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INCREASED VO2 MAX DUE TO CARNITIN LOADING IN YOUTH

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Abstract This study was aimed to investigate the influence of carnitin on the increase of VO2 max in male adolescent nurse students in Tribhuwana Tunggadewi University. This study was an True Experimental study using Randomized Pre-Test Post test Control Group Design. The research outcome of VO2 max remnant after and before intervention of intervened group and controlled group using T-test of two-independent sample finds no significant difference ($p=0,421$). Result of this study reveals that 1) no significant difference between respondent characteristic, 2) no important difference in the consumption of nutrition, except in fat consumption, 3) providing carnitin 100mg of Universal Fat Burners and placebo for seven days does not increase VO2 max among male college students of Nursing Study Program of Tribhuwana Tunggadewi University. The conclusion is . There was no difference of respondent characteristic (age, body weight, height, nutritional status, smoking habit, and health status) between treatment group and control group, There was no difference in consumption pattern of nutrients (carbohydrate, protein, iron and vitamin C), except in fat consumption ($p=0,01$) between treatment group and control group,

Keywords: VO2Max, carnitin, youth

Ergogenic aids is a substance, equipment or exercise to improve the use of energy, production or recovery in individuals. Ergogenic aids as a dietary supplement to improve the health and stamina of the body occurs at the end of the decade (USDA, 1999). Carnitin is an essential nutrient as a food supplement that is being intensively promoted in mass media and electronic media. Carnitin is not only consumed by athletes, but in general, the use of carnitin supplement is associated with sports activities. Sports activities are often done by teenagers. Adolescence is the most important period in a human's life to achieve optimal growth and development (Sayogyo, Savitri, 1995). One of the results of carnitine studies abroad states that an L-carnitine supplement between 200-1000 mg helps the body from carnitine deficiency, as a result of exhausting exercise, helps to avoid stress racism and supports physical fitness ([Http://www.carnipure.com](http://www.carnipure.com)). Research by Dragan (1987) suggests that L-Carnitin supplementation for more than 10 days increases VO2 max, where maximal aerobic strength is achievable and increases body resistance. In accordance with research Marconi, et al (1985) who found that there is the effect of L-Carnitin supplementation towards aerobic, anaerobic and VO2 max performance. Nutritional needs of a person is different. The nutrient needs of someone is depends on age, sex, body size, and activity (Suparto.H, Arsiniati, 1999). Carnitin is one of the nutrients, a product that has long been used by foreigners. The difference between Indonesian and foreigner, including in

terms of body size and activity, can be assumed that the body's need for carnitine is also different. The need for L-Carnitin for overseas people is ± 200 mg per 70 kg of adults (Carpal). While carnitine needs for who performs hard training continuously are 1-2 g/hr (Neumarin 1998). The need for carnitine for Indonesians is lower than the foreigners.

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METHOD This research is true experiment research in field with Randomized Pre-Test design Posttest Control Group Design (Wirjatmadi, 1998). The population of this research are students of semester I-VIII at the Health Science Faculty of Nursing Study Program of Tribhuwana Tunggaladewi University. The samples are male teenagers with the criteria: male, age 19-25 years, hemoglobin level over 12g / dl, normal nutritional status with Body Mass Index of 20-25, normal resting pulse (60-80 times per minute), VO2 max with moderate to severe less, not smoking, not suffering from diseases that can disrupt the course of research. Materials and instruments used in this study include: questionnaire, carnitine 100 mg, capsule form, Hb gauge: expert device, VO2 max measuring apparatus such as metronome and stopwatch, 1 Detekto weight tester with accuracy 0.01, measurement of standiometer height with accuracy of 0.1 mm. Experimental treatment (treated group of Universal Fat Burners 100 mg daily carnitin for 7 days, control group was given placebo (starch) daily for 7 days on the 7th day of carnitine, carnitine supplement was taken by the subjects 2 hours before measurement VO2 max}, post-test implementation {(executed after the end of the experiment is the seventh day of carnitine, a 15 minute run test, after 15 minutes of running, then measured how many meters the distance the sample has taken in the run, then put in the table of physical fitness to know the level of physical fitness) and Asrand table (to know category VO2 max). Data analysis techniques used in this study include: paired data T test and T test with two free samples.

