

Effects of Oat and Barley on Some Biochemical Parameters in Hyperglycemic Rats and their Effects on Rheological and Sensory Attributes of Baked Bread.

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Abstract:

Considering the effects of oat and barley, and their importance in the prevention and control of diabetes mellitus (DM) and cardiovascular diseases, the study aims to investigate the effect of adding oat and barley to the diet of hyperglycemic rats and their effects on blood glucose, total cholesterol, HDL and LDL levels, and to examine the effect of mixing flour of wheat with oat and barley on rheological properties of the bread dough, and to evaluate the sensory attributes of baked breads prepared from various these mixtures. Thirty male Sprague Dawley rats were divided into five groups (six rats per group): (1) normal control group fed basal diet, (2) Alloxan induced diabetic positive control group (DM) fed basal diet, (3) DM rats fed basal diet supplemented with 40% oat (DM-oat), (4) DM rats fed basal diet supplemented with 40% barley (DM-barley) and (5) DM rats fed basal diet supplemented with 20% oat + 20% barley (DM-oat + barley) for 6 weeks. Body weight gain and food intake were measured and the Feed Efficiency Ratio (FER) was calculated. After 6 weeks animals were lightly anesthetized at the end of the experimental period and blood was collected. Blood glucose, total cholesterol (TC), High Density Lipoprotein (HDL) and low Density Lipoprotein (LDL) were estimated. For measurement of dough's rheological properties, dough prepared from wheat 100% (Control bread) and breads containing: wheat 60% + oat 40% (WO 40%); wheat 60% + barley 40% (WB 40%), and the mixture of wheat 60% + oat 20% + barley 20% (WOB 20+20%), were subjected to farinograph and extensograph tests. And the baked bread were subjected to organoleptic evaluation. The body weight gain for groups of rats fed on 40% oat, barley or mixture of oat and barley were lower than that of positive control group. Rats groups fed on oat, barley and their mixture showed significant ($P \leq 0.01$) decrease in blood glucose level when compared with the positive control group. Serum cholesterol and LDL levels were significantly ($P < 0.01$) decrease in groups fed on oat, barley and their mixture in comparison with positive control values, on the other hand serum HDL level increased significantly in experimental groups when compared to the value of positive control. Replacement of wheat flour with 40% of oat or barley increase the water absorption and the dough resistance and extensibility decreased as a consequence of adding either oat or barley flour, wheat flour bread has higher acceptance score in color, taste, aroma, texture and overall quality, followed by mixture of (wheat 60%+oat 20% +barley 20%).

Keywords: Oat- Barley- Hyperglycemia- Rats- Glucose- Cholesterol- LDL- HDL- Farinograph- Extensograph- Sensory Evaluation.