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The Maintenance of Endurance Performance among Taekwondo Athletes During the Competition Period

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Abstract

Taekwondo kyorugy is a martial arts fight conducted one-on-one using the standard rules and performed for 2 minutes 3 times a round. In the case of equal value, there is an additional round with sudden death system. The type of taekwondo kyorugy/fight motion is always done with speed and explosive motion. Therefore, the energy system used is predominantly aerobic. During the competition period, it needs exercise program with a model that is close to the real game but can maintain anaerobic endurance performance up to the main competition. This study was designed using the method of action research where the training program was run and simultaneously observed and evaluated to obtain the desired results. After that, the test results were processed to result in the average values then narrated as it is shown in the existing graphs. The Running-based Anaerobic Sprint Test (RAST) was implemented for durability tests. The results of the discussion on the chart competition period did not show significant change. This condition indicates that training program can maintain endurance performance during the competition period. In the discussion on the competition period, there are findings which strongly confirm the assumption that taking a rest is as important as doing the exercise itself. It is caused by the fact that some tests which were repeated because of lack of rest and the result were not good, but after adequate rest was given the result was much better. Based on the results of the exercise using the four physical exercise models employing the taekwondo approach, techniques, and tactics, it was proven that it was capable of maintaining the aerobic endurance performance during the competition period. It is hoped that athletes will quickly adapt to the actual match.

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INTRODUCTION

Exercise is an ongoing process that is systematically arranged using the principles of the right coaching. In the world of coaching, a training program is essential and must be understood by the coaches of achievement sports. Sports performance can be achieved if it is done with good and comprehensive planning. Whether or not a planning exercise is good depends on of every periodization that can be designed according to the needs and there is no overlap between the exercises to each other. Periodization training is divided into the general period, the competition, and the transition but the details can be divided into five stages. The stages in question are the general period, the special period, the period of pre-competition, the competition period, and the transitions. Each of these periods has different specifications, both in terms of objectives, processes, and forms of training. All of the stages of aimed at improving the physical performance of the athletes, but especially the competition period is emphasized more on maintenance. Meanwhile, the transition period is the period of active rest after the game.

In designing training techniques into the physical realm, there are not many taekwondo coaches who were involved in the field because they have never had sufficient knowledge or they never pay attention to taekwondo training issues. Training in the competition period is a momentum to maintain physical performance. One of them is the durability that has already been built during the period of the previous exercise, but it should be able to support the mastery of technique, tactics, and strategies.

The specificity of the competition period is an interesting thing to study because the exercise does not aim to improve the physical performance of the athletes but instead to maintain the performance that has already been owned. The physical components that are important for the sport of taekwondo are endurance, strength, speed, power, agility, and flexibility. One of the important physical components that greatly affects the appearance of the athlete during a competition is anaerobic endurance. Endurance is the ability of the sportsmen's organs in fighting fatigue during the activity (Sukadiyanto, 2010: 60). Durability, in this case, is both aerobic and anaerobic.

According to Tulloh (2007: 95), improving endurance exercise performance is no longer recommended, but in fact, many athletes miss their chances by doing too much exercise before the game. The model of endurance training during the competition period can use target sparing, Hugo sparing, pecing sparing (box), pecing dodge or semi sparring. Each round is given 1 minute or 30 seconds rest depending on whether or not it is a high or medium intensity. At the time of the target sparing, there are things that should be done by the coach, that is always checking the athletes' pulse of in every 3 rounds. Every 3 rounds the athletes should be in the 90% zone of maximum heart rate. However, what to keep in mind as the main focus is to maintain physical condition. But if the rate increases without disturbing the skills and the other physical components there is nothing to worry about.

According to McNeely & Sandler (2007: 18), for many athletes, one-year training will come to one important thing when strength, skill, speed, endurance, and tactics all need to do together at the right time. The final preparations for the competition are both an art and a science which requires an understanding of the physiological changes that occur and the skills to manage the psychological and emotional condition of an athlete for their experience of the tough year approaching the peak of an exercise.

According to Espen Tønnessen (2015: 37), although there is a further longitudinal study about the elite athletes from different countries and different sports, the detailed training analysis during the 8th world championship the athletes' endurance lead to three specific recommendations for the coaches and athletes: 1) The high-intensity training mode seems to be an important variable that can be manipulated to allow athletes to achieve peak

performance at the desired time. Interval training, continuous training with high intensity, and competition are all critical components of the training process. However, during the special period and the competition period, the majority of high-intensity exercise should lead to the competition period. It provides a holistic stimulus of physical, technical, tactical, and mental factors required for peak performance. 2) A steady growth in the training volume during the transition period through a preparation period is recommended to make sure that the performance will be improved while reducing the risk of injury and illness. 3) In order to achieve peak performance, it is recommended that non-sport-specific training is eliminated during the special periods or pre-competition. The decline in the volume of low-intensity training can be achieved by shortening the simple training session, without reducing the frequency of training.

Competition period is the end of a training plan leading to the main competition. After the competition period, a taekwondo athletes will be directly facing the main purpose of the exercise that is to compete. It should be understood that the purpose of the exercise period of the competition is not to increase the physical ability any longer but rather to maintain the athletes' anaerobic endurance. Therefore, the need for special treatment is to maintain the condition after the pre-competition periodization. After the pre-competition period, a coach must have data of the athletes' anaerobic endurance, because it is a benchmark for the development of the programs and exercise models that are right for maintaining the athletes' performance in the field.

