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Recovery with Drinking Chocolate Milk Vs Cow's Milk on Muscle Strength after Exercise

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Abstract

Athletes in order to peak performance require practice, sustained, overload, and carried in a long time. Then exercise it is a duty and a body condition required to be always healthy and ready to receive the next portion of training. Therefore a recovery is as important as training. Recovery is applied by oral, which includes the consumption of carbohydrate drinks, protein and mineral, among which the munching includes chocolate milk (K1), cow's milk (K2) and placebo (K3) which is expected to restore lost body mass, replanish energy, muscle regeneration and reduce the buildup of lactic acid. The two drinks were compared to the effectiveness by measuring the leg muscle strength of the research subjects after running 5 km, then immediately consuming the drink (500 ml) according to the treatment group that was randomly divided. The measurement of muscle strength was carried out 4 times, which is: (1) before running 5km; (2) immediately after running 5 km (3) after 1 hour of drinking; and (4) after 2 hours of drinking. Results obtained from data processing, stated that consumption of chocolate milk, cow's milk and plain water during the recovery period after exercise can increase muscle strength. But there is no significant difference between the consumption of chocolate milk, cow's milk, and plain water during the recovery period after training on the increase in muscle strength.

Keywords: *Chocolate Milk; Cow's Milk; Recovery Period; Muscle Strength and Exercise*

Introduction

Training is a major factor for athlete to achieve the goal of achievement. According to Zajko et al that exercise is a body movement that is planned, structured and carried out repeatedly to improve or maintain fitness components [(1)]. The average athlete exercises with a long duration of more than 45 minutes with an intensity of training carried out more than 3 times a week. At each training session, athletes are required to have good performance in order to get the benefits of training. This opinion is emphasized by Hamilton that the fact is that "only a small percentage of them actually reach their peak fitness. The reason is not that athletes are lazy but mostly work very hard. Doing too much vigorous exercise can damage your muscles, upset your hormonal system, and weaken your immune system. Strenuous exercise must be optimally balanced with rest and recovery in order to reach peak performance [(2)].

Recovery or recovery period is the time needed to restore the body's initial condition after activity. According to Bompa, it is emphasized that recovery is a process of eliminating metabolic waste products (one of which is lactic acid) so that the body can regain its initial performance in the form of restoring energy sources, oxygen, blood circulation, body fluids, blood glucose, strength and muscle protein [(3) (4)]. There are several types of recovery techniques after exercise, including: active rest, complete rest, massage, heat therapy, cold therapy, diet and dietary supplementation, relaxation, recovery from short term overtraining, psychological recovery.

The easiest and most affordable recovery for all people is by way of dietary supplementation in the form of drinks, one of which is milk. Milk is a healthy drink that contains several vitamins, minerals, carbohydrates and protein (5). In this study, the drink used is cow compared to packaged chocolate milk that has been given chocolate flavor and the content contained in chocolate. Athletes after training need intake of vitamins B6, B12, C and minerals because these nutrients decrease in the body as a result of the intensity and volume of exercise during exercise (3). Therefore, it is necessary to conduct a study entitled "Recovery with Drinking Chocolate Milk Vs Cow's Milk on Muscle Strength After Exercise".

Method

This study used 21 subjects are hockey athletes. Then divided into 3 groups, are (K1) the chocolate milk group, (K2) the cow's milk group and (K3) the placebo group and each group consisted of 7 subjects. At the start of the survey, research subjects filled out informed consent. The training used is a type of endurance training in the form of a 5 km run which is done in one treatment.

Data were collected in the morning and lasted for 3 days, each day applying 1 group consisting of 7 subjects according to the group's drink consumption treatment. Day 1 with 7 subjects in the chocolate milk group, day 2 with 7 subjects in the cow's milk group, and on day 3 Each placebo group with 7 subjects. Each research subject is required to fast 8-10 hours (in the previous evening it is recommended not to eat around 10 pm until the end of data collection). In the morning before data collection, health check (pulse, height and weight), the subject consumed 250ml of water, warmed up, and measured leg muscle strength using a back leg dynamometer (T1) then ran 5 km. After running 5 km, the subject immediately measured (T2) leg muscle strength with a backleg dynamometer then (X) was given a 500 ml drink (chocolate milk, cow's milk or placebo) according to the treatment group. The next data collection (T3) in the form of leg muscle strength was measured after 1 hour of consumption of drinks according to treatment (chocolate milk, cow's milk or placebo) and (K4) immediately after 2 hours of consumption of drinks according to treatment (chocolate milk, cow's milk or placebo). After data collection is complete, it is free to consume food and drink and be free to do activities.

