

## Effect of Indurance Training Techniques on the Vo2 Max Increases of the Gergo Roman Wrestling Athletes in the Gold-for-Indonesia Program in the Sea Games XXVII Myanmar 2013

Rubianto Hadi<sup>1✉</sup>, Hari Setijono<sup>2</sup>, Soegiyanto<sup>1</sup>, Setyo Rahayu<sup>1</sup>

<sup>1</sup> Universitas Negeri Semarang, Indonesia

<sup>2</sup> Universitas Negeri Surabaya, Indonesia

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### Abstract

The Sport of Wrestling is rarely heard in Indonesia but the real fact is not so. Although it is not as popular as football, badminton, or tennis, this type of hard sport still exists in Indonesia. The purpose of this study is to determine whether interval of the endurance training techniques with the training program software can improve the VO2 Max of the wrestling athletes in the Gold-for-Indonesia Program in the Sea Games XXVII Myanmar 2013. The method used in this research was the experimental method; the researchers deliberately and systematically incorporated treatments into natural phenomena and then observed the its effects. The results show that, overall, the VO2 Max of the pretest result is 46.95%, the result of the first cycle test shows an increase to 49.43%, and the second cycle test shows even better result to 50.21%. To improve the endurance of the wrestling athletes of the program of Gold-for-Indonesia in the Sea Games XXVII Myanmar 2013, the trainers need to use the interval of endurance training techniques with the software of the training program.

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✉ Correspondence:

Kampus Pascasarjana Jl Kelud Utara III, Semarang 50237

E-mail: [rubianto.hd63@gmail.com](mailto:rubianto.hd63@gmail.com)

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## INTRODUCTION

The sport of wrestling is rarely heard in Indonesia but the real truth is not so. Although not as popular as football, badminton, or tennis, this type of hard sport still exists in Indonesia. Since the entry of new types of sports to Indonesia such as sumo, wushu, or other similar sports, wrestling has as if been abandoned. Historically, the this sport developed in Indonesia through several quite difficult stages, among which is its existence that has been almost completely eliminated since Japan came to bring sports of Judo and Kempo.

Finally, wrestling was popularized again in 1959 by this country hosting matches in Bandung. This physical sport was also contested in the grand event of Asian Games IV in 1962 so that in a short time Indonesia had to establish a wrestling association to recruit athletes and provide education/coaching for prospective athletes.

The association was named All Indonesia Amateur Wrestling Union (Persatuan Gulat Amatir Seluruh Indonesia abbreviated as PGSI). The association was established on February 7, 1960 and has accommodated this branch of sport until now. PGSI is under the umbrella of KONI and regularly trains athletes to participate in various championships both regionally and internationally. Wrestling is one of the martial sports that prefers to the following notions. According to Jesse E. et al (2017, p.65), wrestling is a physical sport that can cause many injuries. According to Juhanis (2016), wrestling is a sport that relies on physical strength and endurance; the wrestling game is performed by two athletes, one of whom must be drooping or able to control the opponent.

The above notion shows that the sport of wrestling is a hard sport that requires the high skills and physical conditions, especially endurance.

Sajoto (1988, p.60) as cited in Indrayana (2012) states that cardiorespiratory endurance is a person's ability to use the respiratory and circulatory system effectively and efficiently in continuous work by involving large-intensity of muscle contractions for a long time.

Endurance is a component of the much needed physical condition in the sport of wrestling. In addition to durability, for the purpose of optimal athlete performance, recovery, and body compositions, athletes require synchronous diet and activity (Aerenhouts, Zinzen, & Clarys, 2011).

Body endurance exercises can be defined as cardiovascular exercises, such as running, cross-country skiing, cycling, aerobic exercise or swimming that is done to prolong the duration of the body (Mach, & Fuster-Botella, 2016).

A person's endurance level can be identified by measuring the VO<sub>2</sub> Max. According to Giriwijoyo (2012) as cited in Friskawati (2016), VO<sub>2</sub> Max is a measure to determine the cardio-respiratory endurance of a person. VO<sub>2</sub> Max is the level of oxygen consumption during exercise. The body's need for oxygen is determined by the intensity (weight) of movement or exercise performance.