With regard to physical fitness, such factors as agility, strength, endurance, and flexibility are considered very important in the taekwondo competition (Bridge CA F. S., 2014; Casolino et al., 2012; Markovic et al., 2005). More than 90% of the scoring is based on the kicking skills, the strength of certain muscle and endurance in the lower extremities are required (Casolino et al., 2012; Matsushigue et al., 2009; Santos et al., 2011; Tornello et al., 2013). In addition, during the two-minute-three round taekwondo game, the heart rate mean (HR Mean) of the athletes can reach 85% of the maximum (HR max) meaning that taekwondo kyorugy is a sport of high intensity (Bridge et al., 2013; Chiodo et al., 2011; Matsushigue et al., 2009). Thus, the performance is very much dependent on the anaerobic metabolism because scoring is achieved through the attack in a very short time interval, e.g. 3-5 seconds (Fong et al., 2011). Therefore, the athletes must be trained to increase their anaerobic capacity. As mentioned above, such factors as body composition, physical fitness, anaerobic capacity, and isokinetic muscle strength affect an athlete's taekwondo performance (Myong-Won Seo, 2015: 102).

From the results of the research conducted in 2014 with the National Taekwondo Championships of in West Java in 2014 as the subject, is was concluded that the category Kyorugi or fight resulted in 66.00% of the ATP-PC energy, 19.03% of the LA-O2 energy system, and 14.97% of oxygen (O2). This means that the working time or 3x2 minute match was dominated by the ATP-PC energy, which means the motion was rapid and abrupt with anaerobic energy (Widiyanto, H.T. 2014: 13).

Based on the experts' opinion and the research results it can be said that in a taekwondo kyorugy (fight) match virtually all of the attacking and defending motions use speed. When the athlete is moving quickly, the energy used is anaerobic energy. Therefore, maintaining aerobic endurance is very important for kyorugy taekwondo athletes. The taekwondo match takes place in 2 minutes times three rounds, and if the scores are same there is an additional round with the system: who first gets the points win the game. Considering the type of motion and the time span of the game it is necessary to have anaerobic endurance exercises devoted to the technical and tactical approach because this type of taekwondo focuses on speed, kicks, and punches. So the endurance exercises should be designed to be able to represent the needs of the taekwondo fight game.

The psychological peak seen from the perspective of appearance is defined as a state of readiness to act with the high spirit and feeling. This is the objective and subjective circumstances of the athlete to face major competitions (Haff, 2009: 295). The objective aspect of peaking is considered as a certainty of requirement system to adjust quickly and effectively to loading on the demands of the game, while the subjective aspect is defined as the confidence of athletes, motivation levels, as well as the synergic biological and motor perception. The important sign of peaking is the athlete's ability to cope with various kinds of frustrations occurring before, during and after the match. This situation requires a model of anaerobic endurance exercise in line with the game so that psychologically the athletes are accustomed to the same state of the actual game. Peaking is a state special exercises marked with the adjustment capacity of the high nervous system, compatibility of biological and motoric aspects, high motivation, ability to cope with frustration, accepting the risks that arise during the game, and high confidence (Haff, 2009: 295).

The success of a game is heavily influenced by the treatment during the competition period, no exception with the anaerobic endurance. The program of anaerobic endurance exercise should be made paying attention to the techniques, tactics, physical aspects, and the kind of motion that will be utilized during the match. The exercise programs made with regard to these matters will help the athletes adapt quickly during the main competition.

Competition period

Competition period is the latest period before tapering and the main competition, a period of very crucial in determining whether the athletes would be able to look good or not in the actual match. "Improving all of the training factors means strengthening the exercise to improve the athletes' ability in order to be able to compete successfully at any competition specifically the major ones" (Haff, 2009: 219). Furthermore, there are aspects that need to be considered when discussing the competition period because many sports are different in the number of competitions and participation of the athletes; the difference will influence the pattern of periodization. For example, endurance sports such as marathons or long-distance running would limit the participation of the athletes for several competitions in one year/season and it will be different to other sports.

According to Ozolin 1971 (Haff, 2009: 219), the general purposes of competition period are as follows. In accordance with the sports specificity, continuing to repair the bio motoric and psychological capabilities will

1) improve and finalize technique;
2) improve the performance up to the highest level;
3) improve tactical maneuvers and gain competitive experience;
4) maintain a general physical preparation.

Physical preparation must be maintained, especially the dominant physical basis of certain sports. Throughout the competition period, the physical condition that has been achieved by the athletes should be maintained as a constant support for the advanced factor for further training and of course for the main competition. Of the total number of planned physical preparation in practice, 90% should be a direct measure of the exercise, while 10% is a form of active rest. The competition period must always pay attention to "the demands of training and matches in the competition phase can vary dramatically in team sports depending on the quality of the opponent, the number of days between games, and the location of the game" (Kelly & Coutts, 2007).

