

The Difference of Serum Creatinin Level between Bodybuilding and Aerobic Gymnastic Enthusiasts

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Abstract

Background: Sport is one of activities that can be done to reach body fitness. Depends on muscle metabolism, activities can be divided into two type, which are aerobic and anaerobic sport. Creatinine is one that influenced by activities because creatinine is a result of meat diet and creatine metabolism in skeletal muscle tissue and kidney. Level of creatinine of each individu will be different depends on it lifestyle.

Purpose: To know the difference of creatinine level between bodybuilding and aerobic gymnastic enthusiasts.

Methods: This research was a non-experimental study with cross sectional approach. Subject recruitment used quota sampling ,They were 20 subjectfor each group. All subject were examined for serum creatinine level and the datas were analyzed with Mann Whitney Test.

Results: Creatinin levels of bodybuilding enthusiast are 0.71–1.49 mg/dL (Mean:1.0730 mg/dL) and aerobic gymnastic enthusiast are 0.80-1.86 mg/dL (Mean: 0.9745 mg/dL).. There is a difference of creatinine level between bodybuilding and aerobic gymnastic enthusiasts with the result of Mann Whitney Test ($p = 0.038$).The Average value of bodybuilding enthusiast is higher than aerobic gymnastic enthusiast.

Conclusion: There is difference of creatinine level between body building and aerobic gymnastic enthusiasts.

Keywords: Serum Creatinine, bodybuilding, aerobic gymnastic

INTRODUCTION

Exercise can be divided by type of muscle metabolism, the majority of static exercise is anaerobic exercise while the majority of dynamic exercise is aerobic exercise (Mitchell et al., 2005). Aerobic exercise is a form of physical activity involving large muscles. It is done in a fairly low intensity and a long time (Sherwood, 2001). Examples of aerobic exercise is a gymnastics (Sukmaningtyas & Pudjonarko, 2002). Aerobics is an exercise that moves all the muscles, especially the large muscle movements that continue-constantly (continuous), rhythmic, advanced and sustainable. Movements been easy, fun, and varied so as to enable a person to perform on a regular basis over a period of time (Yonkuro, 2006). Anaerobic exercise is a form of physical activity that does not require oxygen in its implementation (Udiyana et al., 2014). Anaerobic exercise aims to train the anaerobic capabilities involving severe muscle contractions in performing an activity. One characteristic of this is the presence of anaerobic exercise training load with high intensity, one of which is bodybuilding (Herman, 2012). The principles of exercise bodybuilding include: (1) the individual, (2) adaptation, (3) overload, (4) progressive, (5) specification, (6) varies, (7) heating and cooling, (8) periodisation, (9) reverse, (10) moderate, and (11) systematic (Nasrulloh, 2012).

The sport would be beneficial if done fairly, not less or more. Sometimes people needs nutritional intake to support their sport activities especially protein supplement. Excessive protein consumption may be harmful to human health. Excessive intake of protein can not be stored in the body. The addition of protein supplementation will be burned into energy or stored as body fat (Husaini, 2000). Sport activity and dietary patterns affect the metabolic system of the body. Creatinine is a product of the metabolism of creatine in the diet of meat and skeletal muscle metabolism (Vadde et al., 2013). Creatinine is made in the muscle through changes in non-enzimatic of creatine and phosphocreatinine. The liver has an important role in shaping creatinine via methylation of guanidine aminoasetat acid. The range levels of serum creatinine is 0,5-1.5 mg / dL by diet and diurnal variation and menstrual (Amin et al., 2014). Creatinine is useful to assess renal function. Plasma creatinine levels rated better than the plasma urea concentration (Luyckx & Mardigan, 2005).

METHODS

This research was a non-experimental study with cross sectional approach. The population in this study were bodybuilding enthusiasts in Adonis Fitness Center Yogyakarta and aerobic gymnastic enthusiasts in the gymnasium Adina Yogyakarta, The recruitment sample was quota sampling who had inclusion and exclusion criterias. They consisted of 20 bodybuilding and 20 aerobic gymnastic enthusiasts with a lifespan about 17-40 years, all genders, and has been practicing for at least 6 months.

