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LAMPIRAN

Lampiran 1. *Informed Consent*

SURAT PERNYATAAN

KESEDIAAN MENJADI RESPONDEN

Yang bertanda tangan dibawah ini

Nama :

Umur :

Jenis Kelamin :

Alamat :

Menyatakan bahwa saya bersedia menjadi responden dalam penelitian yang dilakukan oleh Irma Rizky Lestari, dengan judul “Pengaruh Latihan Pliometrik terhadap Tinggi Lompatan pada Atlet Basket Putri PON Sulsel 2021”. Demikian surat pernyataan kesediaan ini saya buat dengan penuh rasa kesadaran dan sukarela.

Makassar, 2021

Yang membuat pernyataan,

(.....)

SURAT PERNYATAAN

KESEDIAAN MENJADI RESPONDEN

Yang bertanda tangan dibawah ini

Nama : [REDACTED]

Umur : 19 tahun

Jenis Kelamin : Perempuan

Alamat : [REDACTED]

Menyatakan bahwa saya bersedia menjadi responden dalam penelitian yang dilakukan oleh Irma Rizky Lestari, dengan judul "Pengaruh Latihan Pliometrik terhadap Tinggi Lompatan pada Atlet Basket Putri PON Sulsel 2021". Demikian surat pernyataan kesediaan ini saya buat dengan penuh rasa kesadaran dan sukarela.

Makassar, 1 Mei 2021

Yang membuat pernyataan,



(.....)

Lampiran 2. Surat Izin Penelitian



PEMERINTAH PROVINSI SULAWESI SELATAN
DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU SATU PINTU
BIDANG PENYELENGGARAAN PELAYANAN PERIZINAN

Nomor : 14323/S.01/PTSP/2021
 Lampiran : -
 Perihal : **Izin Penelitian**

KepadaYth.
 1. Walikota Makassar
 2. Ketua PERBASI Prov. Sulsel
 3. Ketua KONI Prov. Sulsel
 di-

Tempat

Berdasarkan surat Dekan Fak. Keperawatan UNHAS Makassar Nomor : 2308/UN4.18.1/PT.01.4/2021 tanggal 22 April 2021 perihal tersebut diatas, mahasiswa/peneliti dibawah ini:

N a m a : IRMA RIZKY LESTARI
 Nomor Pokok : C041171016
 Program Studi : Fisioterapi
 Pekerjaan/Lembaga : Mahasiswa(S1)
 Alamat : Jl. P. Kemerdekaan Km. 10, Makassar

Bermaksud untuk melakukan penelitian di daerah/kantor saudara dalam rangka penyusunan Skripsi, dengan judul :

" PENGARUH LATIHAN PLIOMETRIK TERHADAP TINGGI LOMPATAN PADA ATLET BASKET PUTRI PON SULSEL 2021 "

Yang akan dilaksanakan dari : Tgl. **04 Mei s/d 04 Juni 2021**

Sehubungan dengan hal tersebut diatas, pada prinsipnya kami **menyetujui** kegiatan dimaksud dengan ketentuan yang tertera di belakang surat izin penelitian.

Dokumen ini ditandatangani secara elektronik dan Surat ini dapat dibuktikan keasliannya dengan menggunakan **barcode**.

Demikian surat izin penelitian ini diberikan agar dipergunakan sebagaimana mestinya.

Diterbitkan di Makassar
 Pada tanggal : 04 Mei 2021

A.n. GUBERNUR SULAWESI SELATAN
KEPALA DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU
SATU PINTU PROVINSI SULAWESI SELATAN
 Selaku Administrator Pelayanan Perizinan Terpadu

Dr. JAYADI NAS, S.Sos., M.Si
 Pangkat : Pembina TK.I
 Nip : 19710501 199803 1 004

Tembusan Yth
 1. Dekan Fak. Keperawatan UNHAS Makassar di Makassar;
 2. Peringgal.

