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Effect of barley and malted barley on hypercholesterolemic rats

Thesis

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By

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Abstract

The present study was carried out to investigate the efficiency of barley or malted barley in ameliorating lipid profile and oxidative stress alteration caused by high fat, high cholesterol diet (HFHC).Adult male albino rats were divided into six groups; each group consisted of 12 rats. Group (1) Served as control, fed on balanced diet (without treatment);groups (2) and (3), rats were fed on balanced diet containing 10 % barley and malted barley respectively, group (4), rats were fed on HFHC (50 g solid fat +10 g cholesterol/kg diet) to induce hypercholesterolemia. Groups (5) and (6), rats were fed on HFHC plus 10% barley and malted barley, respectively. The results of chemical analysis of barley revealed that each 100 ml of barley and malted barley solutions contain 120 ± 4.00 mg, 158 ± 4.00 mg as gallic acid equivalent (GAE) for total phenols respectively, 524 ± 3.00 mg, 558 ± 3.00 mg for total antioxidants capacity and each 100 gm of barley and malted barley contain 320 ±1.5 mg, 382 ± 3.24 mg for total fiber respectively. The biological trial showed that the oral supplementation of barley and malted barley caused no significant change in the mean value of feed intake, meanwhile, body weight changes and feed efficiency ratio showed a significant decrease when compared with HFHC group. Moreover, the relative weights of liver, spleen, kidney and heart showed no significant change when compared with HFHC group. Also ,The results of HFHC group treated with barley reflected a significant depletion in all parameters of lipids profile and the percentage of change reached 22.04 % 24.87%, 25.19 %, 40.34 %, 34.11 %, 54.37 %, 54.89 % for total lipid (TL), total cholesterol (TC), triacylglycerols (TAG), low density lipoproteins cholesterol (LDL-C), very low density lipoproteins cholesterol (VLDL-C), atherogenic index (AI) and risk factor ratio (RF) respectively when compared with HFHC with an exception of high density lipoprotein cholesterol (HDL-C) showed a significant increase when compared with HFHC group. On the other hand, the results showed a significant increment in reduced glutathione level (GSH) in blood and liver. The percentage of changes in GSH in liver showed 13.82 % and 21.47 % as well as, super oxide dismutase (SOD) activity by 33.05 % and 42.39 %**.** While a significant decrement in malondialdehyde (MDA) in serum and liver, the percentage of decrement in liver by 38.47% and 46.36% in groups fed on HFHC diet and treated with barley or malted barley, respectively when compared with group fed on HFHC ($p<0.05$).It can be concluded that barley or malted barley

can reduce lipids profile and oxidative stress but malted barley is more effective than barley**.**

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List of Abbreviations

Abbreviation	Full name
(APOE 4)	Apolipoprotein E4
(A sample)	Absorbance of sample
(A standard)	Absorbance of standard
(AI)	Atherogenic index
(ALT)	Alanine amino transferase activity
(AST)	Aspartate amino transferase activity
(A-CRA)	Advanced colorectal adenoma
(AOM)	Azoxymethane
(BBB)	Blood-brain barrier
(BBG)	Barley beta-glucan
(BB)	Barley beverage
(BBF)	Barley beverage fermented
(BF)	Barley flake
(BMI)	Body mass index
(CVD)	Cardiovascular diseases
(CHD)	Coronary heart disease
(CE)	Cholesterol ester
(CETP)	Cholesterol ester transfere protein
(CAD)	Coronary Artery Disease
(CYP7A1)	Cholesterol 7-α hydroxylase
(CRP)	C-reactive protein
(DSS)	Dextran sulfate sodium
(DF)	Dietary fiber
(DTNB)	5, 5dithiobis 2-nitrobenzoic acid
(DPPH)	2, 2-diphenyl-1-Picrylhydrazyl
(FFA)	Free fatty acids
(FH)	Familial hypercholesterolemia
(FOS)	Fructo-oligosaccharide
(FBG)	Fasting blood glucose

(FER)	Feed efficiency ratio
(FAS)	Fatty acids synthase
(GBF)	Germinated barley foodstuff
(Gln)	Glutamine
(GBF)	Fraction of germinated barley
(GBFY)	Yogurt fermented with germinated barley
(GIT)	Gastrointestinal tract
(GST)	Glutathione S- transferase
(GPx)	Glutathione peroxidase
(GAE)	Gallic acid equivalent
(HDL)	High-density lipoprotein
(HTGL)	Hepatic triacylglycerols lipase
(HoFH)	Homozygous Familial hypercholesterolemia
(HeFH)	Heterozygous familial hypercholesterolemia
(HFD)	High fat diet
(HMGCoA)	3-Hidroxy 3-metylglutaryl coenzyme A
(HMW)	High molecular weight
(HCD)	High-cholesterol diet
(HWE)	Hot-water extract
(HBG)	Hull-less barley beta-glucan
(HbA1c)	Glycosylated hemoglobin
(HFHC)	High fat high cholesterol diet
(HL)	Hyper-lipidemic
(HLP)	Hyper lipidemic treated with probiotic
(IL-8)	Interleukin-8
(IL-6)	Interleukin-6
(INS)	Insulin
(LDL)	Low density lipoprotein
(LPL)	Lipoprotein lipase
(LRP)	LDL receptor–related protein
(LCAT)	Lecithin cholesterol acyltransferase (LCAT)
(LDL-R)	LDL receptor

(LP(a))	Lipoprotein (a)
(LMW)	Low molecular weight
(Lr263)	Lactobacillus reuteri 263
(MCP-1)	Monocyte chemotactic protein-1
(MI)	Myocardial Infarction
(MDA)	Malondialdehyde
(NO)	Nitric oxide
(ND)	Normal diet
(N)	Standard
($NaHCO_3$)	Sodium bicarbonate
(oxLDL)	Oxidized LDL
(OM)	Oat meal
(PCO)	Protein carbonyl
(PON1)	Paraoxonase1
(sdLDL)	Small dense LDL
(SRB1)	Scavanger receptor B1
(SNR)	Soluble nitrogen ratio
(SCFA)	Short chain fatty acids
(SOD)	Superoxide dismutase
(TNF-α)	Tumour necrosis factor-alpha
(TL)	Total lipids
(TCA)	Tricholoroacetic acid
(TAG)	Triacylglycerols
(TL)	Total phenols
(UC)	Ulcerative colitis
(VLDL)	Very low density lipoprotein
(VAS)	Visual analogue scale
(WR)	White rice
(WB)	White bread
(4-HNE)	4-hydroxynonenal

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