RESULTS Screening Screening of the students of Semester I-VIII in the Health Science Faculty of Nursing Study Program of Thribhuwana Tunggaladewi University was conducted in 3 stages. The results of the screening of 254 students (71 male and 183 female) were the first stage (gender, age, nutritional status, resting pulse, and health status) fulfilled the criteria of 40 people, the second stage (Hb level) met the

criteria as many as 26 people, and in the third stage (VO2 Max) all (26 people) meet the sample criteria. The results of the VO2 max study on the student population who passed the screening (number 26 people) showed that 26 students (100%) had very less VO2 max. From 26 students who met the sample criteria, it was taken by simple random sampling, as many as 11 people for the treatment group and 11 people for the control group. The results of statistical analysis on variable weight and height, can be explained as follows: 1). The average group weight treatment 56.1 kg, height 165.1 cm, 2). The average weight control group was 55.9 kg, height 162.1cm. The result of t test of two free samples to body weight, obtained $t = 0.125$ and $p = 0.902$ ($p > 0,05$), while for height is $t = 1.468$ and $p = 0,158$ ($p > 0,05$). Shows there is no difference in height and weight between the treatment group and the control group. The sample had an average resting pulse of 75 times per minute. The two-sample test t test was free of resting pulse, obtained $t = 0.163$ and $p = 0.872$ ($p > 0.05$), indicating no difference in pulse rate between treatment group and group control.

Measurement of Health Status

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Smoking habits is one of the factors that affect the value of VO2 max. The more cigarettes smoked each day, the lower the VO2 max. From the results of interviews obtained as many as 40 people from 71 male students (56.34%) have no smoking habit. Based on the questionnaire that was distributed to the students, 100% of research samples said they had no disease for the last 3 months.

Measurement of Nutrition Status The subjects of the study were nursing students who had Hemoglobin (Hb) $> 12\text{g/dl}$. In the treatment and control group had an average Hb content of 12.63g / dl . T test result of two free samples to Hb level, obtained $t = 0.00$ and $p = 1$ ($p > 0,05$), showed no difference of Hb level between treatment group and control group. Students who become samples have a value of Body Mass Index (BMI) 20-25. Results of statistical analysis on nutritional status variables: 1). The treatment group had a BMI value of 20.57, while 2). The control group was 21.25 T test result of two free samples on nutritional status, $t = 1.508$ and $p = 0,147$ ($p > 0,05$) indicated that there was no difference of nutritional status between treatment group and control group.

Consumption of Nutrients To know the consumption of energy, carbohydrates, fat derived from daily food, done with Recall 2x24 hours at the beginning of treatment done by the researchers themselves Recall done simply. The results obtained are then converted using the Food Composition List (DKBM) and Nutrient Adequacy Ratio (AKG). The average energy consumption in the treatment group was 2156 ± 331.88 Kal. The control group was 2400 ± 245.01 Kal. This shows that in the treatment and control group is still under the AKG. The average carbohydrate consumption in the treatment group was 269.36 ± 53.95 g. The control group was $266,09 \pm 37.28$ g. This suggests that carbohydrate consumption in both treatment and control groups is still below the AKG. The average protein consumption in the treatment group was 50.59 ± 16.71 g. The control group was 50.56 ± 11.53 g. This suggests that the consumption of both proteins in the treatment and control group is still below the AKG. The average fat consumption in the treatment group was 97.45 ± 31.9 g. The control group was 140.61 ± 40.98 g. This shows that at already fulfill the AKG that is 77,7 gr. The average consumption of vitamin C in the treatment group was 50.01 ± 41.89 mg. The control group is 53.5 ± 37.01 Kal. This shows that has not yet flfilled the AKG 60 mg. The average iron intake in the treatment group was 13.38 ± 7.48 mg. The control group was 15.03 ± 6.41 mg. This shows that already fulfilled the AKG 13 mg. The results of the two free sample test t tests found that there was no difference in energy consumption ($p= 0.06$), carbohydrate consumption ($p=0.870$), protein consumption ($p=0.99$), vitamin C consumption ($p=0.83$), and iron consumption ($p=0,58$) between treatment and control group, except fat consumption in control group was greater than treatment group, indicating that there was a significant difference ($p=0.012$).