SIMAP PTSP 04-05-2021



Jl. Bougenville No.5 Telp. (0411) 441077 Fax. (0411) 448936
 Website : <http://simap.sulselprov.go.id> Email : ptsp@sulselprov.go.id
 Makassar 90231



Lampiran 3. Surat Telah Menyelesaikan Penelitian



**KOMITE OLAHRAGA NASIONAL INDONESIA
(KONI)
PROVINSI SULAWESI SELATAN**



Alamat : Jalan Sultan Hasanuddin No. 42 Makassar, Sulawesi Selatan Kode Pos 90112

Nomor : 053/UV/2021
Lamp : -
Hal : **Penyampaian**

Makassar, 9 Juni 2021

Kepada Yth :

**KEPALA DINAS PENANAMAN MODAL DAN
PELAYANAN TERPADU SATU PINTU
Di**

Tempat

Salam olahraga,

Dengan hormat, berdasarkan surat, Nomor : 14323/S.01/PTSP/2021, perihal : Izin Penelitian, tertanggal, 04 Mei 2021, Mahasiswa/Peneliti dibawah ini :

Nama : **IRMA RIZKY LESTARI**
Nomor Pokok : C041171016
Program studi : Fisioterapi
Pekerjaan/Lembaga : Mahasiswa (S1)
Alamat : Jl. P. Kemerdekaan Km. 10, Makassar
Judul : **"PENGARUH LATIHAN PLIOMETRIK TERHADAP TINGGI
LOMPATAN PADA ATLET BASKET PUTRI PON SULSEL 2021"**

Telah melaksanakan penelitian mulai tanggal 04 Mei s/d 04 Juni 2021

Demikian surat penyampaian ini, atas perkenannya diucapkan terima kasih

**PENGURUS KONI PROV. SULAWESI SELATAN
An. KETUA UMUM,
Pit. SEKRETARIS UMUM**



(Signature)
DR. H. M. DAHLAN ABUBAKAR, M.Hum

Tembusan yth

1. Ketua Umum KONI Sulsel sebagai laporan
2. Dekan Fak. Keperawatan UNHAS Makassar
3. Arsip.

Lampiran 4. Surat Keterangan Lolos Kaji Etik



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN

RISET, DAN TEKNOLOGI

UNIVERSITAS HASANUDDIN

FAKULTAS KESEHATAN MASYARAKAT

Jln. Perintis Kemerdekaan Km. 10 Makassar 90245, Telp. (0411) 585658,

E-mail : fkunhas@gmail.com, website: <https://fkunhas.ac.id/>

REKOMENDASI PERSETUJUAN ETIK

Nomor : 4290/UN4.14.1/TP.01.02/2021

Tanggal : 14 Juni 2021

Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :

No. Protokol	7521091090	No. Sponsor Protokol	
Peneliti Utama	Irma Rizky Lestari	Sponsor	Pribadi
Judul Peneliti	Pengaruh Latihan Pliometrik terhadap Tinggi Lompatan pada Atlet Basket Putri PON Sulsel 2021		
No. Versi Protokol	1	Tanggal Versi	7 Mei 2021
No. Versi PSP	1	Tanggal Versi	7 Mei 2021
Tempat Penelitian	Flying Wheel		
Judul Review	<input checked="" type="checkbox"/> Exempted <input type="checkbox"/> Expedited <input type="checkbox"/> Fullboard	Masa Berlaku 14 Juni 2021 Sampai 14 Juni 2022	Frekuensi review lanjutan
Ketua Komisi Etik Penelitian	Nama : Prof.dr.Veni Hadju,M.Sc,Ph.D	Tanda tangan 	 14 Juni 2021
Sekretaris komisi Etik Penelitian	Nama : Dr. Wahiduddin, SKM.,M.Kes	Tanda tangan 	 14 Juni 2021

Kewajiban Peneliti Utama :

1. Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan
2. Menyerahkan Laporan SAE ke Komisi Etik dalam 24 Jam dan dilengkapi dalam 7 hari dan Laporan SUSAR dalam 72 Jam setelah Peneliti Utama menerima laporan
3. Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah
4. Menyerahkan laporan akhir setelah Penelitian berakhir
5. Melaporkan penyimpangan dari protocol yang disetujui (protocol deviation/violation)
6. Mematuhi semua peraturan yang ditentukan