Result

The results of data collection are in the form of: leg muscle strength. The research data were analyzed and described in accordance with predetermined hypotheses, to explain the comparison of the effects of consuming chocolate milk with cow's milk during the recovery period after exercise on muscle strength. The results of the study will explain of each group's treatment of how significant and effective the effect of beverage consumption is during the recovery period on muscle strength after exercise.

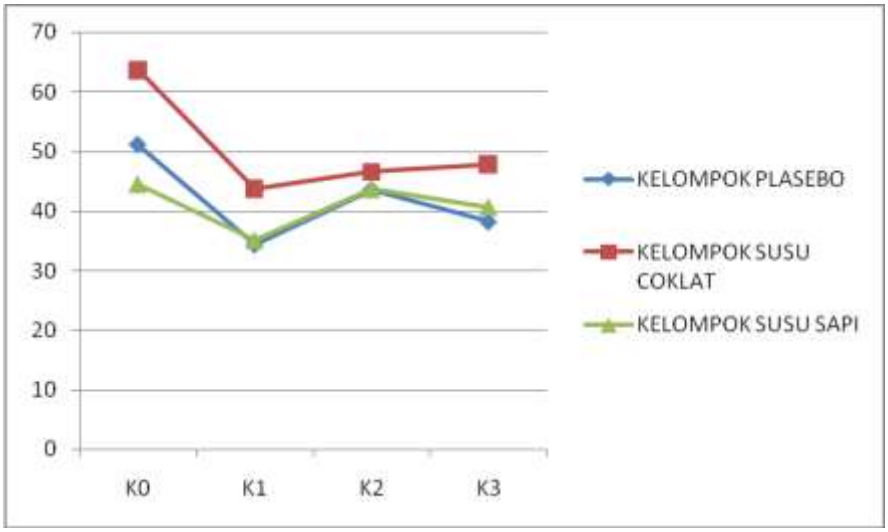
The research subjects were 21 subjects of hockey athletes in Malang district, which were divided into 3 groups, namely: (K1) the chocolate milk group 7 subjects, (K2) the cow's milk group 7 subjects and (K3) the placebo group 7 subjects, the measurement treatment in the form of leg muscle strength was used. back leg dynamometer. Foot muscle measurements were carried out 4 times, namely before running

5 km / pre test (T1); after running 5 km / post test 1 (T2); after 1 hour of drinking / post test 2 (T3) and 2 hours after drinking / post test 3 (T4). Variable data used in the analysis of this study were leg muscle strength pre test (T1), post test (T2), 1 hour after drinking (T3), 2 hours after drinking (T4), delta 1 (T2-T1), delta 2 (T4-T1) and delta 3 (T4-T2). The following is an explanation of the analysis of the research carried out.

Table 3.1 Descriptive statistical results of muscle strength

Kelompok	Rerata ± SD			
	T1	T2	T3	T4
K1	51,14 ± 17,01	33,29 ± 17	43,57 ± 21,01	38,14 ± 18,26
K2	63,71 ± 16,52	43,71 ± 17,90	46,57 ± 22,49	47,86 ± 18,61
K3	44,57 ± 9,40	35,14 ± 7,78	43,71 ± 7,61	40,71 ± 13,30

