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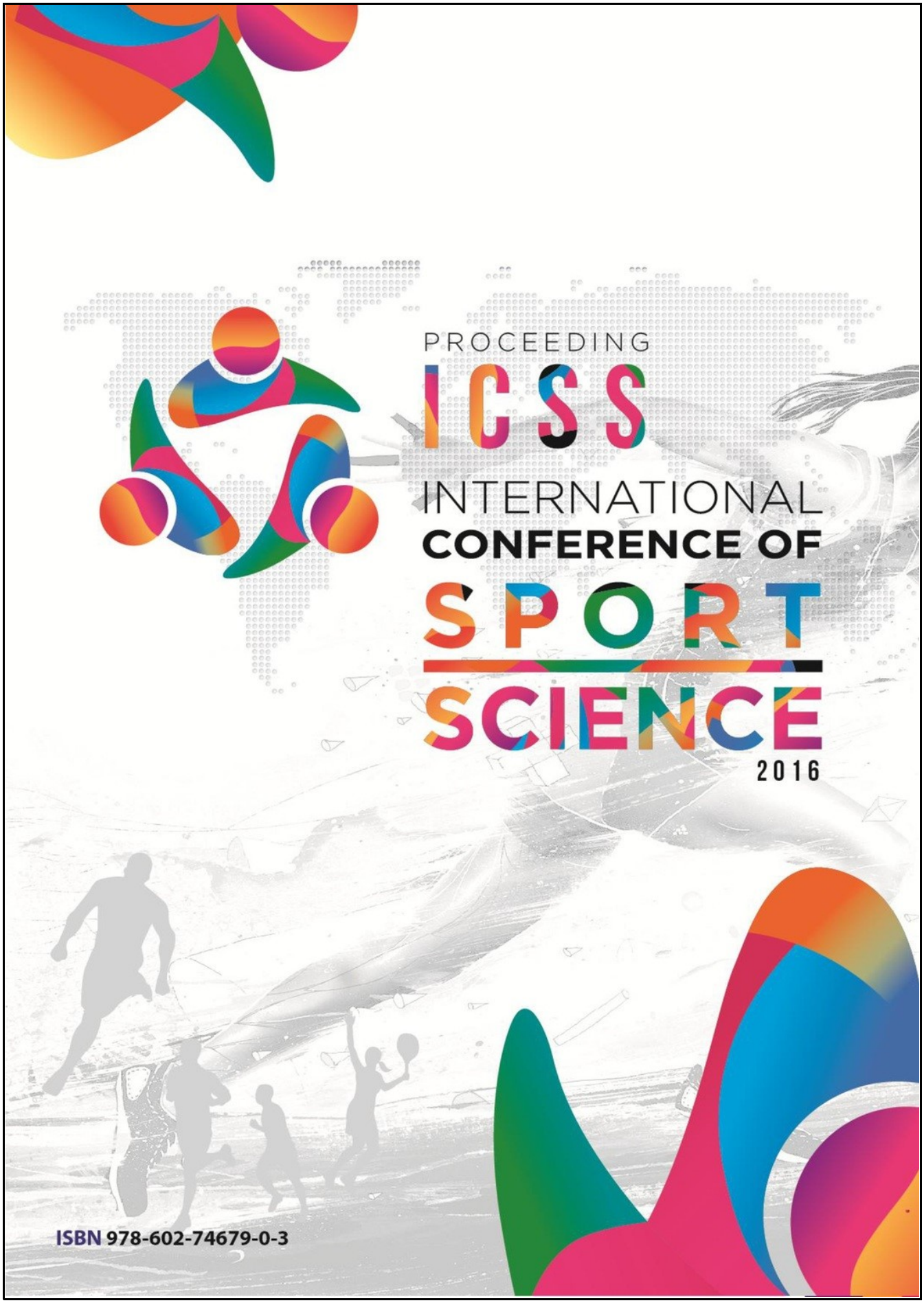

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Preface

Praise be to Allah the merciful and grateful, we have finished the Proceeding book of International Conference of Sport Science. This book was a draft of an international seminar which is the final project of seminar subjects.