In taking part in the Sea Games XXVII Myanmar in 2013, PB PGSI conducted team coaching through the Gold-for-Indonesia program. Based on the results of the test on June 1, 2013 it was identified that the endurance/VO<sub>2</sub> Max of the gergo-style wrestling athletes were still relatively low, that is in the medium and low category. This can be seen in Table 1 below.

Based on the data as mentioned in Table 1, it is implied that the aerobic endurance of the average athletes is still in the medium category. So, it is in need of handling to improve the aerobic endurance, so that at least they fall into either of the categories.

Aerobic endurance can be improved with the method of interval training of endurance using the training program software based on the maximum pulse intensity.

The endurance training program is adjusted to the physical needs of the wrestling athletes as they take part in the match from the qualification to the final.

The wrestling match is held in two rounds and each round lasts for three minutes. This means that the total duration is six minutes per match and in one day the player is expected to make the game four times so that the total volume is 24 minutes with a round-the-clock

break for 30 seconds. The total number of breaks is at least 8 x 30 seconds = 4 minutes. Thus, the total volume of the exercise is 28 minutes plus the two-minute rest after training so that the amount of training session that must be done by the players is at least 30 minutes. This provides the basis for providing a dose of training to a wrestling athlete.

Problems that occur in Indonesia Gold Program for the Sea Games XXVII Myanmar 2013 was the physical condition of the wrestling athletes especially the aerobic endurance/VO2 Max of the gergo romance style wrestling athletes that reached the category of medium and low whereas the training program has been in the special preparation stage so it needs to do an action to improve the athletes' physical condition, especially their endurance. The action that can be done to improve their endurance is to innovate the use of endurance training methods with the software program using

science and technology (polar/pulse detection tool).

Based on the description, the problem that is formulated in this research is whether the training method of endurance of the interval training with software program can improve the VO2 Max of the gergo romance style wrestling athletes at the Sea Games XXVII Myanmar 2013.

The purpose of the study is to explain the use of training methods

for the endurance of the interval training with the software training program to improve the VO2 Max of the gergo roman style wrestling athlete of the Indonesia gold program in the Sea Games XXVII Myanmar 2013.

The results of this study can be used as an input for the trainer in fostering the endurance of wrestling athletes and become an alternative method for athletes in doing aerobic endurance exercises.

**Table 1.** Results of a 15 minute/balke run test to measure the VO2 Max

NO	Name	Distance to be Covered	Results (Vo2 Max)/ Category
<b>Gergo Roman Style</b>			
1	Suparmanto	3,375M	49.12 / medium
2	M. Aliansyah	3,550M	51.13 / medium
3	Rustang	3,310M	48.38 / low
4	Kusno Hadi Saputro	3,440M	49.87 / medium
<b>Men's free style</b>			
5	M Iqbal	3,400M	49,41 / medium
6	Eko Roni Saputro	3,585M	51.53 / medium
7	M Ricky Akbar	3,205M	47.17 / low
8	Fariansyah	3,240M	47.58 / low
<b>Women's free style</b>			
9	Inadrah	2,910M	43,79 / low
10	Heka Mayasari	3,100M	45,97 / medium
11	Eka Setiawati	3,010M	45,01 / medium
12	Ridha Wahdiniyati	2,100M	34.50/ very low

**METHODS**

The method used in this research is the experimental method. An experiment contains activities planned and executed by the researcher(s) to collect data related to a hypothesis. The researcher deliberately and systematically introduces treatments into natural

phenomena and then observes the consequences of the treatment.

This research was conducted in the field using a durability training method based on the maximum intensity of pulse rates. The subject of this study was the wrestling athlete of the Indonesia gold program in the Sea Games XXVII Myanmar 2013. This research was

conducted for two months, divided into two meso/cycle programs, namely (1) Cycle-1/meso program 3 from the macro program, dated from 26 August 2013 to 21 September 2013; (2) Cycle-2/meso program 4 from the macro program, from September 23, 2013 to October 19, 2013.

The training program provided to the athletes in the 2nd cycle was based on the results of the cycle-1 analysis. If there is an increase in endurance/VO2 Max in cycle-1, it indicates that the endurance training program that provided to the athletes has been in accordance with their needs so that on the doses for cycle-2 of the training is increased by adding the volume of exercise from 30 minutes in cycle-1 to above 30 minutes in cycl-2. If cycle-1 does not show any increase of aerobic endurance, there should be an analysis to see the causes.