Lampiran 5. Hasil Uji SPSS

Data Frekuensi Pre Test Tinggi Lompatan					
		<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	<i>Very good</i>	2	15.4	15.4	15.4
	<i>Above average</i>	3	23.1	23.1	38.5
	<i>Average</i>	5	38.5	38.5	76.9
	<i>Below average</i>	3	23.1	23.1	100.0
	<i>Total</i>	13	100.0	100.0	

Data Frekuensi Post Test Tinggi Lompatan					
		<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	<i>Excellent</i>	2	15.4	15.4	15.4
	<i>Very good</i>	6	46.2	46.2	61.5
	<i>Above average</i>	5	38.5	38.5	100.0
	<i>Total</i>	13	100.0	100.0	

Statistics Lingkar Otot Betis Kanan			
		LOB Sebelum Kanan	LOB Sesudah Kanan
<i>N</i>	<i>Valid</i>	13	13
	<i>Missing</i>	0	0
<i>Mean</i>		36.115	36.408
<i>Std. Deviation</i>		2.2898	2.3486
<i>Minimum</i>		33.0	33.0
<i>Maximum</i>		40.1	40.3

Statistics Lingkar Otot Betis Kiri			
		LOB Sebelum Kiri	LOB Sesudah Kiri
<i>N</i>	<i>Valid</i>	13	13
	<i>Missing</i>	0	0
<i>Mean</i>		36.131	36.408
<i>Std. Deviation</i>		2.2533	2.3415
<i>Minimum</i>		32.9	32.9
<i>Maximum</i>		40.1	40.3

Uji Normalitas Shapiro-Wilk Tinggi Lompatan						
	<i>Kolmogorov-Smirnov^a</i>			<i>Shapiro-Wilk</i>		
	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
<i>Pre</i>	.144	13	.200*	.916	13	.219
<i>Post</i>	.166	13	.200*	.944	13	.517
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

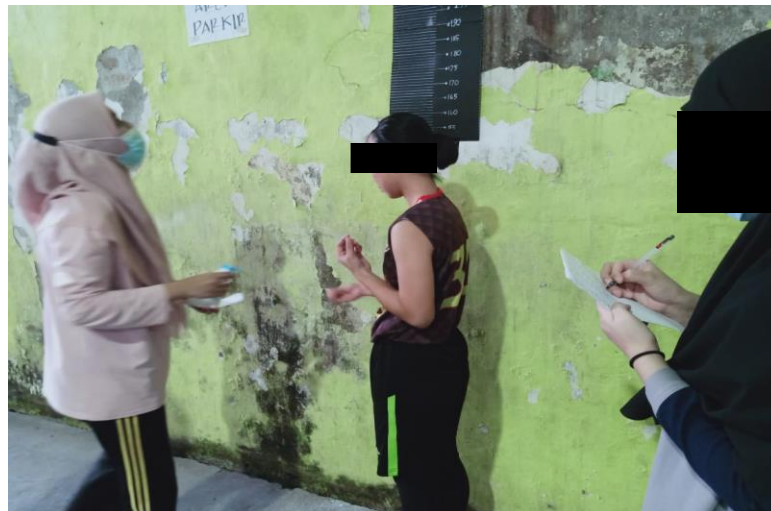
Paired Samples Statistics Tinggi Lompatan					
		<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
<i>Pair 1</i>	<i>Pre</i>	39.31	13	8.635	2.395
	<i>Post</i>	51.46	13	8.038	2.229

Paired Samples Correlations Tinggi Lompatan				
		<i>N</i>	<i>Correlation</i>	<i>Sig.</i>
<i>Pair 1</i>	<i>Pre & Post</i>	13	.926	.000

Paired Samples Test Tinggi Lompatan									
		<i>Paired Differences</i>					<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
		<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>	<i>95% Confidence Interval of the Difference</i>				
					<i>Lower</i>	<i>Upper</i>			
<i>Pair 1</i>	<i>Pre - Post</i>	-12.154	3.262	.905	-14.125	-10.183	-13.434	12	.000

Lampiran 6. Dokumentasi Penelitian

Pengukuran Tinggi Lompatan



Bentuk Latihan Pliometrik *Squat Jump*



Bentuk Latihan Pliometrik *Rope Jump*



Bentuk Latihan Pliometrik *Side Hop*



Lampiran 7. Artikel Penelitian

The effects of Plyometric Exercises on Vertical Jump Height of Female Basketball Athletes PON of South Sulawesi 2021

Abstract

Objective: This study aims to determine the effects of plyometric exercises on vertical jump height of female basketball athletes.

