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THE EFFECT OF LONG-TERM PATELLAR TENDINOPATHY INJURY ON VERTICAL JUMP ABILITY IN HIGH SCHOOL BASKETBALL PLAYERS NEG. 2 PEMATANGSIANTAR

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Abstract

This research aims to determine the effect of long-term injury of patellar tendinopathy on the ability of vertical jumps in basketball athletes. Method: this research is quantitative descriptive with the type of correlation study. Samples were selected using a purposive sampling technique. The sample consisted of 18 male and female basketball players from the Shoots Hope club with the age category of 16 years to 23 years, with inclusion criteria. Still actively participating in training conducted by Tunas Harapan basketball club. Having a history of patellar tendinopathy or having a recurrent patellar tendinopathy injury, at least 1 month. where the duration of tendinopathy injury is measured using a questionnaire and the vertical jump ability test is measured using a sargent test. Results: The mean and standard deviation of the length of time for patellar tendinopathy injuries was 3.89 ± 2.74 calculated in months and the average vertical jump and standard deviation were 45.21 ± 8.46 calculated in centimeters. Normality test with Shapiro Wilk test obtained data with normal distribution. The results of hypothesis testing with Spearman rank correlation test showed p = 0.005 on injury time and vertical jump test and r = -0.718 with negative direction so the longer the injury the more it affects the ability of vertical jump in basketball athletes. Conclusion: There is a long-standing relationship of patellar tendinopathy injury to the ability of vertical jumps in basketball athletes.

Keywords : Long-term of injury, vertical jump, sargent test

INTRODUCTION

Sport is one of the physical activity or physical activity that is useful for maintaining, improving, and preserving an individual's physical fitness. Sport is an activity physique Which own objective certain and done with rules certain systematically as it is time rules,

target heart rate, number of movement reductions and so on are carried out with recreational elements and have certain specific goals". In sport, a athlete No only

It can not only maintain bodily movement but can also improve one's standard of living to a better level psychologically. Therefore, it is possible that sports can also improve achievements in academic and non-academic fields. An athlete is a subject/person who works or specializes in a particular sport and excels in that sport (Wibowo, 2002).

Basketball is a popular sport played all over the world that requires dynamic and fast actions. explosive. Exercise The constant activity of this sport involves repetitive motor actions and excessive joint loading, which increases susceptibility to injury (Gaca, 2009)

When exercising, many athletes neglect the importance of warming up, increasing the risk of injury. Injuries are common among athletes. such as scratches on the skin, torn muscles and ligaments, or broken bones due to impact or falls. No one can deny that injuries experienced by an athlete must be handled by professionals to prevent further injury. Continued. Injury is a disorder that occurs in the body that results in pain, heat, redness, swelling, and malfunctioning of muscles, tendons, ligaments, joints, or bones due to excessive activity or accidents (Ali Satia Graha & Priyonoadi, 2009).

In principle, sports injuries can be categorized into two categories, namely sports injuries caused by (1) trauma (traumatic injuries) and (2) repetitive pressure/fatigue/minor trauma strain). Damage can happen on soft tissue (skin, nerves, ligaments, muscles), joints (capsules, synovial, meniscus) and bones (Lesmana, 2015).

An estimated annual average of 8.6 million sports and recreation injuries occurs at an age-related rate of 34.1 per 1,000 population. Males and individuals aged 5 to 24 account for more than 50% of all injuries. Overall, injury rates are higher among males and children aged 5 to 14. Approximately 50% of injuries require medical attention. Injuries to the extremities lower Which most general (42%) followed by the upper extremities (30%), and the head and neck region (16%) (Sheu Y, 2016)

In basketball, one of the most common injuries is knee injuries, as basketball involves a lot of vertical jumping and running, which puts a lot of impact on the knees. A total of 190 injuries were reported (97 in basketball and 93 in floorball). In both sports, the majority of injuries involved the lower extremities (66% and 55% of all injuries in basketball and floorball). In basketball, the most commonly injured area was the knee (44

cases, 45%). In floorball, the most commonly injured areas were the lower back/pelvis (36 cases, 39%) and the knee (32 cases, 34%). Overuse injuries resulted in an average loss of time. from participation full 26 ± 50 (average 7) days in basketball and 16 ± 37 (average 5) days in floorball (Leppänen, 2015). The risk of injury is not only to the knee joint itself but to all the surrounding tissues, including: ligaments, nervous system, bursa, fascia, muscles, cartilage, bones, and tendons. Injured knee tendons can cause tendinitis, tendon rupture, osteochondrosis, avulsion, and other injuries.