The independent variable (independent variable) in this study were bodybuilding and aerobics enthusiasts. The dependent variable was the serum creatinine level. The researchers gave the information sheet and informed consent as an explanation and consent of respondents to participate in the study. The researchers interviewed and did a physical examination to obtain subject who appropriate on inclusion and exclusion criterias. The laboratory testing for serum creatinine level were done in Balai Laboratorium Daerah Provinsi Daerah Istimewa Yogyakarta

RESEARCH RESULT

a. Subject Characteristics

Characteristics of subject can be seen in the table 1 and 2:

Table 1. Distribution of Subjects based on Gender

Gender	Bodybuilding enthusiasts		Aerobics gymnastic enthusiasts		Total	
	n	%	n	%	n	%
Male	15	75 %	0	0 %	15	37.5%
Female	5	25 %	20	100 %	25	62.5%
Total	20	100 %	20	100 %	40	100%

Table 1 shows the distribution of subjects based on gender. Twenty subjects of bodybuilding enthusiast consisted of 15 male (75%) and 5 female (25%). Twenty subjects of aerobic gymnastics consisted of all female subject (100%).

Table 2. Distribution of Subject based on Age

Age	Bodybuilding enthusiasts		Aerobics gymnastic enthusiasts		Total	
	n	%	n	%	n	%
20-30 years	17	85 %	16	80%	33	82,5%
30-40 years	3	15 %	4	20%	7	17,5%

Total	20	100%	20	100%	40	100%
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Table 2 about the distribution of respondents according to age shows that forty subjects consisted of 33 (82.5%) aged 20-30 years and 7 subjects (17.5%) aged 30-40 years.

b. Serum Creatinine Levels

Table 3. Creatinine levels in bodybuilding and aerobics gymnastic enthusiasts

Activity	N	Creatinine levels (mg / dl)		
		<i>Minimum</i>	<i>maximum</i>	<i>mean</i>
Bodybuilding enthusiasts	20	0.71	1,49	1.0730
Aerobics gymnastic enthusiasts	20	0.80	1.86	0.9745

From the table, it can be seen the maximum value of creatinine levels were the highest in aerobic gymnastic enthusiasts, minimum value creatinine levels were the lowest in bodybuilding enthusiasts, The average value of serum creatinine levels in bodybuilding enthusiasts was higher than aerobics gymnastic enthusiasts.

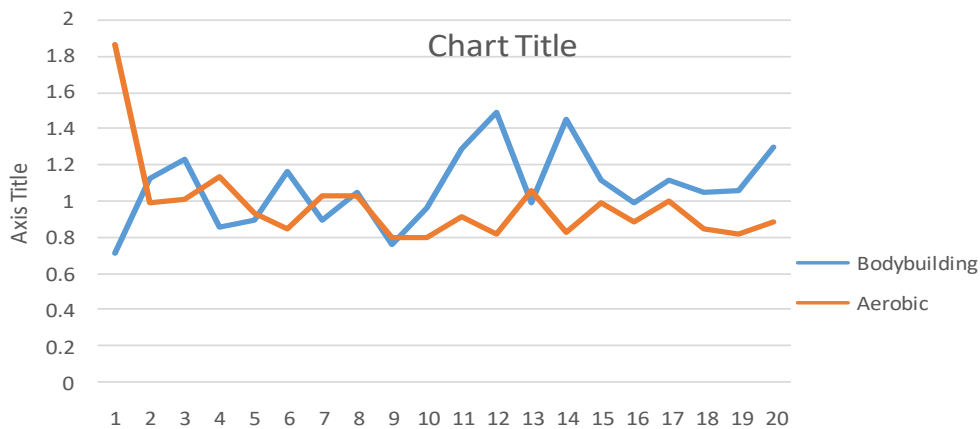


Figure 1. Graphic of serum creatinine levels

From the figure 1 can be seen that the creatinine levels between enthusiasts and aerobic gymnastic enthusiasts bodybuilding are varies. The average levels of the bodybuilding enthusiasts and aerobic gymnastic enthusiasts still qualifies as a normal (the range reference 0.5 mg / dL - 1.5 mg / dL). (Price & Wilson, 2005). There is one sample of the aerobic gymnastic enthusiasts have creatinine levels above the reference value.

Table 4. Statistic analysis with Mann-Whitney Test

Test method	Significance
Mann Whitney	$p= 0.038$

From statistic analysis was found that p value was 0.038, so there isa significant difference of serum creatinine levels between bodybuilding and aerobic gymnastic enthusiasts.

DISCUSSION

This study indicate that the average value of serum creatinine level of the bodybuilding enthusiasts is higher than the aerobic gymnastic enthusiasts. There is significant difference of serum creatinine levels between them. This supports the theory of a chain of several past studies. The first study was conducted by Godfrey (2003) which states that the exercise effect on muscle growth that is mediated by the Human Growth Hormone (HGH). Godfrey also explained that some of factors that may influence to stimulate HGH secretion in exercise are a neural stimuli, nitric oxide, catecholamine, and pH decline. The factor of pH decline has an important role on the secretion of HGH due to sport, particularly anaerobic sport (Gordon et al., 1994).