This activity is expected to be a learning tool in particular, as well as a platform to introduce the state university of Surabaya to the academic community. Thus, the future State University of Surabaya can be more open, and more advanced in the application of information and technology as well as the latest sport science.

We are thanks to all of keynote speaker Dr. Greg Eilson (Australian Strength and Conditioning Association), Gunter Lange (Germany), Dr. Nining Widya K., M.Appl.Sc. (Universitas Negeri Surabaya, Indonesia), Serkan Berber (Anadoulu University, Turkey), Dr. Soumendra Saha (University of Sains Malaysia) and Dr. Yusuf Fuad, M.Sc. (Universitas Negeri Surabaya, Indonesia).

We are thanks to the lecturer as well chief of department of Postgraduate Sports Education of Pascasarjana Unesa, Dr. Edy Mintarto,M.Kes. for support and guidance during we started the process of this conference.

Thanks also to all friends who have worked hard to succeed whole process of international conference.Hopefully in the future, everything we do today can be useful and be equipped very useful in sport studies and other activities of postgraduate of Sport Education of Unesa.

Surabaya, June 1st, 2016

Greetings
Editor,

Fattahilah

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EFFECT OF CIRCUIT EXERCISE AND TRAPPING CIRCUIT WITH REGULAR AND DECREASED REST INTERVAL TOWARD THE ABILITY OF STRENGTH, SPEED, AGILITY, VO2 MAX, POWER AND RECOVERY

Sigit Nugroho

ABSTRACT

This study intended to assess and examine whether there was any difference in the effect of the type of circuit training and trapping circuit with regular and decrease rest interval to the increased ability of strength, speed, agility, VO2 Max, power and recovery.The research was conducted by using a quantitative approach with quasi experimental method. The design used in the research used a design with 2 times factorial design (22). The research population were all male students who live in Wisma Olahraga in 2015. The samples were taken of the total population by means of "Purposive Random Sampling". The amount of sample was determined by the formula of Isaac and Michael gained for 48 samples. The samples were divided into 4 groups by means of ordinal pairing, so that each group consisted of 12 male students. The instrument used to measure in this research was a back and leg dynamometer, 30 meterrun, the T-test, Multistage Fitness Test (MFT), Jump-DF and pulse oxymeter. The data analysis technique used to test for normality, homogeneity and test box test was as a prerequisite test. Meanwhile, for the hypothesis test used multivariate analysis (MANOVA) with 2^2 factorial analysis with a significance level of 0.05.The calculation result of multivariate test showed significant results proven bythe results of the calculation of Sig. point<0.05 (p<0.05). In training method, rest interval, and exercise method interaction with rest interval, all three show significant point that is equal to 0.000. Based on data analysis, it can be concluded that there is significant influence on the four treatment groups towards dependent variables which include strength, speed, agility, VO2 Max, power, and recovery. In terms of the effectiveness of training methods, it can be concluded that the most effective training methodto improve VO2 Max is by using10-second decreased rest interval, to increase the speed and agility is by using trapping circuit method with 45 second regular rest interval, and to improve strength, power and recovery is by using trapping circuit training method with 10 second decreased rest interval. While seen from the difference of rest interval, 10-second decreased rest intervalis more effective in improving all of the dependent variables that consist of strength, speed, agility VO2 Max, power, and recovery than 45 second regular rest interval.

***Keywords**: circuit training, trapping, rest interval, strength, speed, agility, VO_2Max, power and recovery.*

INTRODUCTION

Excellent physical condition is a factor that should be owned by every athlete. The physical condition is seen by the indicator of physical fitness which is the foundation for the subsequent exercises primarily to acquire technical skills and tactics. Perfect technical skill is a factor that is crucial in achieving the highest achievement, without the perfect mastery of the skill, an athlete finds it hard to achieve the high performance. The tactical ability and strategy is the vital ability to win the game in a positive way. Mental health is a psychological aspect that must be possessed byan athlete. Those psychiatric aspectsare moral, sportsmanship, the real sportsman character, discipline, confidence, concentration, thinking, and creativity, willpower and fighting spirit, responsibility, self-esteem, courage, and collaboration (SetyoBudiwanto, 2012: 4).