During the competition phase, the training is focused on reducing the volume and increasing the intensity. Of course, the increase is adjusted to the intensity of the actual match. For athletes who participate in sports considering the importance of exercise during all seasons, peak conditions need to be achieved by the time of entering the competitive period and to be maintained throughout the season (Hoffman, 2000: 9). However, during the

training for a competition season, the intensity and volume are manipulated to suit to skills training that is technically specific to the sports. During the training phase, the intensity of the exercise increases, while the volume is lowered to reduce the amount of exercise. During this session, training is usually called the maintenance phase and generally the training frequency is reduced. Given the importance of maintaining the physical performance in the form of anaerobic endurance, the intensity anaerobic endurance exercises should be appropriate to the match.

Endurance Training Program for Taekwondo Competition Period

The exercise program to maintain anaerobic endurance is the result of discussion and observation of the coaches and athletes, where the materials which were incorporated into the program are the habit that is often done by the athletes during a match.

Table 1. Exercise Program Macro 8

NoNNo	Exercise	Macro 8 Week 1	Week 2	Week 3	Week 4
1 1	Mainstay drill technique	3 combined technique x 20 x 3	3 combined technique x 20 x 3	3 combined technique x 20 x 3	3 combined technique x 20 x 3
2 2	Pecing dodge	2' x 3 round	2' x 3 round	2' x 3 round	2' x 3 round
3 3	Sparring target/pecing	2' x 4 round	2' x 4 round	2' x 4 round	2' x 4 round
4 4	Semi sparring	2' x 4 different sparring	2' x 4 different sparring	2' x 4 different sparring	2' x 4 different sparring

Tabel 2. Exercise Program Macro 9

No	Exercise	Macro 9 Week 1	Week 2	Week 3	Week 4
1	Mainstay drill technique	3 combined technique x 20 x 2	3 combined technique x 20 x 2	3 combined technique x 20 x 2	3 combined technique x 20 x 2
2	Pecing dodge	2' x 3 round	2' x 3 round	2' x 3 ronde	2' x 3 round
3	Sparing target/ pecing	2' x 5 round	2' x 5 round	2' x 5 round	2' x 5 round
4	Semi sparing	2' x 4 round	2' x 4 ronde	2' x 4 round	2' x 4 round

Description of program material

Figure 1. Mainstay technique Drill: is doing a kick technique over and over again which is the mainstay of an athlete. This means that the athlete performs kick techniques that are often used in

the games. However, because it intends to maintain the anaerobic physical condition the amount is specified by the amount of kick. For example Delol Chigi.

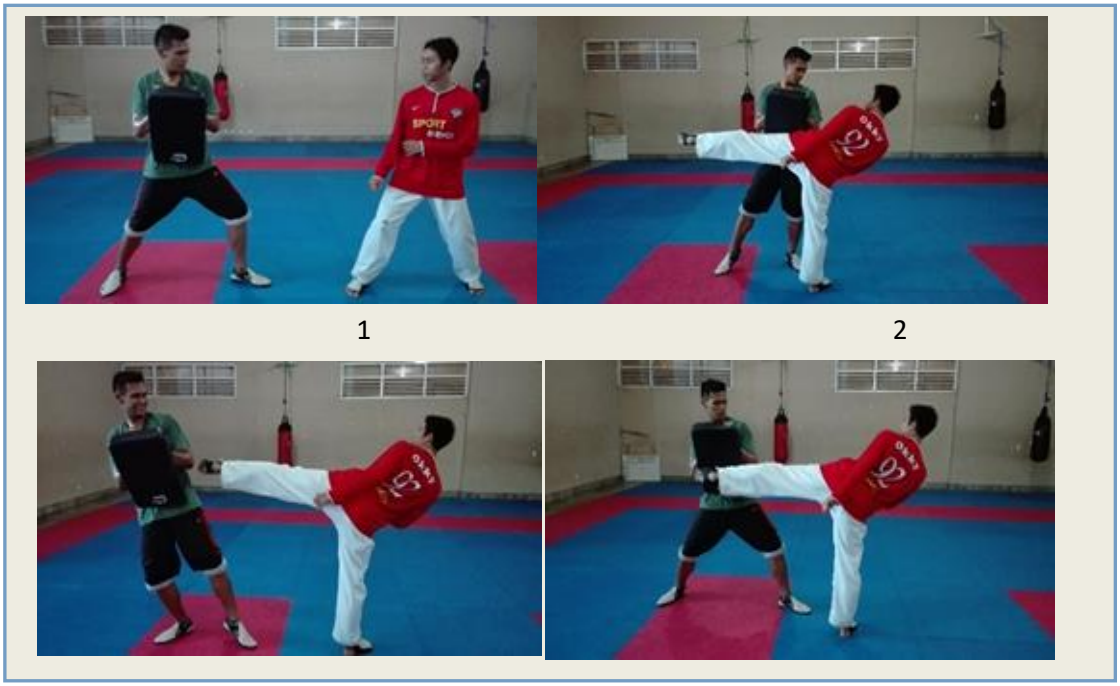

Figure 2. Pecing Dodge. a form of exercise in which the targets holder and kicker are equally free to move, the target holder learns to avoid attacks and the attacker looks for opportunities to learn and perform a kick on the target. The point is that for this technical exercise the target holder learns to avoid the attack with forward and backward motions, while the kicker is trying to find the good attack and counter points.