Patellar tendinopathy is a common overuse disorder in participating athletes. in sport Which Sports that require jumping include volleyball and basketball. 7% of Australian junior basketball players aged 14-18 years had clinical signs of patellar tendinopathy, and 26% of tendons (n = 268 tendons, 134 players) showed abnormal tendon tissue regions on diagnostic ultrasound (US). A study of 760 adolescent athletes in 16 different sports revealed a prevalence of 5.8% of athletes with patellar tendon pain. A 22.8% incidence of patellar tendon pain in a sample of 407 elite volleyball players was also observed, and 4.8% of 2,000 runners had patellar tendon pain. The prevalence of jumper's knee in 613 elite athletes in Norway and the overall prevalence was 14.2% with the highest prevalence in volleyball (44.6%) and basketball (31.9 %) . In a study of 891 non-elite athletes representing seven different sports, the overall prevalence of patellar tendinopathy was is 8.5% with prevalence the highest in volleyball athletes (14.4%) (Reinking, 2016).

All subjects with jumper's knee had at least subchronic symptoms before examination , and 5 of 18 (28%) reported that they had reduced their exercise for more than 1 year prior. Subjects with chronic symptoms before examination early onset tended to have further functional limitations at follow-up than those reporting subchronic symptoms, but his tendency No significant statistically (Kettunen JA 2002).

Higher training volumes have consistently been shown to increase the risk of overuse injuries in many sports. In a study of 2,721 high school athletes, a linear relationship was found between hours of sport participation and injury risk. Specifically, training more than 16 hours per week was associated with a significantly increased risk of injury requiring medical attention. A recent study of 100 US high schools reported that level injury overall (acute and overuse) in 20 high school sports was 1.71/1000 athlete exposures during the 2010-2011 school year. This database estimates 3.7 million injuries occurred resulting in lost time of more than 1 day Because sport excessive (Difori et al

,2013) . Writer Also has do A small field observation was conducted by asking several questions to basketball athletes regarding their feelings before , during, and after playing. Of the three people interviewed, the results showed that they complained of discomfort after playing and decreased participation in training due to pain during training.

LITERATURE REVIEW

Influence Long Injury Tendon

The duration of overuse injuries has been shown to have detrimental long-term effects on young athletes or athletes who are still developing, experiencing a decrease in the number of hours of training and playing on the field (Leppänen, 2015). Microtears that have arisen due to repeated pressure movements If not treated properly, it will become a larger tear (macrotears). There are four types of patellar tendonitis, namely: the first type of pain occurs only after activity, the second type of pain disappears when... active And arise after activity, the third type is constant pain and imbalance to participate in sports, and the fourth type is a complete tear of the tendon. Basically, sports performance is influenced by muscle strength and explosive power, the continuum model of tendinopathy has a correlation clinical Which most clear. Model continuum of placement pathology tendon in three stages, namely reactive tendinopathy, tendon disrepair, degenerative

tendinopathy.(A Rudavsky, 2014)

Degenerative tendinopathy often precedes acute rupture and is considered a failed healing response characterized by hypervascularity, mucoid degeneration, ectopic bone and cartilage nodules, and irregular extracellular matrix. The duration of tendon injury also influences changes in the tendon tissue structure. Injury to structures containing mechanoceptive and proprioceptive receptors can cause deficits in proprioceptive function. Deficits in proprioception result in a lack of proprioceptive information for motor control, placing Athletes are at risk of recurrent or chronic injury. The duration of a tendon injury can also impact the elasticity of the tendon tissue due to structural disruption. This can affect the chance of returning to sport. The longer the injury lasts, the more likely it is to be sustained. tendon so will the more reduce athlete performance both on and off the field (Vries et al., 2015).

Vertical Jump

The vertical jump is a common fitness test used to determine an athlete's leg muscle strength or explosive power. This test is often used by professional athletes, especially to assess their progress during training. The higher the jump, the stronger the athlete's leg muscles and explosive power (Michelle Lovitt, 2004). The ability to jump on The basketball athlete's ability to jump significantly influences the player's performance. The higher he can jump, the greater his chances of getting points to win the game. Most basketball playing techniques require maximum leg muscle strength, especially in the vertical jump movement, to be able to put the ball into the net. ring. Performance on movement vertical Jump is influenced by the stretch shortening cycle (SSC), muscle force, and explosive power. According to definition, stretch-shortening cycle (SSC) describes the natural function of muscles in which a pre-activated musculotendon complex is lengthened in the eccentric phase followed by shortening of the tendons in the concentric phase. In bipedal and quadrupedal species, locomotion, as well as many other movements, such as jumping and throwing, are regulated in the SSC. The efficiency of the SSC on recoil is a property of the tendon-muscular system, which can be influenced by the central nervous system (CNS). Explosive power is the ability muscle or a group muscle someone to use maximum strength which is deployed in the shortest or briefest time.

