

Freshly Crushed Garlic is a Superior Cardioprotective Agent than Processed Garlic

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Background: Earlier studies documented the hypoglycemic, antiatherogenic and antiatherosclerotic properties of garlic. Subsequent studies found efficacy of garlic as a cardioprotectant. Garlic was also found to be beneficial against ischemic heart disease. A large number of physiological effects of garlic are attributed to the volatile sulfur compounds like thiosulfinates. Most recently, the additional cardioprotective ability of garlic was attributed to S-allylcysteine. Raw fresh garlic contains alk(en)yl cysteine sulfoxides and γ -glutamyl alk(en)yl cysteine, which upon activation is converted into S-allylcysteine (deoxyallin) due to the deactivation of the enzyme allinase. Allicin is then formed from S-allyl-L-cysteine, which is readily broken down in volatile sulfur compounds including hydrogen sulfide (H₂S), which is a known gasotransmitter. For that reason, when crushed, raw garlic generates H₂S. Processed and cooked garlic loses their abilities to generate H₂S.

Objective: To examine whether freshly crushed garlic possesses superior cardioprotective effect than its processed counterpart due to presence of H₂S

Methods: Two groups of rats were gavaged with respective garlic preparations while the control group received vehicle only. After 30 days, all of the rats were sacrificed and isolated hearts were subjected to 30 min ischemia followed by 2 h of reperfusion. Cardiac functional parameters like heart rate, LVDP (left ventricular develop pressure), LVdp/dt (first derivative of LVDP), coronary flow and aortic flow were measured. To examine the cardioprotective ability of both types of garlic preparations, the proteins of death vs survival pathway (Bax, Bcl2, Akt, ERK1/2, JNK, PPAR, Glut4 etc) were also measured.

Results: Both of the garlic preparations provided cardioprotection, but superior cardiac performance was noticed for those fed with freshly crushed garlic. Consistent with these results, the freshly crushed garlic group displayed significantly greater phosphorylation of antiapoptotic ERK1/2 proteins, reduced Bax/Bcl-2 ratio, and reduced phosphorylation of proapoptotic p-38MAPK and JNK. Moreover, the survival signaling network consisting of Akt-FoxO1 was increased in the freshly crushed garlic treated hearts. Freshly crushed garlic, but not the processed garlic, showed enhanced redox signaling as evident by increased level of p65 subunit of NFκB, Nrf2, and enhanced GLUT 4, PPARRα, and PPARδ.

Conclusion: The results of this study clearly demonstrated that fresh garlic is a superior cardioprotective agent compared to its processed counterpart. Fresh garlic generates an additional survival signal through the generation of H₂S leading to the activation of anti-apoptotic and anti-death proteins. Processed garlic lacks the ability to generate H₂S, but retains all other cardioprotective properties.