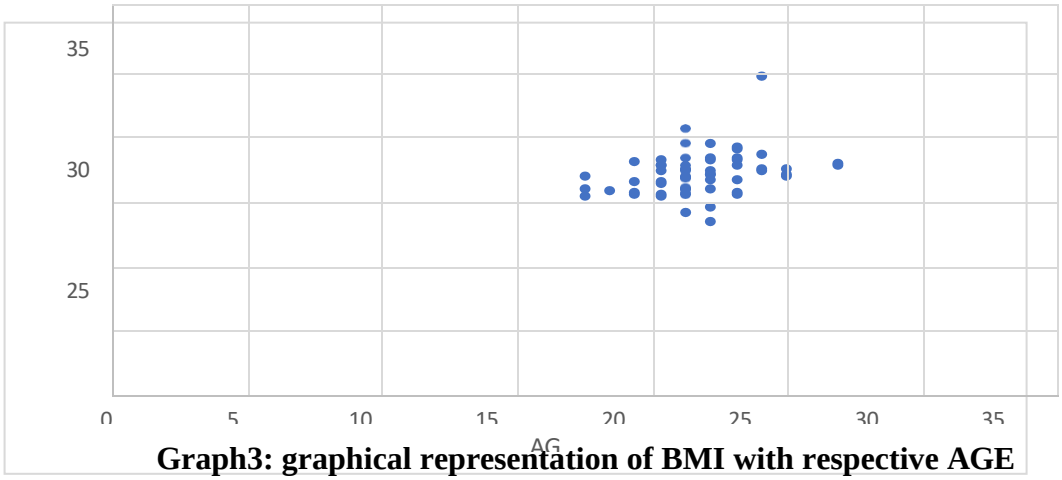
SL.NO.	**DATA**	**NUMBERS**
1.	MALE	42
	FEMALE	18
2.	TOTAL PARTICIPANTS	60
3.	BMIRANGE	18TO31
4.	AGE GROUP	19TO29

Graph1: frequency of male and female out of total participants





Graphs 2: Graphical representation of participant with age



Graph3: graphical representation of BMI with respective AGE

The above graph represents the co-relation between age and BMI. As age group is between 19 to 29 and the BMI range 18 to 31

The graphs show that, mean age =23 and mean BMI ($Kg/m^{2)}$=21.6

DISCUSSION:

The aim of the study was to find the effectiveness of dynamic tape to relieve the pain on jumper's knee (patellar tendinopathy). By using outcomes of pain (vas and visa-p) in our knowledge this is the 1st study to analyze the effect of dynamic tape on jumper's knee in basketball. The taping is method used as an assistive technique in prevention and management in sports or musculoskeletal conditions among all the types of tape. According to our literature search dynamic Taping can be used as a mechanical resistance/decelerator or it assists the motion which will reduce the load on the tendon similarly to a dynamic splint while generating the force externally and can protect or gradually reduce the loading on the injury, overloaded or weak tissue. by using the dynamic tape, we use to find effect on pain relief. Since there was no study done on the effects of dynamic tape in the management of jumper's knee. DR girish lavji bhai Baldha. Et al; all in 2017 proposed evidence based on physiotherapymanagementinjumper'sknee.Theyhavefoundthatconvenientphysiotherapy with ultrasound and convenient physiotherapy with kinesotaping in the management of jumper'sknee.whentheycomparisonbetweenconvenientphysiotherapywithultrasoundand convenient physiotherapy with kinesotaping, that kinesotaping having more effective than convenient physiotherapy with ultrasound in jumper's knee. Breda SJ and Oei EHG et al; all in 2021 proposed evidence based on physiotherapy treatment in patellar tendinopathy they proved that progressive tendon-loading exercises is more effective than eccentric exercise therapy. They found that progressive tendon-loading exercises are superior to eccentric exercise therapy so therefore they have recommended as initial management for patellar tendinopathy. Kaori tamura and portia B. Resnick et al;2020 this study concluded that the maximal jump height was reduced as a result of the usage of KT tape with a tendon correction strip and a muscle facilitative strip for reducing patellar tendinopathy-related pain during jump landing. Previous studies shows that effect of kinesio-taping & ultrasound therapy has significant effect on jumper's knee. but our study reveals that dynamic tape has more significant effect and is a better technique to treat the athletes with jumper's knee for the pain relief. as the $p<0.05$the dynamic tape is most effective treatment management for patellar tendinopathy.

LIMITATIONS:

There was no objective data was taken for pain

RECOMMENDATIONS:

In further studies use better instrument for pain to find an accurate pain score

CONCLUSION:

In this study shows that Dynamic tape and Ultrasound therapy & Stretching is significantly effective in the management of jumper's knee. Comparison between Dynamic tape, Ultrasound therapy & Stretching in the management of jumper's knee, Dynamic tape is most effective and useful in the management of pain on jumper's knee. This finding could help athletes to understand the use of dynamic tape in management of pain on patellar tendinopathy.

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