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The purpose of this test is to test and collect data or information related to the vertical jump ability of basketball athletes. To conduct the vertical jump test, the researcher used sergent test Which developed by Dr. Dudley Allen Sargent (1849-1924). In this test there are normal values that can be used as a basis for assessment. Based on (Arkinstall, 2010) which is used on athletes, the following is a table of normal sergent test values:

Table 1
Mark Sargent Test

Gender	Very Good	Good	currently	not enough	Very Not enough
Man - man	>70 cm	56 -70 cm	41 – 55 cm	31 – 40 cm	< 30 cm
Woman	>60 cm	46 – 60 cm	31 – 45 cm	21 – 30 cm	<20 cm

Source : (Arkinstall, 2010)

METHOD

The research was conducted using a quantitative approach, which falls under analytical research. Quantitative research focuses on numerical data analyzed using statistical tests. This research is descriptive. with type correlation study. Studies correlation is a research method that is carried out to determine relatedness between variables by displaying the results of measuring the duration of injury patellar tendinopathy with vertical jump ability using the sergeant test.

The above study was conducted to demonstrate the relationship between the duration of patellar tendinopathy injury and vertical jump ability in basketball athletes at the Tunas Harapan basketball club in South Jakarta. This study aims to ensure that the methods used by the researchers align with the objectives they wish to achieve.

Population is the entire object of research or the object being studied. Population in research this is All Tunas Harapan basketball players have patellar tendinopathy. A field survey revealed a population of 18 people.

RESULTS AND DISCUSSION

Based on research conducted at the Tunas Harapan basketball club with a sample of 18 people who had patellar tendinopathy pathology.

Table 1 illustrates the distribution of samples based on age, gender, body mass index, duration of injury, and vertical jump. The sample in this study ranged in age from 16 to

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23 years, with a total of 18 samples. (100%). Sample most aged 17 years, totaling 7 samples (38.89%). The next largest number of samples were samples aged 16 years, totaling 6 samples (33.33%). Next, samples aged 18 and 22 years old, each with 2 samples (22.22%) and the sample with the least number of samples was 23 years old with 1 sample (5.56%).

Other data presented includes weight and height data. The largest number of samples was in the 51-60 kg range, with 5 samples. The next sample size was in the 61-70 kg range. namely as many as 4 samples in the range weight 81 – 90 kg as many as 3 samples and at body weight of more than 91 kg 3 samples were obtained.

Characteristics	Results	Percentage
Age (sample)		
***Mean* ± SD**	17.67±2.24	
16	6	38.89%
17	7	33.33%
18	2	11.11%
22	2	11.11%
23	1	5.56%
Type Sex (person)		
Female Male	3	16.67
	15	83.33
Index Mass *Mean±SD* Underweight Body		
Normal	24.06±6.01	
Overweight	2	11.11%
	10	55.56%
	6	33.33%
Long Injury (month)		
Mean±SD	3.89±2.74	
Long Injury **(sample)**		
1- 3 month	10	55.56%
4 - 10 months	8	44.44%
Vertical Jump Test (cm)		
Mean±SD		
Vertical Jump Test (cm **)** 56-70 (Good)	45.21±8.46	
41-55 (Currently)	1	5.56%
31-40 (Not enough)	9	50%
	8	44.44%

Table 2
Results Measurement Variables

ID	Length of injury (month)	Vertical jump test (cm)
1	6	40.0
2	7	40.0
3	4	45.0

4	10	38.3
5	5	40.3
6	4	40.3
7	7	36.0
8	8	34.0
9	3	47.3
10	1	54.0
11	3	43.0
12	1	58.0
13	2	43.0
14	3	66.0
15	1	55.7
16	1	48.7
17	3	46.0
18	1	38.3
Mean±SD	3.89±2.74	45.21±8.46

Source Data : Data Primary

Samples with a height of 151 – 160 cm as much as 1 people .,Sample with range 161 – 170 cm as much as 10 person. Data sample. Furthermore obtained on Seven people with a height range of 171–180 cm were included. The largest sample size was 7 people with a BMI of 15–20 cm. Furthermore, the sample size was 21–25 cm. and 26 - 30 totaling 4 people and 30+ totaling 3 people. to continue the vertical jump test.

Based on table 2, the measurement of the duration of injury using a questionnaire The measurement of how many months the injury had been experienced in all samples showed a mean value of 3.89±2.74 . And in the vertical jump test measurement, the mean value was 45.21±8.46.

Table 3
Results Test Normality

Variables	Mark p	Distribution data
Long injury	0.051	Normal
Vertical jump test	0.102	Normal

Source Data : Data Primary

Based on table 3, namely the normality test analysis, the results of data processing from the independent variable, namely the duration of injury, were obtained with a p-value of 0.51, which means p>0.05 or the data was normally distributed and VISA-P with a value

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of 0.087. Which means p>0.05 or The data is normally distributed. Meanwhile, for the dependent variable, namely the vertical jump test, the value obtained is p of 0.102 which means p>0.05 or the data is normally distributed. From the results obtained in the normality test, it can be concluded that the hypothesis test in This study is a parametric test using the Spearman Rho correlation test.

