

The Effect Of Acute Jamu Kunyit Asam After Strenuous Physical Exercise On Creatine Kinase Levels

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Abstract.

Strenuous physical exercise can trigger muscle damage causing an increase in creatine kinase levels. One of the strategies to prevent muscle damage is to consume antioxidants and anti-inflammatory. Jamu Kunyit Asam is known to have antioxidant and anti-inflammatory activity. The aim of this study was to determine the effect of acutely giving Jamu Kunyit Asam on creatine kinase levels after strenuous physical exercise. The research sample used 20 trained males. The sample was divided into two groups (Experiment = 10; Placebo = 10). The pre-test was done by checking creatine kinase levels before engaging in strenuous physical exercise. After doing strenuous physical exercise by running on a treadmill with an intensity of 90-100% for 30 minutes, the experimental group was given 250 ml of Jamu Kunyit Asam every day for 3 days, while the control group was given a placebo drink. Creatine kinase levels were measured immediately, 24 hours, 48 hours, and 72 hours after strenuous physical exercise. The results showed that CK levels decreased significantly 24 hours, 48 hours and 72 hours after strenuous physical exercise in the Jamu Kunyit Asam group compared to the placebo group ($p < 0.05$). The conclusion of this study is that giving Jamu Kunyit Asam acutely after doing strenuous physical exercise can reduce creatine kinase levels in trained male athletes. Acute Jamu Kunyit Asam supplementation in this study can help reduce muscle damage due to strenuous physical exercise through nutritional interventions.

Keywords: *Strenuous physical exercise, muscle damage, creatine kinase, jamu kunyit asam, antioxidant, anti-inflammatory*

I. INTRODUCTION

Regular physical activity can improve health, and is protective for cardiovascular disease, stroke, diabetes, and some cancers [1], and also improves mental health [2]. However, exhausting physical activity can be dangerous, because it can cause muscle damage (Exercise-induced muscle damage (EIMD)), inflammation, oxidative stress and fatigue [3-5]. Muscle damage due to physical activity, can cause an increase in muscle proteins in the blood such as creatine kinase (CK), lactate dehydrogenase (LDH), and myoglobin (Mb) [6,7]. Muscle damage, inflammation and oxidative stress must be analyzed and controlled together because they are directly involved in EIMD and fatigue leading to decreased performance for at least 24-96 hours [8].

One way to reduce EIMD is to minimize the effects of oxidative stress and the inflammatory process with anti-inflammatory or antioxidant supplements. In recent decades, the beneficial effects of herbal medicines and nutraceuticals have been investigated on physical fatigue and improving exercise performance. Research findings have reported the results of a mixture of natural antioxidant components, such as flavonoids [9,10], polysaccharides [11], polypeptides [12,13], polyphenols [14,15], and saponins [16] are effective in prevent EIMD or delay fatigue. One of the natural ingredients that have antioxidant and anti-inflammatory effects, is curcumin [17-20]. Curcumin is found in turmeric rhizomes and in Indonesia is often made in the form of herbs to be used as health drinks. Jamu is a traditional Indonesian medicine, a cultural heritage of the nation so it needs to be preserved, researched and developed. In the context of scientific investigation of the efficacy of Jamu Kunyit Asam, it is necessary to investigate the effect of using Jamu Kunyit Asam on creatine kinase levels in strenuous physical exercise.

II. METHODS

2.1 Participants

Twenty trained men (age 21.46 ± 1.32 years, height 171.60 ± 0.15 cm, weight 65.00 ± 3.28 kg) voluntarily participated in this study. The sample criteria are as follows: not suffering from acute or chronic disease; did not take anti-inflammatory and antioxidant drugs at least two months before the start of the study; did not consume foods or drinks containing antioxidants one month before the study and during the study.

2.2 Exercise Program

Before strenuous physical exercise, a haematological examination was performed to determine the concentration of creatine kinase levels in the sample (Pre-test). Next, the groups were divided, namely the experimental group and the control group. The Experimental group drank Jamu Kunyit Asam (JKA) once a day for up to 72 hours after strenuous physical exercise, while the control group took placebo. Strenuous physical exercise is done by running on a treadmill with an intensity of 90-100% of maximum heart rate. Blood sampling is done again immediately after strenuous physical exercise; 24 hours; 48 hours and 72 hours (Post-test).

2.3 Blood Samples Collection

5 ml of blood was taken from the forearm before strenuous physical exercise; after strenuous physical exercise; 24 h; 48 h and 72 h after the subject did strenuous physical exercise. Next, the blood was centrifuged for 10 minutes, at 3000 rpm, to separate the serum and stored at -80°C . Furthermore, serum CK levels were measured using an auto analyser spectrophotometer.

2.4 Statistical analysis

All data was analyzed with IBM SPSS Statistics 25 for Windows and expressed as mean standard deviation (SD). The Shapiro Wilk test method was used to determine data normality, and the Levene's test was used to determine data homogeneity. In this work, the interaction impact by time and group was investigated using repeated-measure analysis of variance. The Tukey method was used for post-hoc analysis. The significance level was chosen at $P 0.05$.