The suitable physical exercise method to improve physical conditions should include aerobic capacity and anaerobic capacity. The training methods include the use of circuit training. Bompa (2015: 230-231) arguesthat the circuit training was first proposed by Morgan and Adamson (1959) from the University of Leeds as a method to develop general fitness. Circuit training consists of several stations that are arranged in a circle so that muscle groups can work interchangeably from station to station. From the research results after doing a circuit trainingconsisting of two programs, namely the use of weight and aerobic programs, it can improve the health, cardiorespiratory, and muscular fitness (Shawn Simonson, 2010: 2). Brett Klika and Chris Jordan (2013: 11) suggest a circuit training with high intensity (HICT) which is an efficient way of exercises to help

reducing the body fat, improvinginsulin sensitivity, improving VO2 max and muscle fitness. Chtara et al (2008: 1037) argue that the circuit training is a useful method to improve strength and cardiovascular performance. Chittibabu and Akilan (2013: 22) suggest a circuit training for 3 times per week for six weeks with a time of 2 minutes at an intensity of 90% - 95% of the target of the heart rate with the addition of reps for about 8, 10, or 12 reps for every week, followed by the active rest at 60% - 70% of the heart rate indicate that there is a significant increase in aerobic capacity and improve cardiovascular fitness. While circuit training is carried out in 15 weeks that lasts about 45 minutes with intensity 60% - 85% of the heart rate, it can affect significant changes in anthropometric variables and physical condition (Leonardo Gomes Ferreira, 2013: 3).The physical condition can be improved by a kind of full exercise from the unity of the components that cannot be separated, both for the increases and maintenance. In order to find out the necessary physical training methods, it is important to know the extent to which the method of circuit training and circuit trapping affect the ability of the physical conditions which include strength, speed, agility, VO2 Max, power, and recovery.

METHOD

The research method was based on quasi-experimental research using 2 x 2 factorial designs. The research population was all male students who lived in the sports dorm in 2015 with the total of 55 persons. The samples were taken of the total population by "Purposive Random Sampling". The amount of sample was determined by the formula of Isaac and Michael (Sugiyono, 2013: 128). Once inserted into the sample size calculation formula,the samples were for about 48 persons. The instrument used to measure the six components of physical condition in this study were: a) for the strength of the back and leg, it used digital dynamometer, b) for the speed,it used 30 m sprint, c) for the agility with T-test, d) for VO2 max,it used multistage fitness test, e) for the power,it used Jump-DF and f) for the recovery,it used a pulse oxymeter. The data were analyzed by using the prerequisite test comprising: a test for normality with the Kolmogorov-Smirnov Z, homogeneity test with F-test, and the test box test. While to test the hypothesis, it was using multivariate analysis (MANOVA) with 2^2 factorial analysis with a significance level of 0.05.

RESULTS AND DISCUSSION

Based on the MANOVA analysis on training methods, it obtainsthe value of $p < 0.05$ (sig. Less than 0.05), so that all four methods of exercise with the regularrest intervals of 45 seconds and decreased rest interval for 10 seconds by using four statistical models: 1) Pillai's Trace, 2) Wilks' Lambda, 3) Hotelling's Trace and 4) Roy's Largest Root, show the significance value of 0.000, less than 0.05 ($p < 0.05$), so it can be said that the method of circuit training with regularrest interval for 45 seconds (cell 1), a circuit training with decreased rest interval for 10 seconds (cell 2), circuit trapping with regular rest interval for 45 seconds (cell 3) and circuit trapping with the decreased rest interval for 10 seconds (4 cells), significantly influence the improvement of strength, speed, agility, VO_2Max, power, and recovery. Based on the results of inferential statistics on the value of the lower bound in each cell of the MANOVA analysis, the method of circuit training and circuit trapping combined with a regularrest interval for 45 seconds and a decreased rest interval for 10 seconds, it is found that: a) the most effective increase in VO_2 Max is gained fromthe circuit training method withthe decreased rest interval for 10 seconds, b) the most effective increase in speed and agility is gained from the circuit trapping with theregularrest interval for 45 seconds, and c) the most effective increase in strength, power, and recovery is gained from the method of circuit trapping with the decreased rest interval for 10 seconds. Summary of the research results can be seen in the following table:

