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The Effect of Exercise Phase Preparation Combination Special of Sport Massage toward Resistance of Muscle, Flexibility and Explosive Power of Muscle on Students Non Athlete

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Abstract: ***Physical good condition is one of decisive factors in achieving a sport achievement so it is necessary to preparation exercise program that gradually, planned and systematic which as in the preparation phase special exercises (LPK). Exercises that use in anaerobic energy system that has the potential to produce a high lactic acid, this is causes impaired formation of ATP, occurred fatigue and affect the physical condition. This study was aimed to know the effect of exercise phase preparation combination special of sport massage toward Basic physical condition which consists of resistance of muscle, flexibility and explosive power of muscle. Subject of the study was consist of 20 students faculty of sport and science UNIMED who is not an athlete (age 18, 50 ± 0, 483 years, weight 59, 60 ± 4, 014 kg, height 166, 15 ±2, 554 m). Subjects were randomized in 2 groups, namely Special preparation phase training group (LPK+SM)(n=10) and Special preparation phase training group (LPK-SM) (n=10). Special preparation phase training program 3 days(Monday, Wednesday and Friday) Every week for 8 weeks. Measurement of physical condition is performed before exercise and after 8 weeks of practice. The results showed that there was a significant increase (p<0, 05) on muscle endurance, Explosive power of muscle and elasticity after 8 weeks of exercise in both groups LPK+SM and LPK-SM than before practice. There is a significant difference (p<0, 05) between the two groups, which increases muscle endurance, explosive muscle power and better abilities in groups of LPK+SM than the group of LPK-SM. It can be concluded that Exercise special combination preparation phase of sport massage is more effective in improving basic physical conditions than other exercise groups.***

Keywords: Massage_Resistence, Muscle Flexibility, Power of Muscle

1. Introduction

Sports achievement is an athlete's achievement after doing the maximum effort or best performance in a match or competition. Sports achievement which is best for an athlete in a competition is to become a champion. Achieving maximum performance requires good physical condition is One of the decisive factors in achieving a sport achievement (Bompa & Haff 2009).

The main factors that affect the physical condition among others are exercise factor and recovery factor, in addition to other factors Such as nutrition. To get a good physical condition, it is needed programming gradual exercise, Planned and systematic or which is referred to as the periodic of the exercise such as on a special preparation phase training program (LPK) (Bompa & Haff 2009).

In essence purpose of physical exercise is increase anaerobic and aerobic capacitythrough anaerobic and aerobic exerciseswhich adequate and accurate. Anaerobic exercise aims forIncrease inventory of ATP-PC in a muscle, increased levels of glycogenandincrease in anaerobic threshold valueby means of the formation of lactic acidwhich is less on the same load and resistancetowardsacidity caused by lactic acid. The accumulation of lactic acid in the bloodbe a fundamental problem in physical performance, Because it can cause fatigueSo it can reduce the performance of athletes (Benardot 2006; Foss & Keteyian 2006; Guyton & Hall, 2008; Farenia et al, 2010).

Determining the dosage of exercise is necessary to prevent injury to the athletes. Exact training doses will cause a strong enough stimulus to improve the physical condition of the athlete which is reflected in the increased muscle endurance, Explosive power of muscle and flexibility (Powers & Howell 2001).

Recovery immediately after exercise is a crucial factor to improve athlete performance (Wiltshire 2009; Pinar, Kaya, Bicer 2012). Sport Massage can restore physical condition, because lactic acid which is formed can be eliminated through increases microcirculation in muscles (Mika A, Mika P, Fernhall 2007). However, research on the effects of Sport Massage therapy is relatively limited and even from several studies giving different results about the effect of Sport Massage, like the research of Hemming et al. (2000), Against 8 amateur boxers, the treatment group was given Sport Massage for 20 minutes with effleurage technique and petrissage on whole bodies and other groups with passive rest treatment. The results stated that lactate levels and boxer performance did not differ significantly between groups given Sport Massage and passive rest groups.