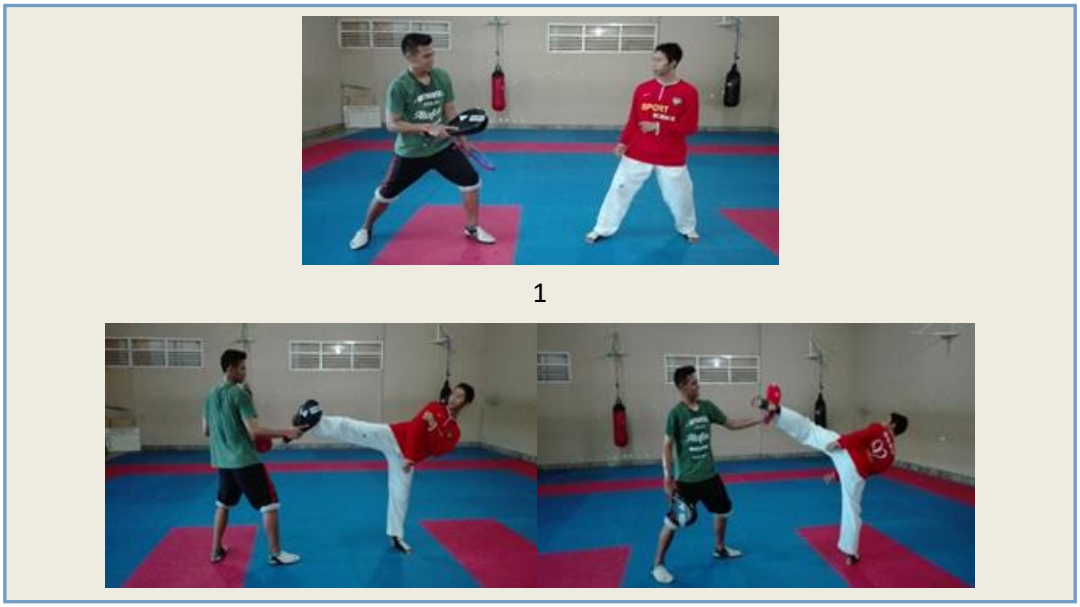

Figure 3. Sparing targets; a free attack and counter exercise serving to follow the target. This means that the key to this exercise is on the target, what to be given, how many series of shot. So the kicker only responds to given targets

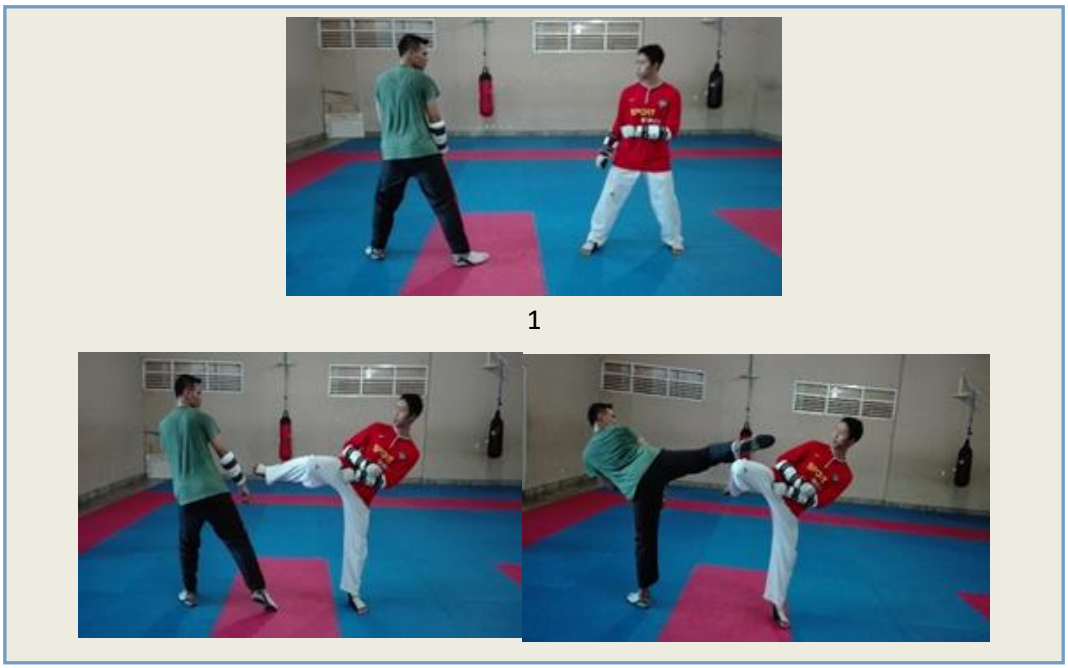

Figure 4. Semi sparing: a fight exercise that not full power, they play improving tactics and strategy. This means that the athletes fight freely, but its use of power is not optimal, but more likely on the tactics and strategy playing.

METHODS

This study used a qualitative approach, however, because this research was also an exercise program that is applied directly to the elite taekwondo athletes the method used was action research. According Kemmis and Taggart in Wiriaatmadja (2009: 66), action research is an effort intended to solve problems or make improvement that are designed using a methodology which is reflective and collaborative. The procedures for implementing the action research are in the form of a spiral cycle each step consisting of four stages, namely planning, action, observation, and reflection. Furthermore Wiriaatmadja (2009: 95) asserts that the most important features of action research is that it is an attempt to solve the problem, as well as seek scientific support.

