



PROCEEDING

2ND ICSS

INTERNATIONAL
CONFERENCE OF

SPORT

SCIENCE

2017

2nd INTERNATIONAL CONFERENCE of SPORT SCIENCE

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ISBN : 978-602-449-208-7

**Sport Education Master Program of Universitas Negeri Surabaya
Alamat: Jl. Kampus Unesa Ketintang, Kec. Jambangan, Surabaya**

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Table of Content

Sport Coaching

| No | Name | Materi | Page |
|----|---|---|------|
| 1 | Ade Satria Bagus Suwadi, Damayanti Tinduh, Edy Mintarto (Indonesia) | The Difference of Submaximal Physical Activity's Effect In The Morning, Afternoon, and Evening Sessions In A Room With Modified Temperature Through The Level Of Oxidative Stress | 192 |
| 2 | Adi Sucipto (Indonesia) | Evaluation of Football School Coach Competences In Malang Raya | 197 |
| 3 | Agni Herarta Anindya Satria, Sugiyanto, Agus Kristiyanto (Indonesia) | The Difference Effect of Anaerobic Interval Training Methods on Underbasket Shooting Results Viewed from Ratio of Body Height and Legs Length | 203 |
| 4 | Agus Himawan, Achmad Widodo, Gigih Siantoro (Indonesia) | The Effect of Game Approach with Workouts 3 Minutes, 5 Minutes Against VO ₂ Max and Agility at Futsal Players | 208 |
| 5 | Ahmad Burhanuddin Kusuma Nugraha, Bambang Purwanto, Harjanto JM (Indonesia) | Effect of Electro Muscle Stimulation Warming Up on Leg Muscle Strength | 213 |
| 6 | Ahmad Syauqi, Hari Setijono, Agus Hariyanto (Indonesia) | The Effect of A-Movement and X-Pattern Multiskill Exercises on Increasing Speed and Agility (Study on Male Players Futsal SMA N 1 Sidayu Gresik) | 220 |
| 7 | Arifah Kaharina, Gadis Meinar Sari, Damayanti Tinduh (Indonesia) | Effect of Far Infrared Radiation with Bag Infrared on Recovery After Submaximal Physical Activity | 225 |
| 8 | Awang Firmansyah, Gadis Meinar Sari, Achmad Widodo (Indonesia) | Comparison Plyometric Rope Jumping With Different Work Interval 10, 20, 30 Second Toward Agility | 230 |
| 9 | Banyu Biru Kurniawan, Agus Hariyanto, Amrozi Khamidi (Indonesia) | Effect Of Exercise Rope Jump And Reactive Jump Over Hurdles To Leg Power Muscle And Speed | 233 |
| 10 | Bujang, Apta Mylsidayu (Indonesia) | Analysis of Physical Condition of Athletes PORDA Bekasi City In 2016 | 239 |
| 11 | Dewiyati Sri Suprawanti, Oce Wiriawan, Soetanto Hartono (Indonesia) | Effect of Leg Press and Leg Extension Ascending and Descending Pyramids Exercises to Leg Muscles Vitality and Power as A Study on Male Extracurricular Students of SMKN Kabuh, Jombang District | 245 |