2. Research Method

Subjects

Subject of this study were 20 students of faculty of sport and science UNIMED who is not an athlete (age 18, 50 ± 0, 483 years, weight 59, 60 ± 4, 014 kg, height 166, 15 ±2, 554 m). Subjects was divided randomly in two groups, namely group of Special preparation phase training (LPK+SM)(n=10) and group of Special preparation phase training (LPK-SM) (n=10). It was got approval from research Ethics Committee of FK USU with number.270/KOMET/FKUSU/2016. Before undergoing the tests, the subjects were given explanations about the assessment procedures, study objectives, and the possible benefits and risks. All subjects based on medical information questionnaire were healthy and none of hypertension, cardiovascular disease, diabetes, lipid disorders, kidney disease, liver disease, respiratory and bone injuries and did not exercise any supplement use in past 6 months

Experimental design

This study was conducted by Experimental Randomized Pre and Posttest group design. Special preparation phase training program 3 days (Monday, Wednesday and Friday) every week for 8 weeks. The form of such as weight exercises. Measurement of physical condition was done before exercises and After 8 weeks of practice. When did a test, research subjects first warm up for 15 minutes, and then physical measurements were taken that is by starting from a muscle endurance test, flexibility test and Test muscle leg explosive power. Rest time was between measurements for 5-10 minutes. During the break time the subject of the study will receive an explanation about implementation of another test.

Muscle endurance exercises

Form of exercise leg curl, Exercise dose was 15-25 RM, 3 sets that accompanied the break between sets of 3-5 minutes.

Flexibility exercises

Form of exercise PNF (Proprioceptive Neuromuscular Facilitation)

Explosive power of muscle exercise

Form of exercises was squat jump; Exercise dose was 12-15 RM, 3 sets that accompanied the break between sets of 3-5 minutes.

Sport Massage

Partials massage on the lower leg by using the effleurage technique (rubbing).The trick is to use the palm of the hand to rub on the lower limb for 12 minutes (6 minutes of right lower legand6 minutes left leg down) after doing the exercises.

Measurement of muscle endurance

Squat Jumpstest to measure the ability of leg muscle endurance.

Measurement of flexibility

Subject of the research was stood with straight legs touch test beam. Flex meter measuring instrument and expressed in units of cm.

Measurements of muscle explosive power

Measurements of leg muscle explosive power by using the vertical jumps test. Subject was took the first gesture by bend their knee and both arms behind (the position is ready to jump). Jump as high as while tap the board scale when at the peak of the leap.

Statistical analysis

Statistical analysis was performed by using Statistical Package for Social Sciences (SPSS) for software of windows (version 23, 0; SPSS Inc.). Descriptive statistics are calculated as the mean and standard deviation (Mean ± SD). As addition, pre-post comparison between groups (LPK+SM and LPK-SM) analyzed by independent t-test. The level of significance in P<0, 05.

3. Result

Subject of the research of 2 groups was based on the age (18, 50±0, 483 age), weight (59, 60±4, 014 kg), height (166, 15±2, 554 m). Based on data analysis the homogeneity test (Levine test), p>0, 05showed that the data homogeneous in table 1.

Table 1: Results of homogeneity test of the capability basic physical components of a runner200 m

Variable	Pre		Post	
	Statistical Levene	sig	Statistical Levene	sig
Muscle endurance of limb(x)	0, 227	0, 877	0, 443	0, 724
Flexibility (cm)	0, 772	0, 517	5, 275	0, 004
Explosive power of leg muscle(cm)	0, 450	0, 719	1, 638	0, 198

p>0, 05: homogeneous of data variance

There was an average increase in muscle endurance, flexibility and explosive power of muscle which has a meaning (p=0, 000) after a workout in the 2nd group was group of LPK+SM and group of LPK-SM, are listed in Table 2.