Method: This study used a pre-experimental design with the type of one group pre-test post-test design. A total of 13 female basketball athletes recruited to participate. The age ranged from 19 to 22 years old. Data collection is done through the primary retrieval of data through the measurement instrument vertical jump test.

Results: From the results of the SPSS obtained a significant value of $p = 0.000$ ($p < 0.05$) after 18 times plyometric exercises was given.

Conclusion: There is an influence of plyometric exercises on vertical jump height using vertical jump test on female basketball athletes PON of South Sulawesi 2021.

KEYWORDS: Plyometric exercises, vertical jump height

Introduction

The sport of basketball has improved and developed from year to year and has resulted in achievements at regional, national and even international levels¹. Proper shooting technique in basketball has an important role in increasing the accuracy of the ball entering the basket. The shooting technique commonly used and scoring the highest points in a ball game is known as the lay-up shoot technique². In addition to basketball techniques, the physical components of basketball players need to be considered. The agility, strength, endurance, speed, and strength of basketball players will affect performance in matches. For the lay-up shoot technique, the physical components needed are explosive power in the leg muscles and agility³. The explosive power component, namely the vertical jump height in ball sports, is important because most of the movements in ball sports are carried out with sports. While some problems can occur in basketball players caused by movement. In the study explained that training and ball games can cause lower extremity injuries such as patellar or Achilles tendinopathy, overuse, or sprains and acute and chronic strains caused by the number of jumps, jumps, and exercises per session⁴. The ability to jump shoot is also low in basketball players are also still found⁵. Several factors such as anthropometry, physiology, and biomechanics have a contribution in influencing vertical jump height⁶. Anthropometric measurements of the feet in the form of foot width, foot length, thigh muscle circumference, calf muscle circumference, and leg circumference can be correlated with height⁷. Differences in height by sex also need to be considered. The height between male and female athletes has differences, this can be caused by differences in style, speed, and displacement time when making a jump and proves that the jump results in male athletes are more significant⁸.

In basketball, athletes start training from the age of 8-10 years and at the age of 18-24 years, athletes reach peak performance⁹. Motor development of late adolescents or adolescents aged 18-22 years occurs at the peak of body development where motor and psychological abilities are well developed so that they can receive exercises that can improve skills, especially movement skills¹⁰. Therefore, it is necessary to optimize the athlete's ability in order to reach the peak of achievement as targeted and reduce the risk of injury. Plyometric exercises are common exercises used in exercises that focus on

the lower and upper extremities. Plyometric exercises improves sports skills in terms of movement and throwing which causes changes in anthropometry and running capacity¹¹. Plyometric exercises is a complex exercise that aims to improve balance, coordination, reflex reflexes, increase in height, and the performance of the athlete¹².

Method

This study used a pre-experimental design with the type of one group pre-test post-test design. Based on the inclusion criteria, 13 female basketball athletes were recruited to participate in this study, namely the female PON basketball athlete who routinely exercises at the flying wheel foundation in Makassar City. The inclusion criteria were female basketball athlete PON of South Sulawesi 2021 who routinely exercises on the Flying Wheel, the age 18 – 22 years old, and are willing to become respondents. The exclusion criteria were players with history of cardiovascular disease, there is history of surgery on the lower extremities, namely on the hips, knees, and ankles and musculoskeletal injuries on the lower extremities, and players with moderate injury to the lower extremities such as pain, inflammation, acute or sub-acute sprains and strains, postoperative soft tissue limitations. General information about characteristics of the samples including name, age, medical history of injury was obtained through direct interview. Initial data collection was performed by pre-test vertical jump height measurement using vertical jump test. The intervention given was in the form of plyometric exercises given for six weeks with post-test measurements carried out after six weeks (18 times) of plyometric exercises. The vertical jump height measurement data was processed using SPSS 24 software using the Shapiro Wilk test to see data that was normally distributed and paired samples t-test for data that was normally distributed.

