



POSTER NO 4

Honey Protects Against Homocysteine Elevation in Rats

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ABSTRACT

Elevated levels of plasma homocysteine (Hcy), known as hyperhomocysteinemia (HHcy), appear to be associated with higher risks of occlusive vascular disease and various clinical conditions ranging from the fetus to the elderly and from cardiovascular and neuro-degenerative diseases to neuropsychiatric disorders, rheumatoid arthritis and osteoporosis. The exact mechanism(s) involved is not fully understood. Current interest is focused upon modulating the levels of Hcy and/or their negative impacts through natural preventive strategies. In this regard, we recently showed that the Black seed (*Nigella sativa*), its oil, and its active ingredient Thymoquinone impart high protection (72-100%) against the induced rise of HHcy in rats.

In this investigation, the ability of natural honey to protect against HHcy in rats was investigated. The results show that honey administered to rats at 1% in water significantly improved growth and imparted a protective effect against HHcy ($54.5 \pm 8.0\%$) induced by feeding the animals a diet enriched in methionine and deficient in B-vitamins (M+B- diet) for two months. This protection was not accompanied by a decrease in concentration of ADMA (asymmetrical dimethylarginine), which may indicate that ADMA concentrations may not be related to the pathophysiology of HHcy. On the other hand, HHcy induced a $30.7 \pm 0.8\%$ drop in the antioxidant enzyme superoxidase dismutase (SOD) activity. Honey treatment recovered an $8.8 \pm 1.7\%$ of the decrease in SOD activity. Furthermore, treatment with honey in the HHcy state decreased catalase antioxidant activity by $47.8 \pm 3.9\%$, while it did not cause any effect on the honey-treated control rats fed a standard methionine and B-vitamin diet, indicating that honey which can release H₂O₂ can compromise the H₂O₂-neutralizing activity of the catalase enzyme under excess methionine and deficient B-vitamin conditions. Honey treatment on the other hand, did not significantly affect glutathione peroxidase activity and total antioxidant status in the control and the M+B--fed rats, while in the same rats it significantly increased the antioxidant agent uric acid by $41.5 \pm 3.0\%$ and $33.4 \pm 2.0\%$, respectively. These results indicate an overall beneficial role of honey under conditions favoring HHcy (emphasis added), and the important role of B-vitamins in the defense against oxidative parameters such as H₂O₂ and superoxide anion.

COMMENT

Elevated levels of homocysteine (Hcy), an amino acid, are associated with an increased risk of heart disease, osteoporosis and Alzheimer's disease. This animal study demonstrates that natural honey has a significant lowering effect on homocysteine. The study results indicated that honey in only a 1% solution fed to rats improved growth, and provided protection against elevated homocysteine levels.

This is another stunning example of honey metabolism and its physiologic effects not available via the consumption of other refined sugars such as sucrose and high fructose corn syrup.