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Dromedary Milk Protein Hydrolysates Show Enhanced Antioxidant and Functional Properties

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SUMMARY

Research background. Milk protein hydrolysates have received particular attention due to their health-promoting effects. Dromedary milk differs from the milk of other dairy animals in the composition and structure of its protein components, which give it unique properties. The bioactivity and functionality of whole dromedary milk proteins and their enzymatic hydrolysates have not received much attention, hence this study aims to investigate the effect of enzymatic hydrolysis of dromedary milk proteins on their antioxidant activities and functional properties.

Experimental approach. Dromedary milk proteins were treated using four proteolytic enzymes (pepsin, trypsin, α-chymotrypsin and papain) and two mixtures of enzymes (pancreatin and pronase). The degree of hydrolysis was measured to verify the hydrolysis of the proteins. The sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and gel filtration chromatography served to determine the molecular mass distribution of the hydrolysates while reversed phase-high performance liquid chromatography (RP--HPLC) was conducted to explore their hydrophobicity. The antioxidant activities were evaluated using various *in vitro* tests, including 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging capacities, iron(III) reducing ability and chelating activity. Besides, functional properties such as solubility, foaming and emulsification were assessed.

Results and conclusions. Dromedary milk protein hydrolysates exhibited different degrees of hydrolysis ranging from 17.69 to 41.86 %. Apart from that, the hydrolysates showed different electrophoretic patterns, molecular mass distribution and RP-HPLC profiles demonstrating the heterogeneity of the resulting peptides in terms of molecular mass and polarity. The hydrolysates displayed significantly higher antioxidant capacities than the undigested proteins at all the tested concentrations. Iron(II) chelating activity was the most improved assay after proteolysis and the hydrolysate generated with pancreatin had the highest chelating power. Dromedary milk protein hydrolysates possessed good solubility (>89 %). Further, foaming and emulsifying properties of dromedary milk proteins were enhanced after their proteolysis. These interfacial properties were influenced by the enzymes employed during proteolysis.

Novelty and scientific contribution. Enzymatic hydrolysis of dromedary milk proteins is an effective tool to obtain protein hydrolysates with great antioxidant and functional properties. These results suggest that dromedary milk protein hydrolysates could be used as a natural source of antioxidant peptides to formulate functional foods and nutraceuticals.

Key words: dromedary milk, proteolytic enzymes, protein hydrolysate, antioxidant activity, functional properties

INTRODUCTION

Endogenous generation of reactive oxygen species (ROS) is unavoidable in aerobic organisms because it is a consequence of normal metabolic processes. At normal levels, ROS are involved in mediating several cellular responses comprising cell growth and immunity