Treatment of research samples

Basketball athletes are more advised to wearing sports clothes and shoes. Basketball athletes do warming-up minutes before 3-5 minutes and are given a break of about two minutes in core exercises. For each move, one minute of practice is given to rest. Plyometric exercises are given in the form of squat jump, rope jump, and side hop exercises. The squat jump exercise begins with the athlete's basketball position half-squat or knees bent about 30 degrees and feet on tiptoes spread shoulder-width apart. Furthermore, for the core movement of the squat jump exercise, it is done by instructing the athlete to jump vertically or upwards. The final movement in the squat jump exercise is when the basketball athlete returns to the starting position, which is in a half squat position with his feet on tiptoe. For jump rope exercises, basketball athletes are instructed to adjust to their respective heights. The benchmark for skipping rope height is basketball at the athlete's shoulder. Then the initial position in the skipping exercise is the basketball athlete standing upright while holding the skipping handle in both hands. At the time of repulsion before the jump, the basketball athlete's knee position is bent about 10 – 20 degrees with straight arms approaching the body. The core movement in the jump rope occurs when the basketball athlete's wrist rotates the rope while jumping in a vertical direction. Basketball athletes will look vertically when the rope touches the floor. Furthermore, for the third exercise, the initial position of basketball in the side hop exercise is carried out in a standing position next to the cone and the basketball athlete's body in an upright position. Basketball athletes are instructed to bend both knees about 10 – 20 degrees to do a push before coming. Then the athlete performs a zig-zag jump to the left and right through the cone with respect to the horizontal direction. Each exercise given, the author instructs basketball athletes to repeatedly move according to predetermined sets and repetitions. Vertical jump height

measurement is done by vertical jump test which is done by looking at the difference in vertical jump height and height achieved, which is measured 3 times in a row. Then each highest result is recorded.

Results

The results showed 13 samples of female basketball athletes, the respondents with the most age were 22 years old (Table 1). There is an average difference between pre-test and post-test calf circumference (Table 1). The results of paired samples t-test showed the effect of plyometric exercises after 18 times of plyometric exercises with a significance of $p = 0.000$ ($p < 0.05$) (Table 2) (Table 3)

Tabel 1. Characteristics of Subject

Based of age	N	%	
19 Tahun	3	23,1	
20 Tahun	3	23,1	
21 Tahun	3	23,1	
22 Tahun	4	30,7	
Total (N)	13	100	
Based of calf circumference	Group	Std. Deviation	Mean
Calf Circumference Dextra	<i>Pre Test</i>	2,2898	36,115
	<i>Post Test</i>	2,3486	36,408
Calf Circumference Sinistra	<i>Pre Test</i>	2,2533	36,131
	<i>Post Test</i>	2,3415	36,408

Tabel 2. Distribution of Vertical Jump Test

Category	Pre Test		Post Test	
	N	%	N	%
<i>Excellent</i>	0	0.0	2	15,4
<i>Very good</i>	2	15,4	6	46,1
<i>Above average</i>	3	23,1	5	38,5
<i>Avarage</i>	5	38,4	0	0.0
<i>Below average</i>	3	23,1	0	0.0
<i>Poor</i>	0	0.0	0	0.0
<i>Very poor</i>	0	0.0	0	0.0
Total (N)	13	100	13	100

Tabel 3. Analysis Data of Vertical Jump Test

Test	N	Statistika deskriptif	Paired T-Test	Nilai Cohen's d
		M (Std. D)	P	
<i>Pre Test</i>	13	39,31 (8,635)	p<0,0001	1,215
<i>Post Test</i>	13	56,46 (8,038)		