| | | | |
|----|--|--|-----|
| 12 | Ebta Heri Susanto, Suroto, Amrozi Khamidi (Indonesia) | Application Software Development Preparation Learning Implementation Plan (RPP) Class VII For Physical Education Junior High School Teachers In Bojonegoro | 250 |
| 13 | Fajar Eka Samudra, Harjanto JM, Damayanti Tinduh (Indonesia) | Acute Effect Of The Crossfit With High Intensity Interval Training (HIIT) And Circuit Training Method On Blood Lactic Acid And Heart Rate | 255 |
| 14 | Faris Pamungkas Wicaksono, Sugiharto, Rias Gesang Kinanti (Indonesia) | Effect of Exercise with Rapi Music Tempo Intervention Toward Increasing The Thickness of Left Ventricle Heart in Wistar Rats | 259 |
| 15 | Hamdani (Indonesia) | The Effect of Visual Audio on The Result of Single Pencak Silat Motion | 264 |
| 16 | Hariadi, Sri Winarni (Indonesia) | Developing A Model Of Karate Basic Motion Exercise Through The Modification Of Tradisional Game For Beginners | 272 |
| 17 | Havid Yusuf, Dini Safitri (Indonesia) | Comparative Analysis of Concentric Exercise Types with Eccentric Exercise to Delta Blood Glucose in Diabetes Mice | 280 |
| 18 | Hernowo, Suroto, Amrozi Khamidi (Indonesia) | Developing Software Application for Lesson Plan (RPP) of Penjasorkes SMA Grade X (Ten) in Bojonegoro | 284 |
| 19 | Heryanto Nur Muhammad (Indonesia) | Evaluation of Athlete Development Program In Field Hockey | 289 |
| 20 | I Kadek Dwi Dian Devayana, Tiassari Janjang Suminar (Indonesia) | Effect of Plyometric Exercise on Shooting Skill of Football School Students Gajayana Malang City | 294 |
| 21 | Johan Nur Cahyo, Tatok Sugiarto, Agung Kurniawan (Indonesia) | The Development of Speed Training Models For PSSI Malang Football Referee. | 299 |
| 22 | Kartika Septianingrum, Setya Rahayu (Indonesia) | Influence Exercise Approach Still Ball Flick And Moving Ball Flick Hockey Shoot Result At Beginners Hockey Player | 303 |
| 23 | Kurnia Dwi Aisyah, Gadis Meinar Sari, Ahmad Widodo (Indonesia) | The Influence of Plyometric Rope Jumping Training Using Interval Training Method with 10, 20 and 30 Second – Working Interval on Strength and Power OF Leg Muscles | 308 |
| 24 | Mahfuz, Nining Widyah Kusnanik, Oce Wiriawan (Indonesia) | The Influence of The Exercise Squat Jump and Standing Jump and Reach Against The Power Leg of Muscle | 311 |
| 25 | Moch. Yunus (Indonesia) | Effect of an Interval Training Program Versus a Continuous Training Program on Antioxidant Enzyme Activities and Oxidative Stress Level in Healthy Young Men | 322 |

THE INFLUENCE OF PLYOMETRIC ROPE JUMPING TRAINING USING INTERVAL TRAINING METHOD WITH 10, 20 AND 30 SECOND – WORKING INTERVAL ON STRENGTH AND POWER OF LEG MUSCLES

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Abstract

The Plyometric Rope Jumping is an easy – used training having a cheap tool, and it can be done anywhere, yet it has a good effect on athletes' physical performance. The aim of this research was to know the effectiveness of plyometric rope jumping training using 10, 20 and 30 second – working interval on strength and power of leg muscles. The number of subjects in this research was 33 trained students which would be divided into 3 groups of 10 second – working interval (n=11), 20 second – working interval (n=11) and 30 second – working interval (n=11) (controlling group). The measurement of both the strength of leg muscles used *Half Squat Jump* and the power of leg muscles used Standing Board Jump Test. This research used consecutive sampling method with pretest – posttest control group design. The research result showed that the variables of strength and power of leg muscles experienced the increases among three groups ($p>0.05$). Anova test on the variables of strength and power of leg muscles showed that there were no differences among those three groups. In conclusion, plyometric rope jumping training increased the strength and power of leg muscles, although there were no differences among the groups of 10, 20, and 30 second – working interval.

Keywords :Plyometric, rope jumping, interval training, Power.

INTRODUCTION

The main training goal of achievement sport is to develop physical abilities of physical elements (strength, speed, power, flexibility and endurance) into higher standards. Sportmen try to achieve the goal of fixing the organism system and the function is to optimize the achievements or sport performances (Bompa, 2015).

The strength is one of essential elements and must be had by an athlete since every performance in sport needs the strength of muscle beside any other elements (Rusli, 2011). According to (Lacy, 2011), power is an ability to use the maximum strength in a very short time. Therefore, the rope of physical training is really important in preparing a match. Besides, by increasing physical abilities, it can prevent injuries (Sukadiyanto,2011).

Chu (2013), plyometric training is a training type which is used to increase the strength and power. Rope jumping is one of types of plyometric training to train the strength and power of leg muscles (Rusli, 2011). Rope jumping is training type which can be used anywhere and without heavy equipments. Interval training is considered as the most effective method since there is a break phase among training phases (Foss, 1998). Hence, the researcher

wanted to know the plyometric rope jumping training using 10, 20 and 30 second – working interval on the strength and power of leg muscles.