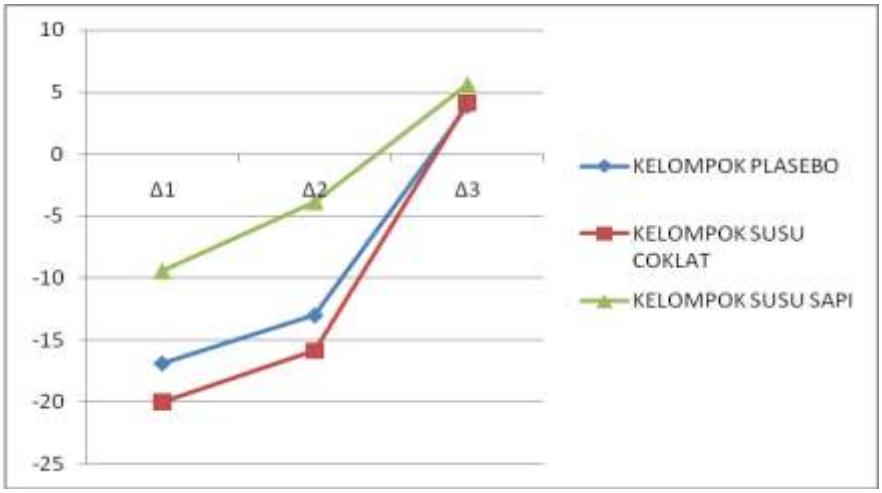
Based on table 3.1 data on leg muscle strength in the placebo group, chocolate milk and homogeneous cow's milk. The following is a graphic image 3.1 of data processing:



Graph 3.1 T1, T2 T3 and T4 leg muscle strengths

Tabel 3.2 Hasil Uji Anova Delta Kekuatan Otot

Kelompok	Rerata ± SD			Sig.
	K1	K2	K3	
Δ 1	-20 ± 22,98	-9,43 ± 6,53	-16,86 ± 10,04	0,416
Δ 2	-15,86 ± 14,63	-3,86 ± 10,43	-13 ± 8,41	0,152
Δ 3	4,14 ± 26,12	5,57± 10,58	3,86 ± 15,89	0,983



Graph 3.2 Delta Muscle strength (Δ1, Δ2 and Δ3)

Anova test value found from the variables in table 3.1 is more than p value ($p < 0.05$), so it is concluded that there is no significant difference between the consumption of chocolate milk and cow's milk during the recovery period after exercise on muscle strength. However, consumption of chocolate milk and cow's milk can increase muscle strength during the recovery period after exercise, rather than not drinking at all. The chocolate milk consumption group was able to increase the mean ± SD muscle strength from 33.29 ± 17 kg after 2 hours of recovery to 38.14 ± 18.26 kg; Initially, the cow's milk consumption group was ± SD average muscle strength from 43.71 ± 17.90 kg to 47.86 ± 18.61 kg; and the placebo group initially mean ± SD muscle strength from 35.14 ± 7.78 kg to 40.71 ± 13.30 kg.

Discussion

Exercise is divided into 2 types, namely anaerobic and aerobic exercises. Anaerobic exercise is an exercise in which energy production is carried out without using oxygen, while aerobic exercise is an exercise whose energy production requires oxygen. Anaerobic exercises every activity without the need for oxygen, can only be done for a short period of time with high intensity in a short duration lasting about 2-3 minutes [(6)]. Some examples of anaerobic exercises include: sprinting, lifting weights, swimming short distances and others. different from aerobic exercise. during the activity it takes more oxygen consumption, with the aim of increasing the body's metabolism. It is also emphasized that aerobic exercise is usually carried out with moderate intensity, long duration of time, lasting for about 20 minutes or more, one of the exercises is running / jogging [(7) (8)]. Aerobic exercise is in the form of endurance training which is useful for improving cardiac performance [(9)]. Endurance training is associated with good performance in athletics, as well as activities of daily life. In addition, the body's muscular endurance can also play an important role in injury prevention by enabling individuals to be more resistant to the effects of repeated stress [(10)]. The effect after endurance training is that the muscles will experience fatigue which results in reduced ability to work properly. Endurance training is influenced by the amount of energy stored in muscles as glycogen [(11) (2)].

The source of energy used during endurance training comes from food sources, are: carbohydrates and fats, so to restore the used energy, intake is needed in the form of carbohydrates, proteins, fats, amino acids and minerals [(12)]. House emphasized that a popular, easily accessible and well-consumed supplement for all groups is milk [(11) (13)]. While the main ingredient for chocolate milk products is cow's milk. Therefore, this study aims to determine how much the effect of consuming chocolate milk and cow's milk in the recovery period after exercise on muscle strength is comparable. In previous studies

it has been shown that consumption of carbohydrate replacement drinks during prolonged exercise of varying intensity, or between exercise sessions, has been shown to improve exercise performance [14].

