



ORIGINAL ARTICLE

Anti-obesity and lipid lowering effects of *Cymodocea nodosa* sulphated polysaccharide on high cholesterol-fed-rats

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Abstract

This study aims to evaluate for the first time the effects of *Cymodocea nodosa* sulphated polysaccharide (CNSP) on lipase activity *in vitro* and *in vivo* to high fat diet (HFD)-rats on body weight, lipid profile and liver-kidney functions. The administration of CNSP decreases the body weight and inhibits lipase activity of obese rats in serum and intestine as compared with untreated HFD-rats. This decrease in lipase activity leads to lipid regulation shown by the decrease of total cholesterol (T-Ch), triglycerides (TG) and low density lipoprotein cholesterol (LDL-C) and an increase in high density lipoprotein cholesterol (HDL-C) levels in HFD-rats. Additionally, CNSP administration to HFD-rats induces anti-oxidant activity observed by the increase of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) activities and the decrease in Thiobarbituric acid reactive substances (TBARS) levels and protects liver-kidney functions proven by a decrease in the levels of toxicity parameters in blood.

Introduction

Obesity is not only a health problem, but a social one as well. The number of people suffering from this disease is increasing rapidly all over the world and it has become the centre of public attention, especially health-related institutions whose aim is to reduce its prevalence (US Department of Health and Human Services, 2003). In 2014, more than 1.9 billion adults in the world, aged 18 and more, suffer from overweight. Among them over 600 million were obese (World Health Organization, 2014). Overall, about 13% of world adult population (11% of men and 15% of women) were obese, 39% of adults (38% of men and 40% of women) were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014 (World Health Organization, 2014). Obesity significantly increases the risk of developing various life-threatening diseases, including type II diabetes, hypertension, coronary heart disease, stroke and some cancers (Cheetham *et al.*, 2004).

Photochemical identified from traditional medicinal plants present an exciting opportunity for the development of newer therapeutics for the treatment of obesity and other metabolic diseases. The potential of natural products for the treatment of

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Polysaccharide, obesity, liver-kidney functions

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obesity is still largely unexplored and might be an excellent alternative strategy for the development of safe and effective anti-obesity drugs. Actually, epidemiological research has focused on identifying and investigating novel therapeutic agents, in particular polysaccharides isolated from seaweeds and plants, which have attracted a great deal of attention in the biomedical field because of their chemical properties and biological activities (Takano *et al.*, 1996; Wu *et al.*, 2007).

In this context, this present study aims to investigate, for the first time, the chemical characteristics of sulphated polysaccharide extracted from the leaves of *Cymodocea nodosa* marine plant collected from the coast of Chebba (Tunisia) and its effect on lipase activity *in vitro*. *In vivo*, this study evaluates the effect of CNSP administration to HFD-rats on lipase activity, body weight, lipid profile and liver-kidney functions.

Materials and methods

Plant material

Cymodocea nodosa (CN) was collected from the coast of Chebba in April 2013 at depth of 1 m. The plant was identified at the National Institute of Sea Sciences and Technologies (INSTM), Sfax-Tunisia and the epiphytes on the leaves were removed with paper towel without damaging the organs. Leaves were dried in shadow and at room temperature.

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