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1 The effect of Iron Supplying on VO2 MAX and Haematology Parameter on Menstrual Woman Rika Nailuvar Sinaga1, Novita Sari Harahap1a, Rima Mediyana Sari 1 1 Faculty of sport science, Medan State University (Unimed), Indonesia aC orespondihor' : novita.s2102@gmail.com Abstract. One of the supporting factors to have good aerobic endurance requires high VO2 max levels supported by good quality and quantity level of Haematology parameter especially such as erythrocytes, hematocrit and hemoglobin.

One of the components in hemoglobin is iron which functions as theoxygen transport to parts of all body required in the process of metabolism. The objective of this research was to find out the difference between VO2 Max and Haematology parameter between iron supplying and no iron supplyingonmenstrual woman. The type of this research is quasi experimental research with non-randomized control group Pretest-Postest Design.The subjectsarethe studentsat faculty of Sports Sciences, Medan State University with the criteria of female gender, monthly regular menstrual cycle, having the level of health and the level of training, willing to be a sample by filling out informed consent.

The total number of research subjectsis twenty students, divided into two groups namely the treatment group and the control group. The hematology parameter was measuredby Haemotology analyzer and VO2 Max was measured by multi-stage run. The result showed that there was a significant effect of iron supplyingon the increase of erythrocyte level on menstrual women, hemotocrit, haemoglobin and an increase in VO2 Max. Iron supplying on menstrual woman has the effect on the increase of erythrocyte, hematocrit, hemoglobin level and VO2 Max 1.

Introduction Nowadays women's participation in match / competition especially in sport has been increasing. Biologically, women will have menstrual periods every month

where this cycle is continuously and regularly will be passed. Hinton et al (2000) says that a woman in menstrual period will lose bloodwhich affectsthe athlete performance.

Healthy physic is one of the supporting factors to achieve maximum performance in sport because it has good cardiovascular resistance (aerobic). To have a good aerobic endurance requires a high level of VO2 max. Many factors affect VO2 max such as heart, lung, Haematology, blood vessels, andskeletalmuscle in consuming oxygen.

There are many components contained in Haematology such as Erythrocytes, one of the blood cellscontained Hemoglobin. Hematocrit is the ratio of red blood cells to blood volume. If one of these components has a low capacity, it will affect the level of VO2max (Fox, 1988) especially Hemoglobin.

(Zhu and Haas, 1997) also said that a decrease in VO2 max can occur in anemic patients with decreased Hemoglobin levels and consequently the oxygen transport capacity in the blood will decreases. Haas and Brownlie (2001) said thatiron is a mineral in hemoglobin namely a protein found in red blood cells (erythrocytes). Iron functions as the formation of red blood cells and these minerals 2 provide a lot of functions in the oxygen transport to parts of all body required in the body metabolic processes. Therefore, iron is very necessary for female athletes during menstruation.

According to Weaver and Rajaram (1992), Iron is widely used as one of the additional minerals for female athletes in performing daily physical exercise. In addition, female athletes in sports(endurance) also require more iron supplementation when compared with women who are less active to obtain more energy in doing heavy work (Fogelholm, 1995). DuecMae Matt(1996)ys hatfemalathle imensrual od can' orbett than before menstrual period.

This problem can affect the level of cardiovascularendurance to maximum work intensity. Newhouse and Clement (1988) says that the current problem of iron deficiency inbody is caused by bleeding of menstruation taking place in many female athletes. Inadequate iron consumption causes reducing oxygen conveyed to the muscle tissues.

This problem arises when female athletes do not consume adequate iron in their main course at the time of menstruation, therefore blood carrying oxygen decreases and can affect athlete performance. Roseann et al (1992), says that in addition to the insufficient amount of iron consumed, women have a necessity for increased iron.

The loss of blood due to menstrual periods from month to month is commonly a daily iron loss about 1-2 mg or monthly iron loss about 28 mg. women who do not have

menstrual period also lose 0.5-1mg iron in a day most women do not consume the amounts of ironsufficiently (Clement et al,1982). There are only 6 mgirons in every 1000 calories of well-chosen food on a daily main course.

A woman who is menstruating must eat 3000 calories to meet daily iron need until18 mg. The Problem arises when many women only take from 1500 to 1600 calories each day. Therefore, the iron formed to be food(supplement) bit help to fulfill the inadequate iron need in body.

Considering background above it is necessary to examine the effects of iron supplement onHaematologyparameter and VO2 max on menstrual woman. 2. Subject and Methods 2.1. Sample The sample in this research is 20 students at Faculty of Sport Sciences, Medan State University. The sample has several criteria that must be fulfilled as following: female sex, monthly regular menstrual cycle, having level of health and level of training, willing to be sample by filling out informed consent. 2.2.

Research design This research is a quasi experimental research with design of Non Randomized Control Group Pretest- Postest Design. The sample was divided into two groups, each group consists of 10 people. The first group (P1) as a control group was given a placebo in the form of starch and second group (P2) as the treatment group was given iron.

The iron and starch was given once a day, for 7 days before the date of menstruation. The Parameter examination of Haemotology and VO2 max was conducted on the third day of menstruation. 2.3. Measurement of VO2 max Measurement of VO2 max used a multi-stage run test or bleep test.