This study focused on how is the physical exercise program of taekwondo athlete in maintaining their performance of endurance during the taekwondo competition period. The data were taken from the research subjects namely taekwondo athletes of the Yogyakarta Special Region and independent athletes but they passes selections for the 2016National Olympic Games in West Java. The selection of the research subjects is intended for athletes to be controlled, because they have the same interests, the athletes must do exercise to face the PON, while the coach wants to implement a program of physical exercise and realize a good performance so that the research, programs, and objectives of the training run equally well.

The data were drawn 7 times using the Running-based Anaerobic Sprint Test (RAST), which was developed at the University of Wolverhampton (United Kingdom) to test an athlete's anaerobic performance. In this standardized test, if an athlete is tested and the result shows a low fatigue index value (<10) it means that the anaerobic endurance of the athletes are advised to be maintained. Meanwhile, a high fatigue index value (> 10) indicates that the athletes may need to focus to practice increasing the tolerance of the lactic acid. Nevertheless, the coach should not only

target the condition of athletes whose index value is less than ten, let alone just in the range of eight to nine because at that range the condition could be said less secure. If the value can be reduced to five or below, it might be more secure because prior to the competition the condition of the athletes was prone to the risk of illness. If it is around five, it would be easy to restore it in case of any health problems. (Mackenzie, 2005: 44 & 46).

This test requires the athletes to run the length of 35 meters as fast as possible for 6 times and in every 35 meters they are given 10-second recovery. After that, the athletes run again as fast as possible for the second 35 meters and so on up to 6 times. The time record is for every 35meter run, meaning that upon completion there are six time records. The results of the time record is then put into the Fatigue Index formula - (Maximum power - Minimum power) ÷ Total time for the 6 sprints or using the online calculator (Mackenzie, 2005: 44-46). The durability test is conducted at the general periodization twice, a special periodization once, pre-competition twice and competition twice. However, on the way, there is a change since the last data retrieval results in data which are not good because of the athletes' fatigue condition.

The exercise program is the result of elaboration of the test results of the athletes' physical condition. It is also the result of a consultation with several experts in the field of exercises programming and experienced taekwondoin in train up to the the international level. This training program is flexible in nature because it intends to find out the right format for endurance exercise during the competition period. On several occasions, it is reflected that consultation is required in order to ultimately change the content of the exercise program. This may be done if there are problems during the course of the study.

The data obtained in this study were then calculated for the average of each test with the help of statistical IBM SPSS version 23, using the ANOVA repeated measurement. The results in were then used for checking whether there were changes for the better or worse. Then, the data were represented in graphs showing the exercise results. The graph was used as the basis for narration in order to provide good information that can be understood by readers and researchers.

This action research study was conducted in a fairly long time. Therefore, the researchers have been documenting, either in writing, photos or video recordings. This was done to review a research process, the type of training, and the condition of the athletes. Having a meaningful documentation can indicate the findings obtained in the research process. In addition, the documentation can be used for testing existing findings.

RESULTS AND DISCUSSION

Endurance Training Program for the Competition Period

Competition period is a crucial period and this period is very important because the time is very close to the main competition. In this period, physical exercise does not improve endurance anymore but maintain the existing capabilities and adapt to the actual match.

In order to create a successful strength training program, coaches and athletes manipulate some variables of training, especially the volume and intensity. Both the volume and intensity of the training, as well as the frequency are changed in accordance with the schedule of the competitions and training purposes. Factors which are more specific to the category of volume and intensity of exercise include load which is generally expressed as a percentage of 1- maximum repetition (1RM); the buffer; repetition; set; the tempo of execution; and a break in the interval between sets. The manipulation of certain variables changes the volume, intensity, level of effort, and the density of the training and the training effect. (Buzzichelli, 2015: 125).

During the competition period, any physical components must be manipulated close to or equal to the needs of both energy and muscles that are specific to the game. Moreover,

there should be a technical element of the training process in the exercise. It is a means of providing a direct adaptation to the actual game.

Maintaining the strength so as to optimize speed is an important consideration. Consequently, the athletes can perform weight training session consisting of 1-4 lift on their main exercise, maximum close raise is supposed to maintain strength but does not develop further force or induce physical and mental fatigue (Shepherd, 2009: 63). Strength training during the competition period is only as a support to keep the power condition of the leg. In the practice session, loading uses a three in one principle consisting of loading, stretching, and utility elements. The lifted burden is 90% of 1 maximum repetition, with two sets of 2 times repetitions. Loading shows the burden lifted by each athlete, that is 90% of 1 RM. The athletes are stretching after a complete weight lifting, and utility is a movement that is in accordance with the muscle is newly loaded. For example, after doing leg extension, and then stretching the feet that have been used to lift weights and go straight to do dolyo chagi kick with speed, either with targets or empty kicks.

Endurance exercise during the competition period is conducted by using technical and tactical approaches, meaning that the exercise should be adjusted to the form of the actual match. Exercise time is set in accordance with the match time, in which a round takes 2 minutes and each match takes three rounds. It is called a set of exercises. we have to adjust to the event that will be faced, approximately how many matches they have to face up to become a champion; this becomes the benchmark of the training program. An athlete must train for that in that duration of time. If during the National Olympic Games (PON) event, the athletes only play a maximum of 4 times, they should be able to practice the two-minute round times, 3 rounds, 4 sessions. The exercises are designed like a real match.