The data were collected through a 15-minute/balke run test to see the aerobic endurance of the athletes. The test was

performed during the pretest, the intercycle test, and final test. Furthermore, the data were analyzed to determine the increase in aerobic endurance.

The data were analyzed using the SPSS Program with a significance level of 0.05 to prove whether the action performed on the wrestling athletes gives an improvement to the athletes.

## RESULTS AND DISCUSSION

### Description of VO2 Max Data

The results show that the pretest of the VO2 Max of the gergo roman style wrestling athletes gives an average score of 49.6250. The Cycle-I test result shows an increase to 51.2875 and the result of the cycle-2 test shows a further increase to 52.1075. The comprehensive results can be seen in Table 2.

**Table 2.** Descriptive Statistics of the Dependent Variable: Vo2 Max

Test	Style	Mean	Std. Deviation	N
Pretest	Gergo Roman	49.6250	1.17333	4
	Men's free	48.9225	1.99251	4
	Women's free	42.3175	5.28747	4
	Total	46.9550	4.57203	12
Cycle I Test	Gergo Roman	51.2875	1.45287	4
	Men's free	50.9725	2.45490	4
	Women's free	46.0250	1.92787	4
	Total	49.4283	3.09335	12
Cycle 2Test	Gergo Roman	52.1075	1.31206	4
	Men's free	51.8700	2.24643	4
	Women's free	46.6575	2.07842	4
	Total	50.2117	3.15031	12
Total	Gergo Roman	51.0067	1.60754	12
	Men's free	50.5883	2.40058	12
	Women's free	45.0000	3.71675	12
	Total	48.8650	3.83112	36

The data in Table 2 show that the highest mean of Vo2 Max is the Gergo Roman style training, which continues to increase from the result of the pretest, test I, and test II while the

lowest is the result of the women's freestyle training. To give a clearer picture of this, see Figure1.

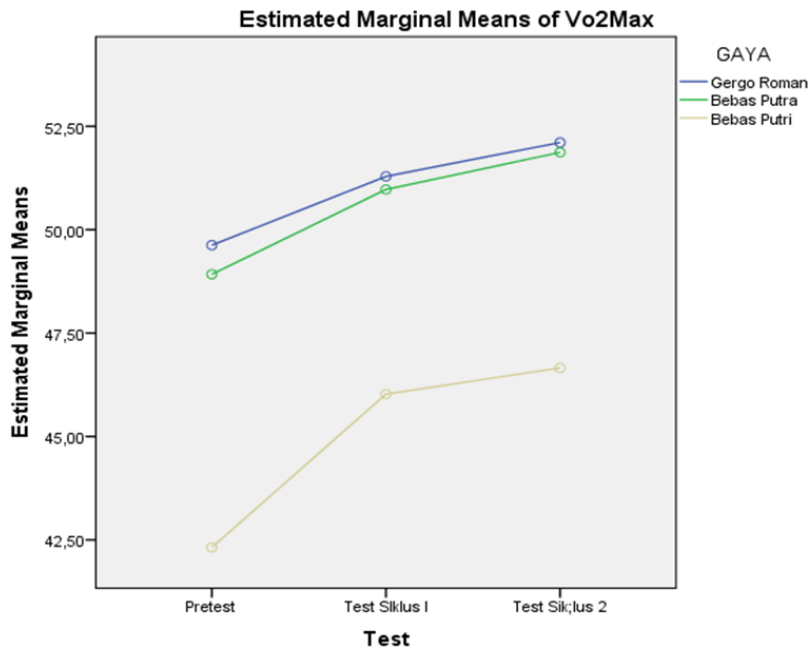


Figure 1. Average comparison of Vo2 Max

**Hypothesis testing**

The results of the analysis of variance can be summarized as presented in Table 3. Table 3 can be explained as follows.

- a. The value of F-corrected model is 6.900 and its significance is 0.000. This indicates that there is a significant variation of Vo2 Max based on the test and exercise style at the 5% significance level (0.05).
- b. The F-test value is 5.548 and its significance is 0.010. This indicates that there are significant variations of Vo2 Max based on the tests (Pretest, Cycle I Test and Cycle II Test) and the exercise style at the 5% significance level (0.05).

c. The F-style value of 21.597 and its significance of 0.000 indicates that there is a significant variation of Vo2 Max based on the exercise style (Gergo Roman, Men’s Free, and Women’s Free) at the significance level of 5% (0.05).

d. The value of F Test\* style is 0.228 and its significance is 0.921. This indicates nothing significant from the interaction between Test and Style in influencing the Vo2 Max. This means that each Test and Style independently influence the variation of the Vo2 Max. Both do not interact with each other.