Table 4
Results Analysis Test

	r	P value	N
Duration of injury to vertical jump	- 0.718	0.001	18

Source Data : Data Primary

Based on table 4.4, it shows that the p value <α value (0.05), which means that there is an influence of the length of injury on the vertical jump ability of Tunas Harapan basketball athletes, with an r value = -0.718, so it can be concluded that the longer the injury, the smaller the vertical jump value.

Age

From results characteristics based on age, showing that the mean±SD value is 17.67±2.24 with the 17 year old sample in first place with a total of 7 people, followed by the 16 year old sample with a total of 6 people, the 18 and 22 year old sample with a total of 2 people each and then the 23 year old sample. with a total of 1 person. At the age of 16 – 17 years become sample most Because Adolescents are at particular risk for injury because most sports are not tailored to their age-specific motor skills. As a result, adolescents play by adult rules and the equipment is not adjusted to their size. For example, basketball hoops are only available in one height, and almost all sports have only one ball size, the one used for adults. However, adolescents in particular can suffer injuries, which can disrupt their growth with potentially lifelong effects (Susanne Habelt 2011). on level age teenager have not received education about sports safety practices. Most of these sports involve high levels of contact, jumping, running and/or turning, which are often involved in injury mechanisms in sports and substandard warm-up and cool-down (Emery &

Tyreman, 2009).

So the researchers concluded that at the age of adolescents who are still developing, knowledge about handling injuries and preventing injuries is very necessary. Incomplete adjustments regarding children's regulations. teenagers and adults need to pay attention so can lower risk injury in teenagers.

Gender

Based on gender, the number of male samples was greater, namely 15 people, while the number of female samples was 3 people. In the study, 4468 injuries in adolescent patients were treated over a ten-year period: 66.97% were male and 32.88% were female. More males were also mentioned that knee injuries were in men (773 men and 557 women) (Susanne Habelt 2011). In basketball, the sport is also dominated by men, so the number of male players is more than female.

Index Body Mass

The results based on BMI with a mean±SD value of 24.06±6.01 obtained results with normal body weight with a sample size of 10 people, overweight with a sample size of 10 people. 6 person And heavy body not enough with a total of 2 people. the danger of such a high load with obesity has the potential risk of acute tendon injury due to increased body weight and masses (Franceschi, 2014). People who own heavy body normal Also have a risk of tendon injury due to training activities and daily activities . Significant risk factors for injury based on multiple logistic regression analysis are the number of risk exposure (average number of hours per weeks during one year) and the number of sports in which students are trained. (Emery & Tyreman, 2009).

The Effect of Injury Duration on Vertical Jump

Results based on length of time Injury to vertical jump with an r value of -0.718 and a p value of 0.001, there is an effect of the duration of injury on vertical jump ability. It was found that 10 people in the sample had experienced injuries for 1-3 months. And sample Which experience injury 4 –

10 months totaling 8 samples. The duration of overuse injuries has been shown to have detrimental long-term effects on young athletes or athletes who are still developing, experiencing a decrease in the number of training hours and playing time on the field

(Leppänen et al., 2015). Microtears that have arisen due to pressure movements in a way repetitive If No in If handled properly, it will become a larger tear (macrotears). There are four types of patellar tendonitis: the first type, pain occurs only after activity; the second type, pain disappears during activity and occurs after activity; the third type, pain is constant and makes it difficult to participate in sports; and the fourth type, a complete tear of the tendon occurs. Basically, sports performance is influenced by muscle strength and explosive power. The tendinopathy continuum model has the clearest clinical correlation. The continuum model places tendon pathology in three stages: reactive tendinopathy , tendon disrepair, and degenerative tendinopathy. (A Rudavsky, 2014)

Degenerative tendinopathy often precedes acute rupture and is considered a failed healing response characterized by hypervascularity, mucoid degeneration, ectopic bone and cartilage nodules, and a disorganized extracellular matrix. The duration of tendon injury also influences changes in the structure of the tendon tissue. Injury to structures containing mechanoceptive proprioceptive receptors can cause deficits in proprioceptive function. Deficit in proprioception cause lack of information proprioception for motor control, placing athletes at risk for recurrent or chronic injury. The duration of a tendon injury can also impact the elasticity of the tendon tissue due to the resulting structural disruption. This can impact the opportunity to return to sport. So that the more long injury tendon then will the more lower good athlete performance in field and outside field (Vries et al., 2015).

CONCLUSION

There is an influence of the duration of patellar tendinopathy injury on vertical jump ability. in basketball athletes.

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