The bleep test procedure is to measure a distance of 20 meters and mark it on both tips with a cone or other mark as distance, thenprepare the cassette and the tape recorder that serves a rhythm when running, have the participants warm up and stretch, turn on the tape and then get all participants to perform a multi-stage run (bleep test) until the participants can no longer follow the rhythm that has been specified.

After that take a note level of the sample capability and be measured VO2max (compared with table). 2.4. Complete Blood Measurement The blood sampling for Haemotology parameters examination wasperformed on the third day of menstruation, then measurements were made using Haematology Analyzer. 3 2.5. Data analysis Data obtained from the research were analyzed statistically using unpaired t-test with significance l below 0.05 (and 95%ievelhe fi sts the noriy t and homogeneity test. Data were analyzed using SPSS 19 software. 3.

Results Normality test of Erythrocyte data, hematocrit, Hemoglobin and VO2 max have normal distribution and same variance data, thus data analysis done on T-test is not in pair. The results of the research show that the average of Haematology parameter consisted of Erythrocyte, Hematocrit and Hemoglobin level on woman with menstrual period as listed in Table 1. Based on the results in Table 1, it can be seen that the average Erythrocite in the P1 group (4.30 ± 0.05 1012 / l) is lower than P2 group (4.61 ± 0.04 1012 / l). The data analysis obtained value p= 0.000 which means there is a significant difference of Erythrocytelevel on menstrual woman who get iron and non-iron.

Table 1 shows that the average hematocrit in group P1 (37.03 ± 0.05%) is lower than group P2 (40.93 ± 0.37%). The data analysis obtained p = 0,000, which means that there is significant difference of Hematocrit level on menstrual woman who get iron and non-iron. Table 1 shows that the average Hemoglobin in group P1(12.22 ± 0.41g / dl) is lower than group P2(14.17 ± 0.24g / dl).

The data analysis obtained p = 0,000, which means that there is the difference of Hemoglobin level onmenstrual woman who get iron and non- iron. The results obtained the average difference VO2 max on menstrual women as listed in table 2. Table 1. Average difference VO2 max on menstrual woman Treatment group Mean ± SD P P1 38,61± 0,26 0,000* P2 40,62± 0,53 Notet : (P1) control; (P2) receive iron Considering on the results of Table 2, it can be seen that the mean VO2 max in group P1 (38.61 ± 0.26 ml / kg Kg / mnt) was lower than group P2(40.62 ± 0.53ml / Kg BW / min) . Data analysis obtained p value = 0.000 which means there is significant difference vO2 max onmenstrual woman who receive iron. 4.

Discussion This research was conducted to find out the effect of iron on VO2 Max and some Haematologyparameters in women who experience menstruation. Thisresearch found that iron has an effect on the increase of erythrocytes, hematocrit, hemoglobin level and VO2 Max in Sports Science students who experience menstruation. This research is in line with previous research by Pasricha et.al (2014) which states that iron supplements can significantly increase VO2 max and performance of menstrual women.This explains that iron can prevent and treat iron deficiency on women of childbearing age (reproductive age).

Women of childbearing age are at high risk of iron deficiency and iron deficiency anemia due to blood coming out during menstruation. Iron deficiency takes place when blood loss causes reduced hemoglobin and iron levels in the body while generally consumed foods do not contain adequate iron, especially for women with menstrual

periods (DellaValle, 2001). Iron is essential for many functions related to physical activity and exercise.

WHO recommends the distribution of iron supplements to all women where the prevalence of anemia (in women) exceeds 20% (WHO, 2011). The International Olympic Committee also recommends female athletes to screen for iron deficiency in order to improve performance (Ljungqvist et al., 2009). VO2 Max called as maxim rc pacy s he s ittconsume maxilpermie.

gh 4 low VO2 Max on a person is influenced by several factors such as: the ability of the heart to pump blood throughout the body; the capacity of the lung that serve to take oxygen from the outside air; the quality of blood (hemoglobin) that serves to bind oxygen and is carried throughout the body, the blood vessels that channel blood throughout the body and the ability of the skeletal muscle to use oxygen for metabolism (oxidation) so as to produce a lot of energy to support the old physical activity (endurance) (Foss and Keteyian, 2006). In addition to supporting the aerobic metabolism process, VO2 Max is also required for recovery process.

After a long and heavy activity, the supply of ATP in the active muscle cell is so low that it is insufficient to generate energy on muscle contraction, therefore ATP recepture process requires energy derived from KreatinPosphat, glucose through anaerobic glycolysis process and oxidation process glucose and fat. The oxidation process occurs in mitochondria and this requires oxygen taken by iron- binding hemoglobin (ferritin).

thus the sufficient amount of oxygen is needed for sports that require endurance or in other words a person must have a good VO2 Max. 5. Conclusion Thesupplyingof iron to menstrual woman affect the increase of erythrocytes, hematocrit, hemoglobinlevel and VO2 Max References [1] Clement DB, Asmundson RC 1982. Nutritional intake and hematological parameters in endurance runners. Physic Sport Med. Vol. 10:37- 43. [2] DellaValle DM. 2001.

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