VO2 Max (VO2 Maximal) Measurements of VO2 max towards the samples in this study were done twice, ie before and after the intervention by using a 15 minutes run test. The results of VO2 max examination on the sample showed that all students (100%) had VO2 max which was very less. The average VO2 max sample before the intervention was 38.84 ± 2.36 cc O2/kgbb/ minutes with the lowest VO2 max of 34.34 O2/kgbb/ min and the highest VO2 max of 44.18 O2/kgbb/min. After the intervention was 39.94 ± 2.69 cc O2 / kgbb / min

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with the lowest VO2 max of 34.22 O2/kgbb/min and the highest VO2 max 45.77 O2/kgbb/ min. The test result of two free sample test to VO2 max before intervention, obtained $t=0.836$ and $p =0.413$ ($p > 0,05$), showed that there was no difference of VO2 max value before intervention between treatment group and control group. The result of t-test of paired data between VO2 max before and after intervention in

both groups showed that 1). There was no significant difference in VO₂ max ($p=0.221$) before and after intervention in the treatment group, 2). There was no difference in VO₂ max ($p=0.272$) before and after intervention in the control group. The results of the two free sample test t tests on the VO₂ max difference before and after the intervention showed that there was no significant difference ($p = 0.421$) between the treatment group and the control group. perbedaan.

Discussion Condition of Respondents' Beginning In the Treatment and Control Group The results of examination of sociodemographic characteristics (respondent age), anthropometric measurement (body weight and height), pulse rate measurement, health status measurement (smoking habits and disease history), measurement of nutritional status (hemoglobin and body mass index), VO₂ max and consumption the nutrients of the respondents in the treatment and control group showed no difference. So the initial conditions of the respondents are the same. While the fat consumption in the treatment and control group showed a difference. Fat consumption in the treatment group was lower than the control group. The high fat consumption in the control group was probably due to a higher fat intake trend compared to the treatment group. Thus, it is possible to have different intake factors between the treatment and control groups. The high low VO₂ max values are influenced by many factors, ie age, sex, genetics, smoking habits, nutritional status and activity (Lamb, 1984; McArle, 1986; Krisdinamurtirin 1990).

Prevalence of Low Consumption of Nutrition and VO₂ max of Faculty of Health Sciences Nursery Program of Tribhuwana University The results of the calculation of student consumption shows the prevalence of low nutrient intake is high enough. From the calculation results obtained the prevalence of low calorie consumption of 50%, protein consumption 54.5%, carbohydrate consumption of 86.36%, fat consumption of 4.4% and consumption of vitamin C by 54.5%. Likewise with VO₂ max. From result of measurement of VO₂ max got prevalence of low VO₂ max value, that is 100% student have VO₂ max which less once. The low VO₂ max of students may be due to the fact that the students are not trained and lack of nutrients every day.

Change VO₂ max Before and After Intervention Measurements of VO₂ max to the research sample were conducted 2 times before and after intervention. Measurement of VO₂ max is executed by using VO₂ max test run 15 minutes. The result of paired T test to VO₂ max in treatment group showed no significant difference between before and after treatment. This result gives the meaning that VO₂ max before intervention is not different with VO₂ max after intervention. Carnitin 100mg brand Universal Fat Burners can not increase VO₂ max T test results of two free samples of VO₂ max difference before and after intervention between treatment group and control group showed that there was no significant difference ($p = 0,421$). These results suggest that there is no difference in the increase in VO₂ max between the

treatment and control groups. It can be concluded that giving and conditioning the 100mg carnitine of Universal Fat Burners for 7 days in the treatment group did not increase VO₂ max. There is no increase in VO₂ max in the treatment group at the end of the study can occur due to several things, among others: 1. The composition of carnitine complex on Universal Fat Burness product is only 100 mg. One of the results of carnitine research abroad states that L-Carnitin supplements of 200-1000 mg will help overcome carnitine deficiency as a result of exhausting exercise, and help avoid stressful reactions that affect physical fitness (<http://www.carnipure.com>). Thus, the composition of L-Carnitin in Universal Fat Burness products is 100mg, judged less if it will be used to increase VO₂ max 2. The increase in VO₂ max is not directly affected by carnitine supplements alone, but can occur through a series of metabolic processes present in the body. Included in that role is the availability of the amount of nutrients needed and the ability of the body to perform metabolism well. The body needs nutrients that are useful for the survival of metabolism and energy generation. Nutrients that play a role in generating energy include carbohydrates, fats and proteins, with various vitamins such as vitamin C and vitamin B6 as well as some minerals (niacin and iron for metabolic sustainability) (Scheider, William.1983). The treatment and control group had lower calorie and carbohydrate consumption values than the recommended nutritional value (AKG). Carbohydrates as the main energy source will be directly broken down or used first in the event of combustion. Lack of carbohydrate consumption causes the body can not be maximum (slow) in combustion because the basic ingredients that should be directly used for combustion to produce energy, less. Physical activity requires energy. Energy is obtained from food consumed every day. Preparation of the menu in determining the amount of nutritional needs for an athlete should be started by determining the energy needs (Benny, 1997). Based on the theory stated that if the main energy source is less carbohydrate in food intake, then the body will use other body energy sources in it is fat or protein that can be broken down to replace the role of carbohydrates. The energy adequacy of carbohydrates and fats will ensure the availability of proteins for tissue formation and repair (Beck, Mary.1993). This means that if the consumption of carbohydrates and fats are lacking, then the role of proteins that should be for formation and repair will turn into a source of energy to replace carbohydrates and fats. In the treatment and control group protein consumption less meet the nutritional adequacy, while the fat consumption has met the nutritional adequacy rate. Because the consumption of fat in the treatment and control groups have met the AKG, while the consumption of carbohydrates is less, then it is possible that fat can be a source of energy. The presence of carnitine supplements is intended to further activate free fatty acids into active fatty acids and transport them to penetrate mitochondrial walls (as a fat burning site). However, the role of L-Carnitin may work maximally, if not only from adequate carnitine stores in the body, but also from carnitine-containing supplements with adequate L-carnitine composition. L Carnitin is produced in the human body through the intake of food and endogenous synthesis in the body. Approximately 90% of normal LCarnitin

