Chemical, Technological and Biological Studies on Wheat Germ

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Abstract

This study was carried out to investigate the utilization of microwave defatted wheat germ flour (MDWGF) as replacement of wheat flour at different levels (5, 10, 15, 20 and 25%) to prepare rich protein and minerals biscuits and balady bread. The chemical composition of wheat flour and MDWGF was determined. Chemical composition and physical properties as well as organoleptic evaluation of prepared biscuits and balady bread were also investigated. Minerals analysis of MDWGF and wheat flour as well as of prepared biscuits and balady bread were performed. In addition, studying the effect of substitution microwave wheat germ flour(MWGF), MDWGF for casein and the effect of substitution microwave wheat germ oil(MWGO 50% and 100%) for corn oil on body weight, feed efficiency ratio, serum liver function enzymes, serum lipids profile and antioxidant enzymes in carbon tetrachloride (CCl4) intoxicated rats. Results indicated that the MDWGF contain a high protein content (28.21 %) compared to that of wheat flour 72% (10.16%), wheat flour 82% (11.65 %) and MWGF (22.68 %). Ash content of MDWGF (4.30 %) was significantly higher than those of MWGF (3.50%), wheat flour 72% (0.65%) and wheat flour 82% (0.95%). MDWGF had values of phosphorus, potassium, calcium, iron, Magnesium and zinc, significantly higher than those of wheat flour. The protein and minerals contents of biscuit and balady bread made with MDWGF increased significantly with increasing the replacement ratio. Addition of MDWGF as replacement of wheat flour until level of 15% gave significant effect on sensory characteristics and protein efficiency ratio of prepared biscuit and balady bread. Organoleptic properties of biscuit and balady bread samples contained MDWGF until 15% as replacement ratios of wheat flour are nearly similar to control sample. As well as, results showed that substitution of MWG, MDWG instead of casein and MWGO instead of corn oil in CCl4-intoxicated rats led to increased their feed intake and body weight gain. This substitution also decreased the levels of serum liver function enzymes, improved lipid profile and increased the activity levels of antioxidant enzymes in CCl_4-intoxicated rats. Histopathological examination revealed alleviation of hepatic lesions caused by CCl_4. In conclusion, it was suggested that MWG, MDWG and MWGO could protect the liver cells from CCl4-induced liver damages perhaps, by its antioxidative effect on hepatocytes, hence eliminating the deleterious effects of toxic metabolites from CCl_4. Based on the obtained results, the new product of biscuit contained MDWGF can be covered protein and minerals of nutritional needs of schoolchildren in developing countries and could be recommended as a food aid in institutional feeding programs for pupils in different school stages. And also improve the nutritional quality of balady bread especially in developing countries to avoid the malnutrition prevalent. As well as, study recommended that the use of MWG, MDWG and MWGO may be useful for patients suffering from liver diseases due to its Hepatoprotective and hypolipidemic activities.