

Effect of chronic supplementation with methylsulfonylmethane on oxidative stress following acute exercise in untrained healthy men

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Abstract

Objective This study was conducted to assess the effects of chronic daily methylsulfonylmethane (MSM) supplementation on known markers of oxidative stress following acute bouts of exercise in untrained healthy young men.

Methods Eighteen untrained men volunteered for this study. Participants were randomized in a double-blind placebo-controlled fashion into two groups: MSM ($n = 9$) and placebo ($n = 9$). The participants took supplementation or placebo daily for 10 days before running. Participants ran 14 km. The MSM supplementation was prepared in water at 50 mg/kg body weight. The placebo group received water. Serum malondialdehyde (MDA), protein carbonyl (PC) and plasma oxidized glutathione (GSSG) were measured as markers of oxidative stress. The plasma-reduced glutathione (GSH) level and the GSH/GSSG ratio were determined as markers of plasma antioxidant capacity.

Key Findings Acute exercise led to elevated levels of serum MDA, PC and plasma GSSG. MSM supplementation maintained PC, MDA and GSSG at lower levels after exercise than the placebo. The plasma level of GSH and the ratio of GSH/GSSG were significantly higher in the MSM supplemented group.

Conclusions These results suggest that chronic daily oral supplementation of MSM has alleviating effects on known markers of oxidative stress following acute bouts of exercise in healthy young men.

Keywords antioxidant; GSH; malondialdehyde; methylsulfonylmethane; protein carbonylation

Introduction

Physical exercise may increase the accumulation of free radicals and induce oxidative stress.^[1] Oxidative stress is a condition in which the existing balance between free radical production and their subsequent reduction via the antioxidant defence system becomes skewed in favour of free radical expression.^[2] Free radicals or, more generally, reactive oxygen/nitrogen species (RONS) are well known for playing both deleterious and beneficial roles since they can be either harmful or beneficial to living systems.^[3] Evidence for increased RONS production during and following exercise is provided by numerous investigations that have noted an increase in various oxidative stress biomarkers following both acute aerobic and anaerobic exercise.^[2] During exhaustive exercise, an insufficiency of endogenous antioxidants may cause antioxidant defence systems to be temporarily overwhelmed. Supplementation of these systems with antioxidants may therefore reduce oxidative stress.^[4] Measurement of various antioxidant or oxidant parameters can be used to determine the risk of oxidative stress or the effectiveness of antioxidant supplementation.^[5]

Methylsulfonylmethane (MSM) is a natural chemical that is a new candidate antioxidant. It is a sulfur-containing compound found in a wide range of human foods, including fruit, vegetables, grains and beverages.^[6] Recently, MSM has received wide attention as a dietary supplement in the treatment of osteoarthritis.^[7-9] It has been shown that MSM is effective in seasonal allergic rhinitis,^[10] interstitial cystitis,^[11] autoimmune disease^[12] and cancer chemoprevention.^[13,14] The sulfur of MSM may be incorporated into methionine and cysteine, sulfur-containing amino acids, and act as a source of sulfur.^[15] It has also been found that

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