Table 2: The measurement results of muscular endurance, explosive power of muscle and flexibility on group of LPK+SM (N=10) and LPK-SM (N=10) after and after training. Data was presented by mean±SD

Variable	LPK + SM		LPK-SM	
	Pre	Post	Pre	Post
Muscle endurance of limb(x)	38, 60 ± 1, 64	49, 10 ± 1, 44*	39, 60 ± 1, 83	42, 20 ± 1, 98*
Flexibility (cm)	15, 90 ± 0, 57	19, 80 ± 0, 79*	16, 00 ± 0, 82	18, 20 ± 1, 23*
Explosive power of leg muscle(cm)	47, 80 ± 3, 88	56, 60 ± 3, 16*	47, 20 ± 4, 51	50, 90 ± 5, 04*

LPK+SM: group of exercise preparation phase special combination of sport massage, LPK-SM: group of exercises without special preparation phase of a sports massage.* Differences in exercise significant influence (p<0, 05) than before exercise.

There was a significant difference in average increase muscular endurance, , flexibility and explosive power of muscle after exercise between groups of LPK+SM wit group of LPK-SM (p=0, 000). This means that the group of LPK+SM better in improving muscle endurance, flexibility and explosive power of muscle which compared to Group of LPK-SM, it can be seen in figure 1, 2and 3.

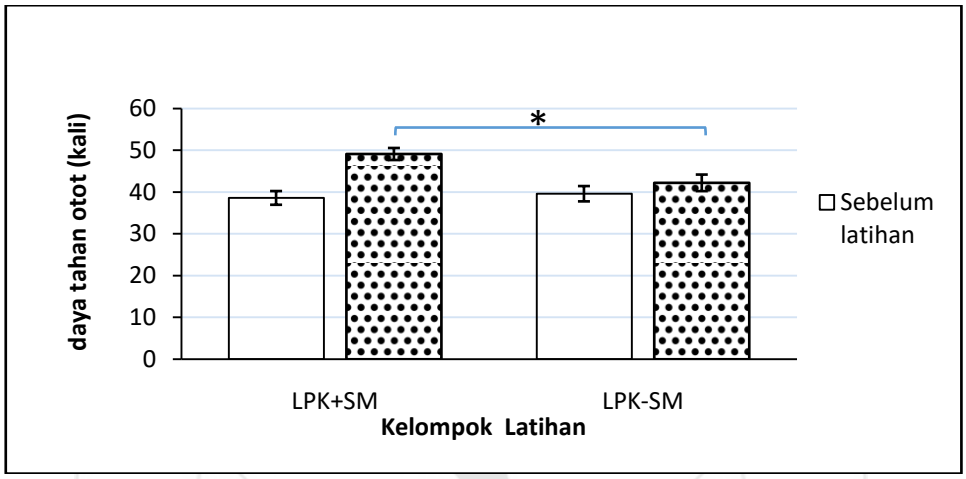

Figure1: The mean endurance muscles before and after exercise in group of LPK+SM and LPK-SM. * Differences in exercise significant influence (p<0, 05)