The endurance exercise model during the competition period implements the target sparing, sparing hugo, sparing pecing (box), pecing dodge or semi sparing. Each round is given 1 minute or 30 seconds brake depending on whether the intensity is high or moderate. At the time of the target sparing exercises there are things for the coaches to do, namely always checking the pulse in every 3 rounds. In every 3 rounds, the athletes should be in the zone of 90% maximum heart rate. Improving the performance of the endurance exercise is not recommended anymore. However, many athletes ruin their opportunities by doing too much exercise before the match (Tulloh, 2007: 95). This statement is still often realized on the training ground. There is a presumption that the continuous training will result in better durability, whereas the rest is as important as the exercise itself.

Table 3. Data of test results in every exercise period.

No	Name	Test results						
		I	II	III	IV	V	VI	VII
1	Farta Kamoteb	8.025	7.066	4.983	5.251	4.982	4.516	4.559
2	Sigit	11.234	9.789	5.732	6.046	5.796	4.963	5.101
3	Wulan	8.015	7.032	4.957	5.499	4.975	4.395	4.420
5	Okky Indera p	11.024	9.766	4.978	6.559	4.986	4.336	4.481
6	Bayu Prasto K	11.106	9.541	5.517	6.759	5.678	5.599	5.772
7	Aditya	10.139	8.696	4.998	6.143	5.003	4,82	5,032
8	Arip Darmanto	10.085	8.620	5.015	6.279	5.142	5.058	5.157

Data of the test results are presented in Table 3. There are obvious differences between each column. Columns I, II, III and IV show the tests performed from a period of general, specific, and pre-competition respectively. Column I-IV show that improvement is obvious. This is because the practice is still carried out in accordance with the shape and purpose of

endurance exercise. This means that endurance exercise is not entirely in accordance with the technical and tactical approach so that the training focuses only on improving durability.

Columns V, VI, and VII show that the exercise has entered the period of competition, meaning that endurance exercise has been carried out using the technical and tactical approach. The exercises model is adapted to the real game, both in technical forms, motional rhythm, motional direction, the minimum number of kicks to be done, as well as its execution time. Endurance exercise is intended for the athletes to be able to adapt to the real match without degrading the physical condition of endurance. This is evident in Table 3 column V, VI, and VII which indicate that the results did not show a significant difference.

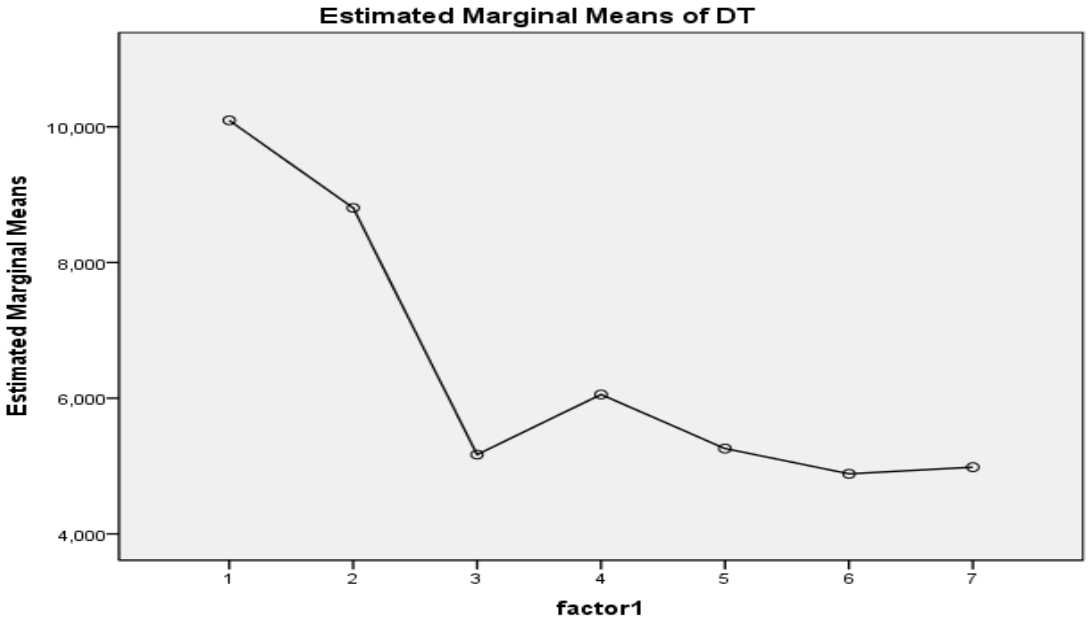

Figure 5. The differences of endurance results in each exercise period.

