



The Effect of Caffeine on VO₂Max Athletes Ability

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Abstract

Caffeine active ingredients have a physiological effect of restraining the body's ability to increase blood flow to the heart during of exercise, it will be beneficial to saving the use of oxygen. This study aim to provide information on the utilization of natural food from caffeine in coffee as a supplement to support the performance of athletes is much better and safer for the body than the use of chemical drugs or doping, then in this study will see how the influence of coffee caffeine prior to the ability of VO₂max athlete. This study showed that there is an average difference in the ability of VO₂max before with after caffeine, in athletes or in other words, there influence effect of caffeine on the ability of vo₂max athletes.

Keywords: Caffeine; Vo₂max; Athlete.

1. Introduction

Caffeine is often used as a stimulant during heavy activity because it can improve endurance exercise performance [1]. Coffee containing coffee is considered to be a safe alternative drink for athletes, some research suggests that coffee does not have a negative effect if consumed by athletes [2, 3]. Biochemical mechanisms showed involving protein such as dopamine, it has a role as stimulat in the central nervous system [4]. The main role of caffeine in the body is to improve psychomotor work so that the body is maintained and gives physiological effects of energy enhancement. The effect is usually only seen 1 - 2 hours later after consuming coffee.

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All this happens because the caffeine in coffee restrain the body's ability to increase blood flow to the heart during exercise, it will be beneficial in saving the use of oxygen because at the time of exercise, blood flow to the heart is definitely increased, because the body needs more oxygen and nutrient intake [5] (Desintya Dewi, 2012). Caffeine affects brain function and adenosine receptor is the main target [6,7].

2. Material and Methods

Type of study used was pre-experimental design, population was badminton athletes in Makassar and sample size used in this study were 25 participants. VO₂max athlete measured using Bleep Test and data was analyzed using Paired-T Test and represented in the form of table that display mean, mean differences and probability values.

3. Result

Based on the table showed that the average ability of VO₂max with caffeine athletes is 44.85 ml / kg / min. is higher than the average ability of VO₂max prior to caffeine in athletes 41.02 ml / kg / min. The result of the analysis used T-Pair test with significance level ($\alpha = 0,05$) showed significance difference VO₂max athlete between before and after caffeine consumption, that is 3.83 (p=0.001, p<0.05).

Table 1: Influence of Caffeine on VO₂max Athlete Ability

VO ₂ max	Pulmonary Vital capacity Mean (Standard Deviation)	Mean Difference	P*
Before caffeine Consumption	41.02(5.89)		
After caffeine Consumption	44.85 (5.96)	3.83	0.001

*Paired T-Test

4. Discussion

Caffeine is known as a stimulant in the production of energy in the body of either short-duration sports or durable shelf, these athletes consume caffeine as an energy producer to pump up their performance during practice. Caffeine is very useful in training and improving athlete performance through increased endurance and eases muscle fatigue and pain. Caffeine is also a powerful antioxidant, stronger than vitamin C [5]. There is no evidence to suggest that consume caffeine before exercising causes dehydration, ion imbalance, gastric irritation, and other side effects. Caffeine tolerance does not seem to affect the ergogenic benefits of either long-term caffeine users or non-caffeine users responding to caffeine intake in the same way and intensity. The mechanism of action of caffeine in the body is to rival the function of adenosine (one of the compounds that in brain cells can make people fast asleep). Where caffeine does not slow the movement of body cells, but caffeine will reverse all the work of adenosine so that the body is no longer drowsy, but appears feeling fresh, slightly

excited, eyes wide open, heart beat faster, blood pressure rises, muscles contract and The liver will release the sugar into the bloodstream which will form the extra energy. Increased durability in the sample was due to the presence of coffee by the sample-weighted dose in which the results increased the average VO₂max capability by 3.83 ml / kg / min, the original VO₂max measured an average of 41.02 ml / kg / min, to 44.85 ml / kg / min. This is in accordance with previous studies [8] which states that in a test of the effects of caffeine, subjects were asked to ride high-speed cycles to exhaustion. As a result, caffeine increased endurance by more than 17%, the original travel time of 14.9 minutes to 17.5 minutes and increased muscle activity by 20% in subjects consuming caffeine, and endurance increased by more than 30%, from 13.5 Minutes to 17 minutes. Although the results of the research are so diverse, it is clear that caffeine is capable of enhancing higher endurance in short duration short duration exercise. Caffeine is absorbed by the body quickly because caffeine in the coffee is present in the form of potassium chlorogenate and chlorogenic acid, this bond will be released in the presence of hot water. The duration of caffeine work as a sports supplement depends on the dose, the higher the amount of caffeine athlete intake, the maximum concentration of caffeine in the blood will be longer.

5. Conclusions

It can be concluded that there is an average difference in the ability of VO₂max before with after caffeine in the athlete or in other words there is an effect of caffeine on the ability of VO₂max athlete.

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Reference

- [1]. Hodgson, A.B., R.K. Randell, and A.E. Jeukendrup, The metabolic and performance effects of caffeine compared to coffee during endurance exercise. *PLoS One*, 2013. **8**(4): p. e59561.
- [2]. Higgins, S., C.R. Straight, and R.D. Lewis, The Effects of Preexercise Caffeinated Coffee Ingestion on Endurance Performance: An Evidence-Based Review. *Int J Sport Nutr Exerc Metab*, 2016. **26**(3): p. 221-39.
- [3]. Sokmen, B., et al., Caffeine use in sports: considerations for the athlete. *J Strength Cond Res*, 2008. **22**(3): p. 978-86.
- [4]. Jones, G., Caffeine and other sympathomimetic stimulants: modes of action and effects on sports performance. *Essays Biochem*, 2008. **44**: p. 109-23.
- [5]. Dewi, Desintya. *Sehat dengan Secangkir Kopi*, Surabaya: Penerbit Stomata. 2012
- [6]. Jacobson, K.A. and Z.G. Gao, Adenosine receptors as therapeutic targets. *Nat Rev Drug Discov*, 2006. **5**(3): p. 247-64.
- [7]. Ribeiro, J.A. and A.M. Sebastiao, Caffeine and adenosine. *J Alzheimers Dis*, 2010. **20 Suppl 1**: p. S3-15.
- [8]. Weinberg, Bennett Alan dan Bealer, Bonnie k. *The Miracle of Caffeine: Manfaat Tak Terduga Kafein berdasarkan penelitian paling Mutakhir*, Bandung: Penerbit Qanita. 2010.