Discussion

Based on age, this study focuses on the category of late adolescents, namely those who have an age range of 18 - 22 years. In late adolescence, muscles and bones are still growing. In this late adolescence, there is a process of perfecting physical growth and psychological aspects that can form perfect maturity for a person¹³. Based on distribution of calf circumfere, overall the two graphs show that some respondents experienced an increase in calf muscle circumference and there were also respondents

who did not experience an increase. Previous research state that there is no relationship between vertical jump height and calf muscle circumference and thigh muscle circumference with a significance ($p>0.05$) which means that there is no relationship between vertical jump height and calf muscle circumference. The results in research occur because the respondents in his research are players in several sports that do not require movement to jump (such as boxing, table tennis) so that the physiological response of the body is different. Meanwhile, in other study it was explained that there was a relationship between vertical jump height and calf muscle circumference. This happens because the effectiveness of the calf muscle circumference can affect the explosive power of the muscles so that it can increase the vertical jump height¹⁴.

The implementation of jump measurements at the pre-test and post-test in this study was carried out using a vertical jump test. Based on the distribution of the results, it can be said that the pre-test results in the category below the average amount to 3 people, in the average category 5 people, in the category above average, and in the category totaling 2 people. Respondents with vertical jump heights that fall into the category below the average who return three people occur because the respondents do not regularly follow the exercise caused by several factors such as the respondent's other busyness at the same time as the exercises time so that the respondent cannot follow the exercise regularly, one respondent experienced pain so that the amount of exercise that the respondent got was not the same. The frequency of different exercises can affect the physical condition of the respondents themselves. There are several factors that can affect a person's physical condition, including exercise factors, exercises load factors, resting factors, healthy living habits, environmental factors, and food factors¹⁵.

The provision of plyometric exercises in the form of squat jumps, rope jumps, and side hops can increase vertical jump height. This is in accordance with previous research where in this study plyometric exercises in the form of squat jumps were given to female volleyball players, then the results obtained were that there was no increase in vertical jump height in the first and second weeks¹⁶. the increase in vertical jump height occurred in the third and fourth weeks after being given a squat jump exercise. The increase in vertical jump height given the type of exercise in this study is also in accordance with the research who conducted a study with a sample of 30 students at the Faculty of Physiotherapy. after being given squat jump exercise for six weeks to increase vertical jump height¹⁷.

The three types of plyometric exercises in this study, namely squat jumps, rope jumps, and side hops, whose basic movements are jumping, describe the basic neuromechanics of SSC. Plyometric exercises with jumping basic movements with increasing doses can increase vertical jump height and muscle strength depending on the type of plyometric exercise with the basic jumping technique chosen and the duration of the given exercise¹⁸. The stretch-shortening cycle mechanism occurs quickly if the duration of the contact with the soil is shorter than 25 ms, while the slow SSC mechanism occurs when the threshold for contact with the soil is longer than 25 ms¹⁹. To produce a maximum jump, it can be obtained by increasing the strength of the extensor leg muscles, namely by shortening the duration when making contact with the ground²⁰.

The stretch-shortening cycle (SSC) mechanism during the third movement for the three types of plyometric exercises in this study can improve the ability of the nervous and musculo-tendon systems to produce maximum strength in a short duration of time²¹. An important component that affects performance in plyometric training is the individual's ability to adapt to the SSC mechanism that occurs, and how muscle strength

can develop properly so that excursions occur in muscles during contraction²². To perform movements in plyometric exercises, it begins with a stretching contraction process. In this process, pre-activation occurs in the muscles, especially in the leg muscles to produce maximum strength when carrying out movements²³. This contraction process also produces potential elastic energy that is stored and used during the shortening contraction process²⁴.

The limitation in this study are there is no control group in this study and the number of samples is still lacking. And the researcher did not control for some other aspects such as exercises outside of the plyometric exercises provided so that it is possible to cause bias in this study.

Conclusion

Based on the research that has been done, it can be concluded that plyometric training for six weeks has the potential to increase jump height in women's basketball athletes at South Sulawesi PON 2021. The results of this study are expected so that female basketball athletes can apply the plyometric exercises especially squat jump, rope jump, and side hop to improve the physical performance of athletes, especially related to the addition of the athlete's vertical jump height. For further research, it is hoped that it can control confounding variables and make plyometric exercises the primer exercise

Acknowledgements

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