Other research results indicate the greater muscle mass, the greater storage location of creatine. It result for more creatine that can be stored (Balsom et al., 1994). It is also supported that the bodybuilding enthusiasts normally consume protein intake in large quantities such as Whey Protein and amino acid supplement (Princess, 2011). Protein-containing amino acids such as methionine, glycine and arginine are then used to form creatine in the liver which will then be stored in the muscle tissue (Murray et al., 2003). Creatine itself is a precursor of creatinine in which creatinine from creatine formed via non-enzymatic process, the more total creatine levels will affect the levels of creatinine produced (Wiss & Kaddurah-Daouk, 2000).

Conclusion

There is significant difference of serum creatinine levels between bodybuilding and aerobic gymnastic enthusiasts. The average value of serum creatinine levels of bodybuilding is higher than aerobic gymnastic enthusiasts.

Suggestion

Further research needs to be conducted with more subjects, specific criteria related to consumption and activities

References

- Amin., *et al.*, (2014). Evaluating Urea and Creatinine Levels in Chronic Renal Failure Pre and Post Dialysis: A Prospective Study. *Journal of Cardiovascular Disease*.
- Balsom, P.D., Soderlund, K., Ekblom, B. (1994). *Creatine in Humans with Special Reference to Creatine Supplementation*. University College of Physical Education and Sports.
- Godfrey, R.J., Madgwick, Z., Whyte, G.P. (2003). *The Exercise-Induced Growth Hormone Response in Athletes*. United Kingdom.
- Gordon, S.E., *et al.* (1994). *Effect of The Acid-Base Balance on The Growth Hormone Response to Acute High-Intensity Cycle Exercise*.
- Hermawan, H. (2012). *Pengaruh Latihan Aerobik dan Anaerobik Terhadap Kecepatan Reaksi Pada Siswa Sekolah Sepak Bola Tugu Muda Semarang Usia 10-14 Tahun*. Semarang: Fakultas Kedokteran Universitas Diponegoro, p. 11-5.
- Husaini, M.A. (2000). *Kebutuhan Protein untuk Berprestasi Optimal*. Depkes R.I. Dirjen Kesehatan Masyarakat Direktorat Gizi Masyarakat., Hal. 13.
- Luyckx, V.A., & Mardigan, T.A. (2005). *High Protein Diets are not Hazardous for The Healthy Kidneys*. Oxford University.
- Mitchell, *et al.* (2005). Task Force 8. Classification of Sports. *JACC* Vol. 45., No. 8.
- Murray, R.K. (2003). *Biokimia Harper* (Edisi 25). Jakarta: Penerbit Buku Kedokteran EGC

- Nasrulloh, A. (2012). Progam Latihan *Body Building* Dapat Meningkatkan Massa Otot Mahasiswa Ikora FIK UNY. *Media Ilmu Keolahragaan Indonesia.*, Vol. 2, No 2 Tahun 2012.
- Price, S.A., & Wilson, L.M. (2005). *Patofisiologi: Konsep Klinis Proses-Proses Penyakit* (Edisi 6 Vol. 2). Jakarta: Penerbit Buku Kedokteran EGC.
- Putri, H.P. (2011). *Hubungan Tingkat Pengetahuan Gizi dengan Asupan Gizi pada Bodybuilder*. Universitas Diponegoro.
- Sherwood, L. (2001). *Fisiologi Manusia dari Sel ke Sistem*. Penerbit Buku Kedokteran (Edisi 2). Jakarta: EGC, p. 34.
- Sukmaningtyas H & Pudjonarko D. (2002). *Pengaruh Latihan Aerobik dan Anaerobik terhadap Sistem Kardiovaskuler dan Kecepatan Reaksi*.
- Udiyana, I., Kanca, I., Sudarmada, I. (2014). Pengaruh Pelatihan Modifikasi Zig Zag Run terhadap Peningkatan Kecepatan dan Kelincahan pada Siswa Putra Peserta Ekstrakurikuler Sepak Bola SMA PGRI 1 Amlapura Tahun Ajaran 2013/2014. *E-Journal IKOR*. Universitas Pendidikan Ganesha.
- Vadde., *et al.* (2013, 7 Mei). Creatinine Clearance. *Medscape*. Diakses 11 April 2016, dari <http://emedicine.medscape.com/article/2117892-overview#a4>
- Wyss, M. & Kaddurah-Daouk, R. (2000). Creatine and Creatinine Metabolism. *Physiological Reviews Vol. 80*. USA.
- Yonkuro, T. (2006). *Profil Instruktur*. Yogyakarta: FIK UNY.