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In vitro* antiglycation effects of an instant soup mix powder containing *Spirulina* and *Gracilaria edulis

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Background: Diabetes mellitus is a chronic disease characterized by hyperglycaemia. When left uncontrolled, it can lead to diabetic complications via accelerated protein glycation and protein cross-linking.

Objective: The study aimed to investigate the inhibitory effects of a developed instant soup mix powder supplemented with *Spirulina sp.* and *Gracilaria edulis* on glycation-induced protein cross-linking, using a novel method with Sodium dodecyl polyacrylamide gel electrophoresis (SDS-PAGE).

Method: Two samples of the soup mix were prepared, namely sonicated (SS), made by adding the powder to water and sonicating; and sonicated boiled (SB), made by boiling a portion of sample SS. Lysozyme and fructose (500 mM) were incubated at 37 °C and pH 7.4 in the presence and absence of each soup mix at concentrations of 1.6%, 0.8% and 0.4% (w/v). Standard glycation inhibitor aminoguanidine (AG) and other appropriate controls were used. SDS-PAGE was used to detect the products of protein cross-linking in the incubation mixtures after 7 days.

Results: High molecular weight protein products were observed in the negative control (fructose present; AG and soup mix absent). These bands represent the dimer, trimer and tetramer of lysozyme, indicating the occurrence of protein cross-linking. The positive control (AG) showed no occurrence of these bands, confirming inhibition of the glycation process. SS and SB showed a concentration dependant inhibition of protein cross-linking, showing similar bands to that of the positive control at 1.6% (w/v).

Conclusion: These results provide evidence for the antiglycation effects of the developed soup mix powder. The observed inhibition by the boiled SB sample indicates that the powder would retain its effects even when prepared as a soup after heating and thus has the potential to prevent glycation-induced protein cross-linking.