Table 3. Tests of between-Subjects Effects; Dependent Variable: Vo2 Max

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	344.973 <sup>a</sup>	8	43,122	6.900	.000
Intercept	85960.376	1	85960.376	13754.651	.000
Test	69.347	2	34.674	5.548	.010
GAYA	269.938	2	134.969	21.597	.000
Test * Style	5.687	4	1.422	.228	.921
Error	168.738	27	6.250		
Total	86474.087	36			
Corrected Total	513.711	35			

R Squared = .672 (Adjusted R Squared = .574)

The results of this study indicate that the test and the Roman gergo style provide significant variation to Vo2 Max.

The results of this study also show that the VO2 Max pretest result of the Gergo Roman athletes is 49.6250, The cycle-I test result shows an increase to 51.2875 and the cycle-II test further shows a better result of 52.1075 of VO2 Max.

The results of the VO2 Max test above show that the endurance of the gergo-style wrestling athletes has increased. This suggests that the methods and training program of endurance interval training provided to the gergo-style wrestling athletes are appropriate to the athletes' needs. The endurance/Vo2 Max increases will improve the athletes' physical condition. This is in accordance with the opinion of Glaister (2005) as cited in Meckel, Bishop, Rabinovich, Kaufman, Nemet, & Eliakim (2013) who stated that high aerobic ability levels are a requirement to enhance performance.

The increases of aerobic endurance or VO2 Max as mentioned above can be due to the training process that is done on the basis of the correct training methodology.

There are three kinds of exercise law that can be presented as follows.

#### Overload Law

Basically, the human body adaptive to any treatment, including the burden of training. When a body with a certain level of fitness is given the burden of exercise with a certain dose level, the body will adapt it with a series of processes as follows. The initial process after loading is fatigue so the athlete needs to rest. After a certain period of break, the body will regain fitness but with a better level of fitness than before.

#### Law of Reversibility

The law of reversibility requires athletes to practice sustainably and progressively. Continual exercise will provide increased fitness. Conversely, if exercise is stopped the athlete's fitness will decrease. Exercise should be done at least every two days because after 2 x 24 hours a person's fitness will decrease.

The results of months of training will quickly disappear if the athletes stop exercising

in a few weeks. Therefore, they should always practice every day: no day without practice. Practicing every day, they maintain conditions that they have achieved can be maintained.

#### Specificity Law

The law of specificity provides guidance that the training load given to the athletes must be in accordance with the needs associated with their physical ability and skills of the sport and the objective conditions of the athletes such as their current chronological age, development, physical and mental abilities and the distinctive features of the athletes that are difficult to change but they do not repeat their performance. The law of specificity also provides guidance to the coach to fully understand the athletes' condition associated with the sport, the weaknesses, the strengths, and the opportunities and challenges for the athletes to their achievement.

With the law of specificity a trainer is expected to be able to create various forms of exercise that suit the needs of the athletes. Various forms of exercise can help reduce boredom and stress during exercise. The specificity principle says that the maximum benefit that can be gained from training stimuli will only occur if the stimuli are similar to or resemble the movements performed on the sport (Hadi 2007, p.53)

#### Principle of Individualization

Every athlete has individual differences in the background of ability, potential, and characteristics. Exercises should be designed and adjusted to the uniqueness of each athlete in order to give the best results. Factors to be taken into account include age, gender, physical characteristics, health status, duration of practice, physical fitness, school /work/family, psychological characteristics, and so on.

#### The Principle of Exercise Variation

Proper physical exercise often requires a lot of athlete's time and energy. Repetitive and monotonous exercise can lead to boredom. To prevent that, varied exercises should be applied. For example, leg muscle strength training, in addition to leg press, can also be created in the forms of exercise that are as useful as bench

jumping, stair climbing, football squatting, and the like.

### **Pedagogic Principle**

Exercise is essentially an educational process that helps individuals improve their cognitive, affective, and psychomotor abilities. The pedagogic principle directs the training to observe various rules, namely, multilateral, systematic and gradual development, health, usefulness, and awareness.