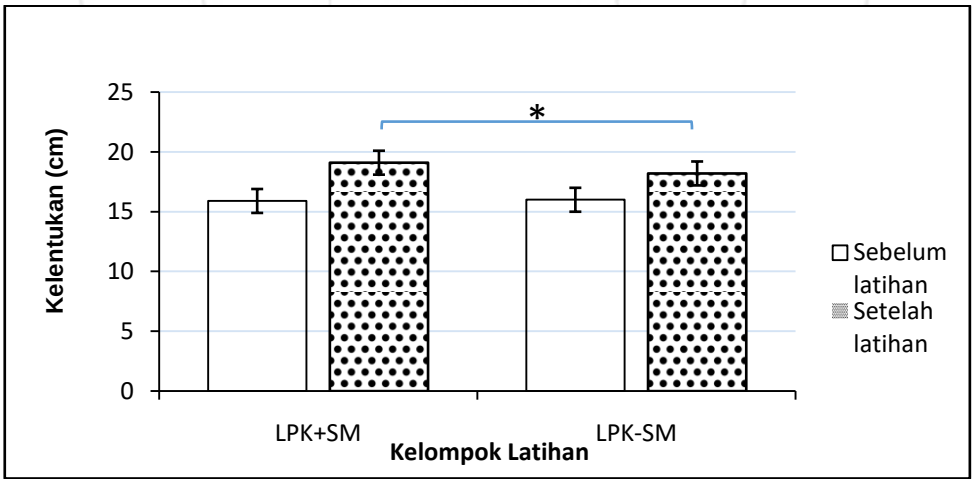

Figure 2: The mean of flexibility before and after exercise in group of LPK+SM and LPK-SM. * Differences in exercise significant influence (p<0, 05).

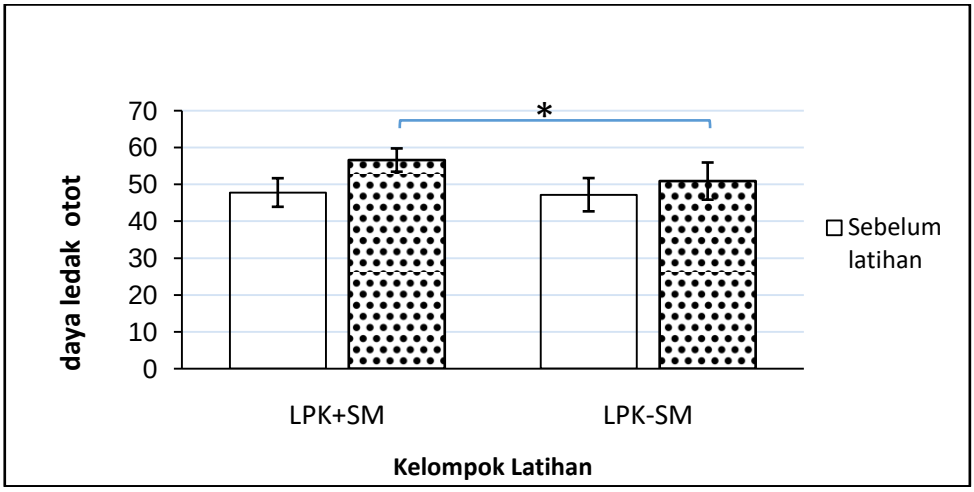

Figure 3: Average explosive power of muscles before and after exercise in group of LPK+SM and LPK-SM. * Differences in exercise significant influence (p<0, 05)

4. Results

The Effect of exercise on LPK + SM group were better and significant in improving muscle endurance, flexibility and explosive power of muscle, because LPK is part of periodic Exercise Program that continuous and well according with each individual exercise dose. The exercise program given in the form of weight training is a systematic process that is done repeatedly with increasingly long load increases gradually and can improve muscle strength (Bompa & Haff 2009).

Weight training will lead to physiological and biochemical changes in the muscles. The physiological changes that occurred along with increase muscle endurance that was increased myoglobin (13%-14%) which is muscle hemoglobin to bind oxygen. As the increased amount of myoglobinin muscle cells so physiologically stimulate repair oxygen uptake (Guyton dan Hall, 2008; Nala 2011). There was also a biochemical changes in the muscle that is increasing the number of mitochondria is a producer of energy (ATP) in the cell, an increase of glycolytic enzymes, myokinase enzymes and creatine phosphokinase (Foss & Keteyian 2006; Willmore & Costill 2008).

LPK is good exercise to improve flexibility because LPK program performed three times a week in the form of exercise Proprioceptive Neuromuscular Facilitation (PNF). Increased flexibility with a combination of exercise LPK because of that an increase in the elasticity of the muscles, tendons and ligaments. Flexibility exercise causes joint space becomes more widespread. Flexibility is important for all sports, especially sports that require rapid movement as in athletics, sports games and more (Arazi et al. 2012; Morcelli, Oliveira, Navega 2013).