Table1.Summary of Lower Boundfrom 4 Training Methods

Training Method	Dependent Variable	Rest Interval	
		Regular	Decreased
		Lower bound	**Lower bound**
Circuit *Training*	Strength	204,706	242,915
	Speed	3,448	3,593
	Agility	10,109	10,537
	VO_2 Max	42,894	**49,736**
	Power	65,296	73,879
	Recovery	18,812	32,812
Circuit *Trapping*	Strength	252,081	**257,456**
	Speed	**3,005**	3,510
	Agility	**10,056**	10,083
	VO_2 Max	42,844	43,761
	Power	66,879	**89,546**
	Recovery	27,396	**51,562**

From thosecircuit training methods that have been made in the implementation of the study, it shows that there is some significant influence of the circuit training and circuit trapping method with the regularrest interval for 45 seconds and the decreased rest interval for 10 seconds on the ability of strength, speed, agility, VO2 max, power and recovery. Baljinder Singh Bal (2013: 8) states that all forms of exercise can change the atmosphere of life, attitude and bring rhythm and it can improve the appearance of better performance. Louisa Beale et al (2013: 1)argue that circuit training with moderate intensity (40% - 70%) is more effective for the treatment of cardiac rehabilitation when compared with high-intensity interval training. Pedro Alcaraz et al (2008: 667) find that the prisoners' circuit training is an excellent method to stimulate an increase in muscle size, strength, power, and local muscular endurance. Numerous studies show that the ability of the power is influenced by anthropometric variables such as body mass, height, leg length, width calf, thigh length, arm length and hand width (Jayakumar, 2013: 12). Menzies (2010: 14) finds that active recovery after strenuous aerobic activity will increase lactate clearance compared with passive recovery. Other studies have also found that active recovery can increase blood flow, thus increasing the translocation of lactic acid from the muscles into the blood (Spierer, 2004: 5). The research conducted byConolly et al (2003: 49) found that there was no significant difference in the concentration of blood lactate between active recovery and passive recovery donein 3 minutes, but when seen from the graph, an increase in blood lactate on active recovery was lower than the passive recovery.

CONCLUSION

Based on data analysis, it can be concluded that there is significant influence on the four treatment groups on the dependent variable which include strength, speed, agility, VO2 Max, power and recovery, shown by the results of the calculation of the value of Sig. <0.05 (p <0.05) which is equal to 0.000. In terms of the effectiveness of training methods, it can be concluded that the most effective training method: a) increase VO2 max by the circuit training method with the decreased rest interval for 10 seconds, b) increase the speed and agility by the circuit trapping methodwith the regular rest interval for 45 seconds, and c) increase the strength, power, and recovery by the circuit trapping method with the decreased rest interval for 10 seconds. While looking at the differences in training methods, there is a significant difference on the circuit training and circuit trapping method as the method of circuit training workout is more effective in improving the speed and agility, while the method of circuit trapping is more effective in improving the strength, power and recovery. However the circuit training and circuit trapping

method show that those methods give no significant difference in the increase of VO2 Max. Judging from the difference interval break, the decreased rest interval for 10 seconds is more effective in improving all of the dependent variable that consists of strength, speed, agility VO2 Max, power, and recovery compared to the regular rest interval for 45 seconds. There is a significant interaction of circuit training methods and circuit trapping with the regular rest interval for 45 seconds and the decreased rest interval for 10 seconds on the ability of strength, speed, agility, VO2 Max, power, and recovery.