III. RESULT AND DISCUSSION

The results of measuring CK levels at rest (before doing strenuous physical exercise) showed no difference between the control group (C) and the experimental group (JKA) ($P > 0.05$). A significant increase in creatine kinase levels was immediate; 24h; 48 and 72h after strenuous physical exercise when compared with CK levels before strenuous physical exercise. Creatine kinase levels in the Jamu Kunyit Asam group were significantly lower than the control group ($p < 0.05$). (Figure-1).

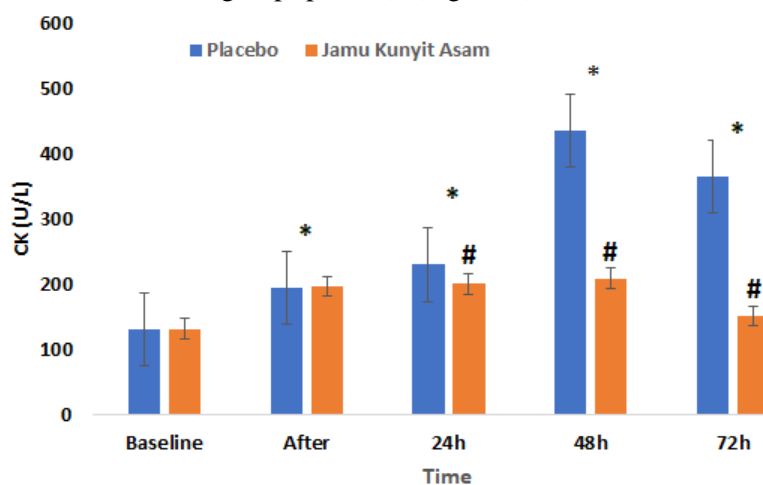


Fig 1. Creatine Kinase levels before and after strenuous physical activity. Values represent means \pm SD.* show significant increase compared with pre- strenuous physical exercise in both groups ($p < 0.05$).

Showed a significant increase compared with pre- strenuous physical exercise in both groups and significant decrease in group JKA compared with group C ($p < 0.05$).

The goal of this study was to see how acute administration of Jamu Kunyit Asam affected creatine kinase levels during severe physical activity. When compared to the control group, the results demonstrated that acute administration of Jamu Kunyit Asam could lower creatine kinase levels. Physical exercise, particularly intense eccentric muscular contractions, is known to cause muscle injury (Exercise-induced muscle damage) [3]. Exercise-induced muscle damage (EIMD) can result in delayed onset muscle pain (DOMS), decreased ability to produce muscle strength, range of motion (ROM), local swelling [21], and muscle protein elevations in blood creatine kinase (CK), lactate dehydroglycinate (LDH), and lactate dehydrogenase (LDH) [22]. Our findings show that acute administration of Jamu Kunyit Asam can significantly reduce the increase in creatine kinase levels triggered by strenuous physical exercise. The decrease in CK levels in this study was due to the curcumin compound contained in the Jamu Kunyit Asam. Curcumin is known to have a pharmacological effect that functions as a strong anti-inflammatory and antioxidant. Curcumin works as an anti-inflammatory in various ways including by scavenging free radicals and suppressing the activity of COX, LOX, iNOS and other inflammatory mediators. Research shows curcumin is a highly pleiotropic compound, where curcumin can interact with various target molecules involved in inflammation. Curcumin modulates the inflammatory response by decreasing the activity of cyclooxygenase-2 (COX-2), lipoxygenase, and nitric oxide synthase (iNOS) enzymes, inhibiting the production of inflammatory cytokines tumor necrosis factor alpha (TNF- α), interleukine-1, interleukine-2, interleukine-6 and interleukine-12, migration inhibitory proteins, decreased mitogen-activated protein, and monocyte chemoattractant protein (MCP) [22].

Curcumin inhibits nuclear factor-kappa B, which is thought to be the mechanism by which it inhibits COX-2 and iNOS (NF- κ B). Inflammation, cell proliferation, transformation, and tumor formation are all regulated by NF- κ B. Curcumin is hypothesized to limit the phosphorylation of inhibitory factor I-kappa B kinase, which inhibits NF- κ B activation and proinflammatory gene expression (I κ B). COX-2 and iNOS expression are reduced when NF- κ B activation is inhibited, which inhibits inflammation and tumor processes [24]. Curcumin is also thought to be able to reduce oxidative stress, inflammation through the NRF2-keap1 pathway. Curcumin can suppress proinflammatory pathways and inhibit TNF production and TNF-mediated cell signaling in various cell types. Curcumin can also be a TNF inhibitor by binding to TNF directly [24,25]. The results of our study are supported by several other researchers, among the studies conducted by Tanabe et al. reported that a single dose of curcumin 1 hour before and another dose of 150 mg 12 hours after 50 maximum eccentric contractions of the elbow flexors can reduce CK activity when compared with placebo using a study crossover with 14 healthy young men [26]. The results of a study conducted by Roohi et al also reported the administration of curcumin at a dose of 150 mg immediately after intensive eccentric exercise in healthy young men (age, 25.0 ± 1.6 years; height, 178.9 ± 4.1 cm) can reduce CK levels [27].

IV. CONCLUSION

In conclusion, acute administration of Jamu Kunyit Asam after strenuous physical activity can reduce creatine kinase levels in trained male athletes. Supplementation of Jamu Kunyit Asam acutely in this study can help reduce muscle damage due to strenuous physical exercise through nutritional intervention.

V. ACKNOWLEDGMENTS

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