The dominant use of explosive power movements that are explosive, the explosive power biomotoric there are two components, namely the strength and speed. The process of contraction in the muscles due to the stimulus that was causes its active actin filaments and myosin filaments. The faster the stimulus received and the faster the reaction given by the two filaments then muscle contraction becomes faster, so the explosive power generated merging become bigger because of the speed and strength (Satriya et al. 2007).

The impact caused the training is an increase in the percentage of muscle mass, so it was hypertrophied, increased by 30-60%. Hypertrophy occurs due to changes in skeletal muscle or increase the diameter of the fibers muscle fast. All muscle hypertrophy as a result of an increase in the number of act in and myosin filaments inside each muscle fiber, it was causing enlargement of the individual muscle fibers (Guyton& Hall 2008).

Mancinelli et al (2006) namely by providing the type of classic western massage for 17 minutes before the game against women volleyball players. The results showed that massage can reduce muscle fatigue and improve muscle explosive power than the athletes who did not receive massage treatment (Mancinelli et al. 2006).

When did the exercise by observing the motion patterns of muscle contraction, in part the necessary energy source derived from anaerobic lactasid. This leads to the accumulation of lactic acid in the muscles during a workout. If there is an increase in lactic acid is relatively long will cause the connective power of troponin Ca2 + ions into decline, and the rising power tie sarcoplasmic reticulum Ca2 + against. Both of these mechanisms will reduce the number of calcium ions bound to troponin during muscle contraction, so that will can lead to rapid onset of fatigue in runners 200m (Guyton & Hall 2008). To eliminate the increase of lactic acid in the muscles after exercise can be pursued with a sports massage.

Although with weight training at LPK increased lactic acid, but with a measured dose of exercise, regular and well programmed to increase the ability of muscles to eliminate lactic acid and increase tolerance to lactic acid by increasing the buffer capacity of bicarbonate and phosphate in the muscle (Willmore & Costill 2008).

Each training session at LPK + SM group carried out the recovery of lactic acid with a sports massage. In this study recovery was in the form of sports massage that includes active recovery and will reduce levels of lactic acid

quickly, due to the provision of a sports massage can eliminate the lactic acid that forms each completed work out by the presence of sufficient oxygen supply to the muscles (Weerapong, Hume & Kolt 2005; Best et al. 2008).

Sport massage is given after exercise LPK (LPK group and SM) causes the muscles in a state of relaxation and restore the blood vessels that had been squeezed by the contraction of muscles. Optimal relaxation allows blood flow to the lower leg muscles more optimal bring lactic acid to the liver. The lactic acid in the liver by the Cori cycle can be converted to pyruvic acid, pyruvic acid subsequently converted into glucose. This glucose can be metabolized back on the muscles active or stored in the muscles through the process of gluconeogenesis into glycogen and can be used as an energy source. Pyruvic acid going into the mitochondria when exercise performed below the threshold of lactic acid, or lactate threshold (LT), the process of formation of energy aerobically, while exercise above the LT like conventional exercise (exercise intensity weight) then the pyruvic acid is converted to lactic acid due to insufficient supply of oxygen into the mitochondria (David, Lee &Swanwick 2001; David, Cotterrel & Jones 2005).

The results of this study were also consistent with another study by Hartmann et al (2015) in people who were not trained. In the research found their physiological responses such as muscle hypertrophy, muscle strength and explosive power muscle after training periodization program. In this study, exercise intensity RM 12-15, 3 sets and performed 2-3 times / week. The results showed that an increase in muscle hypertrophy and muscle explosive power.

This research was conducted by Mancinelli et al (2006) namely by providing the type of classic western massage for 17 minutes before the game against women volleyball players. The results show that massage can reduce muscle fatigue and improve muscle explosive power than the athletes who did not receive massage treatment

5. Conclusion

Special Preparatory phase Exercise Sport Massage was better combination in improving muscle endurance, flexibility and explosive power of muscle that compared to the effects of exercise training Special Preparatory phase without Sport Massage.

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