Giving a drink in the form of chocolate milk to the subjects as much as 500 ml, the cow's milk group as much as 500 ml and the placebo group 500 ml after exercise, aimed to overcome dehydration and sweating after running [15] [16]. Running activity, the dominant muscles used during activity are the leg muscles, the leg muscles work hard to support the body's work, so that when fatigue the indicator can be seen with data on decreased leg muscle strength [3]. Less fluid loss in the body during exercise is also a factor in fatigue [17]. Resistance training decreases the loss of muscle mass and muscle strength. Increased use of glucose by active muscles can directly cause a decrease in blood glucose and glycogen, especially in endurance training.

Low levels of blood glucose and glycogen cause a decrease in athlete's performance as shown in graph 3.1 at point Δ2 (after endurance training in the form of a 5km run) all groups experienced a decrease in muscle strength. After training, athletes need intake of vitamins B6, B12, C and minerals because these nutrients decrease in the body as a result of the intensity and volume of exercise during exercise [3] [5] [18]. Glycogen levels in muscles decrease, the body fluids are lost in the form of sweat and urine.

On the graph 3.1 point Δ3 it is clear that the three groups of leg muscle strength values increased after being given drinking drinks. Table 3.2 Mean ± SD of muscle strength at Δ3 (after 2 hours of drinking) was 4.14 ± 26.12 kg. The chocolate milk group experienced an increase in leg muscle strength, this is because chocolate milk contains carbohydrates, protein, minerals, fats and vitamins. It was confirmed by Karfonta et al in their study that consumption of chocolate milk after endurance training was able to restore glycogen to muscles [14]. Chocolate milk contains carbohydrates and protein which function to replenish muscle energy after working hard [18]. Helps the muscles recover quickly and can potentially help maintain performance during training.

The same thing happened to the cow's milk group, in graph 3.1, point Δ3 shows an increase in leg muscle strength after drinking drinks. The mean ± SD of muscle strength at Δ3 (after 2 hours of drinking) was 5.57 ± 10.58 kg. Previous research has been reinforced by Maughan that to restore the body's condition, during the recovery period, nutritional intake is needed, namely by consuming drinks containing carbohydrates, protein, minerals, vitamins and fat in milk which is included as rehydration drinks [15]. The amino acids contained in milk function to regenerate muscles, maintain muscle composition [19] [20]. Cow's milk naturally contains important nutrients, including: carbohydrates, fat, protein, water and essential macronutrients needed by the body, especially natrioum [21] [4].

Graph 3.1 in the placebo group, point Δ3 has increased with a mean ± SD value of muscle strength of 3.86 ± 15.89 kg. Consumption of water has the ability to cope more quickly with rehydration [22] [23]. During activities with a duration of up to 15 minutes, the body loses fluids around 50 ml- 300 ml [17], so consuming 500 ml of water has replaced the lost fluid in the form of sweat and is able to reduce fatigue so that performance is maintained [23] [24] [25].

The results obtained from table 3.1 anova delta test of muscle strength from the comparison of the three groups, namely: the consumption group of chocolate milk, cow's milk and water, there was no significant difference in the recovery period after exercise on muscle strength ($p < 0.05$). It can be seen in Table 3.2 that the three groups both experienced an increase in leg muscle strength, the three drinks have similarities in the content of water, minerals needed by the body and natural electrolytes contained therein [26] [27].

Consumption of fluids with water or nutritious drinks during the recovery period is as good as not consuming it at all, because the body after doing activities requires replacement fluids to be able to restore

performance [4] [23] [28]. The body loses fluids during activities, so as a replacement the body needs fluids to enter the body. Most of the components of the body are fluids, if the body loses fluids it will result in concentration, fatigue and thirst [29] [30]. And water consumption is the simplest fluid.

Conclusion

From this research that the conclusion of these results is that there is no significant difference between consumption of Chocolate Milk and Cow's Milk during recovery period after training. The good thing after exercise is to consume healthy drinks that are carbohydrates, minerals, protein and electrolytes instead of not drinking at all. Because after practicing, the body consumes a lot of energy, and the body needs an incoming intake to replace the energy that is used up so that performance can recover. For future research as an improvement and usefulness in the world of sports, it is necessary to add a variable sports drink, coffee or other beverage that is associated with loss of body mass due to activity or muscle strength.

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