

Vegetables' juice: Potent inhibitors of polyol pathway induced oxidative stress

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Oxidative stress plays important role in stimulating pathogenesis of diabetic complications by free radicals mediated damage of biomolecules. Hyperglycemia induced oxidative stress develops through multiple mechanisms. Polyol pathway has been recognised as an important mechanism that contributes to the development of oxidative stress. Under hyperglycemic conditions, glucose is channelled into aldose reductase dependent polyol pathway which depletes NADPH and consequently reduces the level of enzymatic antioxidant GSH. During SDH mediated conversion of sorbitol into fructose, NAD⁺ is converted to NADH which is substrate for NADH oxidase responsible for increased generation of free radicals. Conversion of fructose into Fructose-3-phosphate and 3-deoxyglucosone leads increased formation of non-enzymatic glycation end products. Reduction in antioxidant enzymes, increased generation of free radicals and consequently oxidative modification of biomolecules increases level of oxidative stress.

Ten commonly consumed vegetables were evaluated for their aldose-reductase inhibitory, antioxidative stress and antioxidant potentials. Study revealed that vegetables' juice prevented utilization of NADPH by aldose-reductase and hence, reduced aldose reductase activity. Vegetable's juice mitigated formation of sorbitol in human erythrocytes under different glycemic conditions. Vegetable's juice also prevented hemolysis from erythrocytes and 2-deoxy-D-ribose oxidation induced by hydroxyl radicals and displayed antioxidative stress and antioxidant activities.

Vegetables' juices are rich source of polyphenols, flavonoids and proteins. In the order of their overall potentials, ivy gourd and ridge gourd juice were identified most potent aldose reductase inhibitors and antioxidative stress agents. These observations endorse that vegetables can become economical source in preventing development of diabetic complication by multiple mechanisms.