Based on the pedagogic principle the trainer is required to give full awareness of every training load given to the athlete with all the positive benefits and negative impacts so that any given exercise needs to be systematically designed and gradually upgraded to ensure all elements of education can be achieved.

### **Principle of Active engagement**

One of the trainers' duties in the training process is to treat athletes with equal opportunities. Therefore, the trainer needs to design his/her training management so that every athlete can perform the activities optimally.

### **Principle of Recovery**

Recovery is a very critical factor in the modern sport coaching process. Therefore, the trainer should be able to create recovery opportunities in his/her training sessions.

The development of athletes depends on the provision of adequate rest after exercise so that the effects of the exercise can be maximized. This is in accordance with the principle of recovery stating that if we want to excel maximum achievement, after the body being given the stimulus in the form of training, there must be "complete recovery" before the next stimulus. Without enough recovery there will not be much benefit to the athlete after a strenuous exercise.

The duration of recovery depends on the level of fatigue the athlete feels after the previous exercise. The greater the fatigue that is felt, the longer the time allocated for recovery.

The amount of time needed for recovery depends on (a) the individual athletes, (b) the level of fatigue suffered by the athlete, (c) the

energy system involved, and (d) a number of other factors.

### **The Principle of Recovery**

Some trainers often say that if you do not use this principle then you will lose. The time to rest should not be too long otherwise the body condition will return to the origin. On the other hand, if you do not rest at all you will not experience improvement.

### **Warming up**

Warming up aims to prepare physical and psychic conditions before practice. In addition, warming up is done primarily to avoid injury. Forms of warming up may include jogging, static stretching, dynamic stretching, and joint shaking.

### **Cooling Down**

Cooling down aims to develop physical and psychological conditions in the original state. Cooling down is done like the warming up activities with lower intensity (Hadi, 2007, p 55).

### **Training Load Indicator**

The training load is determined by three indicators: (1) the volume indicates the amount of loading with units of kilometers, meters, kilograms, time in minutes/ second, and number of repetitions; (2) the intensity of the exercise refers to the percentage of burden of the maximum ability; (3) recovery is the time and form of activities needed to perform recovery after loading both in series, in set, and in part (Hadi, 2007, p.67).

In addition to the exercise methodology, the increase of the athlete's aerobic endurance is also influenced by the following factors.

### **Power Aerobics**

The factor that influences aerobic endurance exercise is aerobic power. Maximum aerobic power has long been considered a major factor in determining success in sports that require endurance. However, aerobic power is not the only determinant factor of sport performance. Aerobic power is measured as the highest level in which oxygen can be taken and used by the body during maximal exercise and

can also be defined as maximal oxygen uptake (VO<sub>2</sub> Max) (Johansyah Lubis, 2013, p.83).

### Factors affecting endurance exercise consist of the following

The central nervous system

If the exercise process is done correctly, it will improve the working ability of the central nervous system with other organs and systems to overcome fatigue.

Willingness/Motivation of athletes

In general, the form of endurance training is boring and monotonous so it takes a prime psychic condition for athletes to be able to do the exercise in accordance with the dose that has been determined..

Aerobic capacity

Aerobic capacity is determined by the ability of internal organs to transport oxygen to fulfill the needs of the entire system. Therefore, the circulation and transport system of oxygen is one of the goals of the endurance exercise.

Anaerobic capacity

Without having a good anaerobic ability, athletes will not be able to work with high intensity and short duration.

Back-up Speed

Spare speed is required in the activity of cyclic motion. Athletes with high back-up speed are capable of running fast at short distances and are able to run at a greater distance even at slower speeds.

Intensity, frequency, and duration of exercise

This component is important in endurance training because it can improve the athlete's physical fitness.

Hereditary factors

Some of the factors influenced and determined by heredity are aerobic ability (VO<sub>2</sub> Max) of 93%, lactic acid system of 81% and a maximum heart rate of 86%.

Age and sex

The training load for children differs from that for adults, and sex differences will also affect the acceptance of burdens and adaptation (Apta Mylsidayu and Febi Kurniawan, 2015, p.89).

### CONCLUSION

The conclusion of this research is that endurance interval training with software training program can increase the VO<sub>2</sub> Max of the gergo Roman style of the wrestling athletes of the Gold-for-Indonesia Program in the Sea Games XXVII Myanmar 2013.

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