METHOD

This research was the field experimental research. The number of subjects in this research was 33 trained students which would be divided into 3 groups of 10 second – working interval (n=11), 20 second – working interval (n=11) and 30 second – working interval (n=11) (controlling group). The measurement of both the strength of leg muscles used *Half Squat Jump* and the power of leg muscles used Standing Board Jump Test. This research used consecutive sampling method with pretest – posttest control group design. This research was done as long as 6 weeks with the frequency of meeting at 3 times in a week.

RESULTS AND DISCUSSION

The data explained the whole characteristics of sample. The average and standard deviation of age on all groups were (19.27 ± 0.91 years old), IMT were (21.56 ± 1.55 kg/cm²) and leg were (85.33 ± 5.34 cm). The data of age, IMT and leg were homogenous due to $p > 0.05$ on homogeneity test. The distribution data was normal due to $p > 0.05$. The result of different test showed the significant result (0.000). The data of power of leg muscles also showed the significant result (0.005). Those meant there were significant differences before and after the treatment. Because the result before and after plyometric rope jumping training using 10 second – working interval experienced the increase, the result of different test showed the significant result (0.000). The power of leg muscles also showed the significant result (0.001). It meant there were significant differences before and after the treatment. Because the result before and after plyometric rope jumping training using 20 second – working interval experienced the increase, the result of different test showed the significant result (0.000). The power of leg muscles also showed the significant result (0.000). It meant there were significant differences before and after the treatment. Because the result before and after plyometric rope jumping training using 30 second – working interval experienced the increase. The ANOVA data showed on the strength (0.717) and power (0.301) of leg muscles that there were no significant differences which meant three groups using 10, 20, and 30 second – working interval had the same working effectiveness.

From the results which had been analyzed, 10 and 20 second groups of rope jumping experienced the increase of the strength of leg muscles. This was because if it is trained continuously, it will improve the recruitment of muscle fibers. The expansion of muscles is caused by extending muscle fibers as a consequence of the training. If muscle fibers get bigger, the muscles will be much stronger. This is because of the stretch reflect which happens, response from contraction, the consequence of this plyometric rope jumping training form caused response from muscle spindle experiencing muscle contractions. The bigger and faster loads which happen on the muscles will make stronger contractions (Kutz, 2003). In the use of energy system on 10 and 20 second groups of rope jumping training, it used the energy system of ATP-PC where if muscles are trained continuously, so ATP supply becomes bigger. In order that muscles can be contraction continuously strongly, so ATP should be formed rapidly. Re-establishment of ATP (ATP resistance) requires energy. That

energy comes from PC (PhosphoCreatine) which also exists in the muscles. If the PC is broken, it will produce energy. That fission does not require the oxygen: The number of this PC is just a few, but it is the fastest energy resource to re-establishment of ATP. ATP-PC has already been stored in the muscles. Both of them can provide enough energy in the maximum physical working which is done in 0 – 20 seconds (Foss, 1998). This ATP-PC is the energy resource that can be used rapidly needed for sports which need a high speed. In the 30 second – working interval, it happened a fission of glycogen reserves without using oxygen (anaerobic glycolysis). The activity which was done maximally was in 20-45 seconds. This process required a reaction which was longer than phosphagen system, because this glycolysis produced lactic acid, eventually the establishment of energy through this system was slower. The lactic acid that was formed in anaerobic glycolysis would decrease pH whether it was in muscles or blood. The change of pH would hamper the work of enzymes or chemical reactions in the cell particularly in the muscles, so it caused the contraction becoming weak and finally muscles experienced the exhaustion. To remove it needed 3 -5 minutes.

CONCLUSION

The groups of 10, 20 and 30 second – working interval experienced the increase on the strength and power of leg muscles, yet there were no differences among them.

SUGGESTION

It needs to do research on the influence of plyometric rope jumping training using the different interval training method.

ACKNOWLEDGMENT

Thanks to Universitas Negeri Surabaya on permission given for doing the research in GOR Bima Unesa.

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