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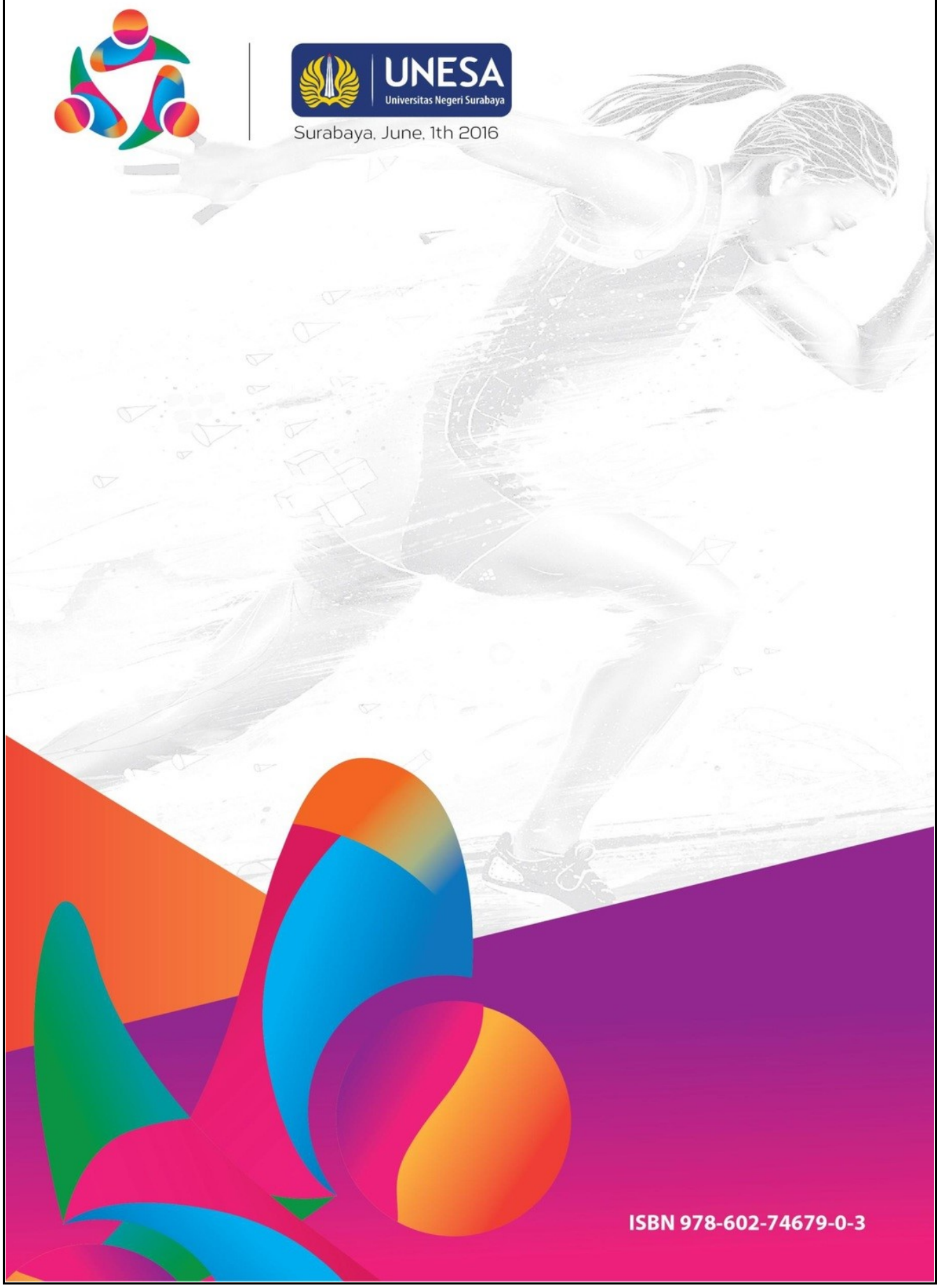

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