Test 1 on January 21, 2016, is a pre-test before the athlete was given any treatment, meaning the first test aimed to determine the physical condition or endurance of the athletes before the exercise program was run. This initial test is in the general period and goal of the exercise in this period is the athletes' adaptation of anatomy and physical improvement in general. The intensity of the endurance training program in this general period is low but the long duration of time is likely to cause the target of this exercise to increase the VO2 max. The AA (Anatomical Adaptation) phase is the foundation for another phase of training that is based on and is used during the preparation phase of the training. AA is the first phase of periodization models and is conducted immediately after the transition phase (the transition phase is sometimes referred to as "off-season" (Bahr, 2003: 31). The focus and sub-phase are common to develop a physiological basis and use the specific training methods (Haff, 2009: 127). Therefore, from the first test to the second one there was a sharp increase because the exercise was specified to aerobic endurance. This endurance training program was still in the form of jogging, cross-country sprint or running with intervals of 3 times in one week. The three-times a week endurance exercise varied in terms of methods and forms of training. This means that the athletes did not experience any boredom. The endurance exercise in the first period was done for 3 months and ends in a special period. On March

29, 2016, the second test was held and the results showed an increase. Prior to the test in April the training proceeded to the specific period. In this period the practice had been focused on the energy system that would be used in taekwondo match. It means that if the kind of the taekwondo motion looks quick and explosive, it can be convinced that the energy used will be anaerobic.

Anaerobic exercise is particularly important in the transition period leading to the pre-competition period. At this specific period, the exercise is still common but the intensity of the exercise is already focused on the form of exercise with sub-maximal intensity or an aerobic laktit exercise. The types of exercises performed are just like interval training, fartlek, 100, 200, and 300 m sprint. For fartlek, the purpose of this special period is to provide more portion of training when the athlete sprints. The interval training is given with an intensity of 80-85% pulse. Although given only in 1 month, this particular period of training has a higher intensity than the general practice because this particular period of training focuses more on anaerobic exercise.

The period from test two leading to test 3 is called a pre-competition period. Test 3 was administered on June 6, 2016. The exercise in this period has been combining general endurance exercise and technical approach. The training program contains general exercise combined with a form of kick technique and steps which are designed in the forms of drill and sparring techniques with semi sparing tools. During the pre-competition period, the endurance exercise is fixedly performed 3-4 times a week but exercise is a combination of moderate and fast forms in a relatively a long period of time because it is emphasis more on the formation of anaerobic endurance. Because the pre-competition period is still improving endurance, the training process is designed to vary between general anaerobic exercises and special anaerobic and the endurance training approach is focused on a kick technique. The kicking technique is performed using the method of interval training, that is the exercise using speed kick that is divided into reps and sets that are already planned in an exercise program.

The exercise in pre-competition period is focused on improving durability which leads to its use in the actual games. The method of training varies between general exercise and specific exercise. General exercise means that the exercise is carried out in the field, the athletics track, and outdoors. Exercise in the athletics track is in the form of anaerobic sprint 100, 200 and 300 meters with the training zone between 85-95% pulse. Exercise in the track could also use fartlek and interval training method with the duration of 30-60 minutes with five-minute intervals. The intensity of interval training is between 75-85% athlete pulse. With a pulse like that, the athletes can be controlled in accordance with their training zone. Endurance exercise of a general nature is in principle the same as the specific exercise but the content and the form of the training are different. The difference is due to the exercise training materials that specifically contain drill techniques that will be used in the kyorugy (fight). Despite the drilling technique, the target of the training emphasis on anaerobic endurance.

Endurance exercise with drill techniques takes place every 10-15 seconds and each consist of 3-5 repetitions. The recovery between repetitions is 1: 3 and recovery between sets are 2.5-5 minutes adapted to the conditions of the athletes during training. In addition to drill techniques, the special endurance exercise also gives materials of the sparing target, sparing pecing, and semi sparing. This exercise is performed 2 minutes for each round and lasts for 6-9 rounds with a break between rounds for 30 seconds to one minute. This exercise is adjusted to the time and form of the same motion. In an exercise like this, the athletes can be directly adapted to the actual game. The combination of general and specific training is designed such away that it is able to contribute fairly well to the athletes' endurance. It is proven that increase in endurance is significant enough as shown by the graph illustrating the condition after Test test 3. Test 3 was administered by the fasting month,

which means that with normal practice and carrying out the training programs that have been made previously the athletes are able to give changes for the better durability.

Test 4 is the end of a pre-competition phase, but the problem is that the exercises are performed during the fasting month. From the results of the discussions with experts and athletes, it is recommended that the exercise should still be done but the time allocation is changed from morning to afternoon or evening. Scheduling the exercise at night is not without problems because the athletes attend tarawih prayer so that practically many exercises are not effective. Usually, such exercise is done twice a day but at night it can only be done once. The once a day exercise is done in the afternoon before breaking fast. At the beginning of the process, the exercise can be considered normal; the athletes are able to do it well, but in the mid and the end of the fasting month the athletes start to look lacking passion and energy. Such a condition is indeed understandable because they neither eat nor drink for the whole day, while the college is still running so that in the afternoon the athletes often appear weak. Therefore, sometimes they do not do the exercise maximally. Seeing these circumstances, a straightforward action is needed to focus training on bio-motor components that can be trained effectively, such as speed, flexibility, and power. Although bio-motor components that could be handled, endurance should still be taken into account. Therefore, training is done in one meeting focused on a single target practice only.

Test 4 was administered before the Eid holiday on July 1, 2016. At the end of this pre-competition period, the purpose of the test was to determine the endurance condition of the athletes while experiencing changes of exercise program during the fasting month. The result was predictable: the condition of the athletes had decreased. This decrease was as a result of the exercise performed by the athletes with the less favorable condition because the exercise was done at the time when they experienced a reduction in intake due to fasting. As a result of this decrease, the condition of the athletes was practically lowering while celebrating Eid holiday. The focus of the exercise after the Eid holiday was of a particular concern that must be considered, whether using the existing programs or creating new ones. Some experts advise to create new programs, and the content of the new programs is focused on the increase of aerobic endurance in the first week and anaerobic one in the second week after the Eid holiday. The exercise forms are general training without being combined with the taekwondo techniques. After the implementation of the training for two weeks, 3-4 times a week, on 15 July 20016 Test 5 was held.

