STUDIES ON FUNCTIONAL FOODS RICH IN DIETARY FIBERS

By

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دراسات على الأغذية الوظيفية الغنية بالألياف الغذائية

رسالة مقدمة من

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ABSTRACT

Mahmoud Abd Alhamed Elwakeel : Studies on Functional Foods Rich In Dietary Fibers . Unpublished Ph.D. Thesis , Department of Food Science , Faculty of Agriculture , Ain Shams University , 2011 .

Dietary fiber promoted several beneficial metabolic and physiological effects in human . Therefore , the present study was carried out to use plant sources rich in dietary fiber from pumpkin (P_k) , cauliflower (C_f) , doum (D) and psyllium husks (P_s) in bread making and to utilize them in diets fed to experimental rats . The physicochemical and functional properties of these plant sources rich in dietary fiber were also determined . Crude fiber of these plants ranged between 6.7 (P_s) as a minimum ratio to 16.1% (P_k) as maximum . On the other hand , the same samples had either very low levels of fat being 0.01 and 0.43 % in P_s and D , respectively , or relatively higher fat level being 2.03 and 4.09% in P_k and C_f , respectively . C_f is worthy of consideration as an important vegetable source of protein being 21.72% on dry matter basis (DMB) . As regard to the three dietary fiber fractions celluloses, hemicelluloses and lignin, they constitute about 66.4 , 0.5 and 14.5% from total dietary fiber (TDF) in P_k ; 46.6 , 3.6 and 2.8% in C_f as well as 35.4 , 17.5 and 28.1% in D ; 7.3 , 54.7 and 0.5 % in P_s , respectively. All plants used in the present investigation as a source of dietary fibers contained relatively large amounts of both K (247:606 mg/100 g DMB) and Fe (79:116 mg/100 g DMB) . However Na , in (C_f) , Ca in (P_k and P_s) and Mg in (D) were also found in relatively large quantities . Particle size and degree of fineness , particle density , the loose bulk density and tapped bulk density as well as water holding capacity , swelling capacity , water adsorption , fat ab sorption capacity , wettability and least gelation concentration were also studied . Assignments of

functional groups by the Furrier Transform Infrared (FTIR) Spectrum Technique of P_k , C_f , D and P_s were investigated in details . Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) of the P_k , C_f , D , and P_s samples were carried out . Bread was baked from tested wheat flour supplemented with P_k , C_f , D and P_s powders at 2.5 , 5 , 7.5 and 10 % were made and both dough and bread properties as well as the sensory attributes were tested .

Significant gradual increase in body weight at different rates of albino rats fed different diets was attained . Rats maintained on cholesterol–free diets showed lower concentrations of total cholesterol and LDL as well as atherogenic index in their serum followed by those fed diets contained either 10 or 20% psyllium husks . As regard to hypercholesterolemic rat groups their aorta showed diffuse vacuolization in the media . In contrast , hypercholesterolemic diets supplemented with 10 or 20 % psyllium husks powder did not show any histopathological alterations in rats aorta after 30 days . Experimental animals of dietary–induced hypercholesterolemia suffered from symptoms of diseased heart . After 60 days hypercholesterolaemic rats fed diets supplemented with 10 or 20% doum as well as 10 and 20 % psyllium husks showed recovered hearts . Most groups fed on dietary fibers for 30 days showed focal gliosis in the cerebrum of the brain .

Key words: Dietary Fiber ; Pumpkin ; Cauliflower ; Doum ; Psyllium Husks; Physical properties ; Thermal properties ; Total Cholesterol; Hypercholesterolemic ; Atherogenic Index.

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