requirements are covered from food. The six nutrients needed for endogenous synthesis include amino acids, vitamins, and ferrum. The source of L-Carnitin in food is found in proteins (animal products), especially the 2 essential amino acids lysine and methionine necessary for L-Carnitin biosynthesis in the human body. Lack of protein consumption in the treatment and control groups is also likely to cause the synthesis of

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carnitine in the body to be impaired. Vitamin C and ferrum also play a role in synthesizing carnitine in the body. Lack of consumption of vitamin C and ferrum will lead to the synthesis of carnitine in the body is also less. The body's need for carnitine is about 200 mg to avoid deficiency. For athletes lacking carnitine, it is given 100-400mg / hr. The administration of L-Carnitin at a dose of 1-2 g provides an effective reaction during a strenuous exercise period ([http:// www.horley.com](http://www.horley.com)). In this study, the researcher used carnitin brand Universal Fat Burners containing carnitin kompleks only 100 mg. So it is possible that no increase in VO₂ max in the treatment group because of the lack of carnitine in supplements to increase physical fitness, as well as nutrient intake (calories, carbohydrates, proteins, vitamin C and iron) play a role in synthesizing carnitine in the body. Because of the fewer amounts of carnitine in the body, the supplements required to activate free fatty acids become active fatty acids and transport them to penetrate the mitochondrial wall (as a fat burner) as well as more. Body energy derived from fat breaking produces greater energy than breaking carbohydrates (Wirahadikusumah, 1985, Wasserman K, Whipp 1975). In providing the energy derived from the breakdown of fat, it takes the role of carnitine (carrier) as longchain fatty acid transport (Asil Ko-A) in order to penetrate mitochondria. Carnitin serves as a means of transporting fatty acid entry into the mitochondrial membrane (the site of oxidation) in the oxidation of fatty acids (Bremer J, 1983). Increased fat-breaking activity due to the availability of carnitine transport devices to penetrate mitochondrial membranes (Hiatt, Wolfell, Regensteiner, Ruff, Brass, 1989), also means increased oxygen demand for aerobic respiration ([http:// www.medicdirectsport.com](http://www.medicdirectsport.com)). Carnitin administration with the right amount of carnitine will help the breakdown of fat, which requires oxygen respiration as oxidation fuel. Thus, the hypothesis stating that there is a difference of VO₂ max on day 0 and day 7 of giving and conditioning of 100mg carnitin brand Universal Fat Burners between the treatment and control group of students of the Health Sciences Faculty of Nursery program study of Thribhuwana Tungadewi University is not proven.

CONCLUSIONS 1. There was no difference of respondent characteristic (age, body weight, height, nutritional status, smoking habit, and health status) between treatment group and control group 2. There was no difference in consumption pattern of nutrients (carbohydrate, protein, iron and vitamin C), except in fat consumption ($p=0,01$) between treatment group and control group 3. Treatment group (giving and conditioning of 100mg carnitin brand of Universal Fat Burners for 7 days) could not increase VO₂ max significantly ($p=0,421$) in student of Health Sciences Faculty of Nursing Study Program at Tribhuwana University

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