Test 5 is sufficient to restore the athletes' endurance like the one in Test 3 although the results of Test 3 is still better. However, the result is pretty good compared to Test 4. According to Reil et al (2010); Issurin (2010); Storen et al (2012) written by BR Rønnestad1 (2012: 327), another way to organize the proposed training is a " block periodization model " where the training period is divided into shorter periods (1-4 weeks) with special focus on the major upgrading of some aspects like maximal oxygen consumption (VO2max) while the other capability is maintained. The opinions of the experts are the basis of making a two-week companion program in the form of a combination of low and high-intensity exercise. The results of the two-week exercise could restore the physical condition and the endurance of the athletes just like before the fasting month.

Entering the competition period is the most crucial point in the training process, where the game was nearing while the physical condition should be good and the skill should be well increased. During the competition period, the volume of the exercise was gradually decreased and the intensity was increased. For example, lifting a heavier burden, reducing the frequency of repetition, speeding up the agility, but the recovery time was longer. The characteristics of the competition were simulated during this training period. Mini competition, local area or regional competition is good training competition during this period. It is

important to keep the training load heavy enough to improve the fitness levels of the athletes, yet it was light enough to enhance the enthusiasm and maintain a high energy level, invalid source specified. Observing that opinion, it is clear that in this period it is important to retain the physical condition, but the exercises have to adjust to the shape of the real match.

The period of competition training was held indoors using the mat as well as tools and other competition equipment. The exercise used a drilling technique which had been tactically designed and done repeatedly with a good accuracy target. However, the drill exercise could also be designed to maintain the anaerobic endurance. Therefore, the number of repetitions was adapted to the number of kicks performed in the actual competition; the minimal amount of kick should even be doubled. In addition to technical and tactical drill training, the practice also included sparing target, sparing pecing, pecing dodge and semi sparing. This type of practice lasts for 2 minutes in each round, then do 6-9 round practice and 1-minute rest between rounds. Such drill and sparing exercises were performed in single sessions, five times a week. In this exercise for the competition period, the intensity of the exercise the pulse of each athlete was 90%. Therefore, the time span for the exercise was short but the drills were repeated and performed with a fast rhythm.

On August 9, 2016, a test was conducted to assess the endurance of the athletes, and results were good enough because they could maintain their condition to remain stable. The result of the test shows that the training program did not face any problem and it continued without adding and subtracting the number of exercises, but as a control, the heart rate of each athlete must remain in the training zone of 90%. The combination of these exercises would increase automatically when the athletes did not enter the training zone. Of course, it is the responsibility of each athlete to remain working seriously. From the test dated August 8, 2016, until September 2, the athletes performed 20 times practices. Considering that the athlete continuously did the exercises, it was decided to conduct the final test on September 2, 2016, because PON in West Java would begin on 22 September 2016, so in case there was a problem there was still enough time to solve it.

On September 2, 2016, there should have been a final test of anaerobic endurance. However, because the test was conducted untimely, the results turned out to be decreasing as a whole. The errors of this test as shown in Table 46 was due to the lack of 24-hour break provision to the athletes. It was surprising because after the morning practice and attending lectures during the day, the test conducted in the afternoon turned out to result in worse scores compared to those obtained during the fasting month., which means that the test results decreased to a rate nearing 9 which means that they were on the verge of a state of bad exhaustion which needs special treatment to increase it. Without adequate rest, relaxation, and recovery the athletes were in a state of chronic fatigue and lack of motivation (Buzzichelli, 2015: 64). Subsequently, a reflection about the athletes and consultation to experts were made. The results of the reflection and consultation implied that the athletes should take a 2-day break then they were directly reassessed, Unless there was a change of data it was necessary to provide a companion program.

On 5 September 2016, it was decided to repeat the test. The decision to take the two-day span was supposed to anticipate the possibility that problem was not due to physical fatigue, but perhaps such other problems as the training program. The test was conducted in the morning and it was true that what the athletes complained about was that they were in fact exhausted. It was then proven that the test results indicated that the condition of the athlete was back to its original position, i.e. the same as the results of the test conducted on August 8, 2016. Therefore, it is important to pay attention to the brake or fatigue level of the athletes before testing or by the match time. The results of the test conducted on 2 September 2016 was discarded after considering the results of the test on September 5 showed stable conditions just like the previous test.

CONCLUSION

Based on the results obtained during the training process using the physical exercise program with the specific technical and tactical approach, conclusions can be drawn as follows. Endurance exercise by combining a match, a break between rounds, techniques, and tactics that are designed to refer to the actual game taking into account the work and recovery time can keep or maintain the anaerobic endurance of the taekwondo athletes to remain stable during the competition period. High exercise intensity ranges between 85-90% of the athletes' maximal HR, while the volume is reduced to the low category. As a side note, athletes should never ignore break time because a good and right rest would affect the performance of the athletes.

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