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Procedia Chemistry 18 (2016) 190 – 193

Procedia Chemistry

Molecular and Cellular Life Sciences: Infectious Diseases, Biochemistry and Structural Biology 2015 Conference, MCLS 2015

Curcuminoid Prevents Protein Oxidation but not Lipid Peroxidation in Exercise Induced Muscle Damage Mouse

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Abstract

Oxidative stress is believed as underlined mechanism of exercise induced muscle damage. This study was aimed to investigate curcuminoid effect on protein oxidation and lipid peroxidation muscle of exercised induced model. Adult male healthy mice were used as experiment models, grouped in to curcuminoid treated, placebo (corn oil only treated) and untreated group. Protein carbonyl level was significantly lower in curcuminoid treated group compared with untreated group (p =0.003). In the contrary, the malondialdehyde level was not significantly different between those groups (p = 0.092).

Peer-review under responsibility of the organizing committee of the Molecular and Cellular Life Sciences: Infectious Diseases, Biochemistry and Structural Biology 2015 (MCLS 2015)

Keywords: curcumin; mallondialdehyde; protein carbonyl; eccentric; downhill

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doi:10.1016/j.proche.2016.01.029

Nomenclature

BW	Body weight
DOMS	Delayed Onset Muscular Soreness
GST	Glutathion s trasnferase
kg	kilogram
MDA	Mallondialdehyde
mg	milligram
nmol	nano mol
sTnI	Skeletal muscle Troponin I

1. Introduction

Curcuminoid is active compound found in the *Curcuma longa L* extract, consisted of 95% curcumin, 5% *desmethoxy* and *bidesmethoxy curcumin*[1]. Previous studies reported it antioxidant activity in protection of serious damage tissue, such as liver and kidney[1]. Curcuminoid is a potent radical scavenger for reactive oxygen species (ROS) and it also stimulates some antioxidant endogen enzymes activity.

Delayed onset muscular soreness (DOMS) is a damage of muscle at late onset of recovery phase after exercise stop[3,4]. Oxidative stress is believed as underlined mechanism of exercise induced muscle damage[2]. Unfortunately, curcuminoid administered after exercise stop was failed to protect muscle damage[2]. We look forward for this explanation. This study was aimed to investigate curcuminod effect on oxidative stress marker, such as mallondialdehyde and protein carbonyl level in the exercise induced muscle.

2. Methods

2.1. Materials

Curcuminoid was obtained from standardized *Curcuma Longa L extract* of *NHK Laboratories Inc Cat. TUR011*. It was suspended in 0.4 ml corn oil for each 100 mg curcumioid. Models were used male healthy 10 weeks balb/c mice, obtained from LPPT pre-clinical unit Gajahmada University. Mouse was trained downhill running on Colombus treadmill apparatus. Skeletal muscle damage marker was determined by measurement of sTnI level using ELISA Medicine kit. The MDA level was determined using thiobarbituric acid, obtained from Sigma Chemical. Protein carbonyl level was determined colorimetric assay using Oxiselect kit *Cat no STA-31.*

2.2. Methods

A day before exercise, curcuminoid was administered orally in to treated group by gauge 4 mg/kg BW in corn oil suspension. Untreated mice were given only corn oil as placebo. Muscle damage was obtained by downhill running on Columbus treadmill, 30 cm/s for 18 minutes with 5 minutes preconditioning. Mice were recovery for 4 hours after exercise stop, then anesthetised and harvest it blood and calf muscles. Blood was taken 1.5 ml from the heart of ketamine anesthetized mouse and process for it serum. Calf muscle were taken from both right and left legs and grind in the cold PBS solution to get the muscle homogenate. Level of sTnI was measured using ELISA sandwich method. Muscle homogenates were examined for mallondialdehyde and protein carbonyl level using colorimetric method. All procedures were approved for ethical clearance from Animal Care and Use Committee Faculty of Veterinary, Universitas Airlangga.

3. Results and discussion

The sTnI level of curcuminoid treated mouse was significantly lower compared with untreated group ($p = 0.003$) but it was not different with normal mice ($p = 0.165$). Curcuminoid protected muscle against execised induced damage in mice. Our result did not support previous study that reported curcuminoid failure in muscle damage