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Research Article

Biochemical Study on the Role of Curcumin in Male Rabbits

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Abstract

Districts. We have therefore investigate the effects of either 15 mg/kg B.W. doses of curcumin on the levels of biochemical parameters in male New Zealand White rabbits. Animals were orally given 15 mg/kg B.W. doses of curcumin. The tried measurements were given to rabbits each other day for 6 weeks.. Treatment with curcumin caused significant (P < 0:05) decrease in the concentrations of glucose, plasma asparatate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) activities, gamma glutamyl transferase activity (ɣ-GT), Plasma thiobarbituric acid-reactive substances (TBARS) and bilirubin. Contrariwise, the total protein (TP)was significantly increased in plasma. Concentrations of urea. But, creatinine, cholesterol, triglycerides (TG), low-density lipoprotein (LDL) and very low density lipoprotein (VLDL) were significantly decreased, while high density lipoprotein (HDL) was increased. The aim of this study was to evaluate the potential of increasing levels of turmeric powder as phytogenic additives on serum biochemical metabolites and antioxidant enzyme activities in growing rabbits.

Keyword: Curcumin, biochemistry, enzyme activities and rabbits

INTRODUCTION

Turmeric (Curcuma longa) may be a restorative plant broadly utilized and developed in tropical locales. Plant extricates were found to have antifungal, imunomodulatory and antioxidative[1,2]as well as antimutagenic activities[3] .

Turmeric powder is a rich source of beneficial phenolic compounds: the curcuminoids, where three main curcuminoids, curcumin, demethoxycurcumin and bisdemethoxycurcumin[4] have been isolated from turmeric. Supplementation of turmeric powder at 0.20 and 0.40 g/kg to the commercial eat less for rabbits emphatically influenced the body weight pick up in rabbit does [5].

Turmeric is an Indian rhizomatous herbal plant (Curcuma longa) of the ginger family (Zingiberaceae) of well-known medical benefits [6,7]. Fig. 1 shows Curcuma longa. The therapeutic benefits of turmeric might be ascribed to the nearness of active standards called curcumin oids. One of the foremost curiously components of curcumin oid is curcumin, which could be a little atomic weight polyphenolic compound and lipophillic in nature, subsequently insoluble in water additionally in ether but solvent in ethanol, dimethylsulfoxide, and other natural solvents [8]

Curcumin is stable at the acidic pH of the stomach[9]. The other constituents present are volatile oils including tumerone, atlantone and zingiberone and sugars, proteins and resins [7] . The active constituent of turmeric- curcumin is isolated from curcuma longa and it provides colour to turmeric. Such bioactive component has been thoroughly investigated [10]. Curcumin (1, 7-bis (4-hydroxy-3- methoxyphenyl)-1, 6-heptadiene-3,5-dione) is also called diferuloylmethane [11].

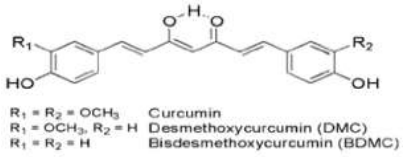

Figure 1. Chemical structures of curcumin

On the other hand,[12] famous that dietary consideration of turmeric powder at 0, 0.15 and 0.30% had no advantageous impacts on blood parameters and meat characteristics of developing rabbits raised beneath summer stretch. Be that as it may, data around ideal level of garlic and turmeric powder as development promoters and normal cancer prevention agents in developing rabbit is rare

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Enhanced concentration of serum AST and ALT are used as indicators of liver damage [13], the activities of AST and ALT reduced in rabbit fed diet supplemented with turmeric compared to the control group suggesting the hepatoprotective effect of turmeric. Researchers investigate the protective effects of curcumin on experimentally induced hepatotoxicity, and cardio toxicity using various animal models with biochemical parameters like serum marker enzymes and antioxidants in target tissues. The increased relative weight of liver and heart in liver injury and isoproterenolinduced cardiac necrosis were also reduced by Curcumin treatment. Elevated serum marker enzymes, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) in edematous, granulomatus, liver and heart tissues during liver injury and cardiac necrosis, respectively. The study demonstrated the invitro and in-vivo protective effect of curcumin on experimentally induced hepatotoxicity and cardiotoxicity in rabbits [14]. Within the current explore, bolstering the creatures on turmeric supplemented eat less progressed the hepatic antioxidant enzymes and diminished the MDA concentration in comparison with the control gather. The same results were reported by [15] who found that the intake of herbs resulted in an increase in serum antioxidant enzyme activities and a decrease in MDA concentration.

Our discoveries too upheld by[16] who detailed that turmeric extricates can rummage free radicals, increment antioxidant proteins, and repress lipid peroxidation, though turmeric extricate (1.66 mg/kg of body weight) was given to rabbits encouraged a high-fat count calories, oxidation of erythrocyte layers was found to be essentially lower than that in films of control creatures. Grass "metalloprotein chemical" is the primary chemical contributed within the antioxidant defense framework. GSH-Px "seleno chemical" catalyses the reaction of hydro peroxides with diminished glutathione to make glutathione disulphide. Subsequently, hoisted levels of these chemicals may make strides the consistent state of antioxidant framework of rabbits. The concentration of liver MDA is an pointer for assessing antioxidant frameworks. Compared with the control bunch, creatures encouraged 2, 4 or 6 g/kg of turmeric had significantly lower liver concentration of MDA common added substances as turmeric can be connected within the future to make strides the wholesome quality of creature meat. It seems that turmeric supplementation to control diet were effective in enhancing the antioxidant ability of animals. Since, turmeric is a rich source of beneficial phenolic compounds, the curcuminoids having strong antioxidant activity [17]. [18] found that curcumin supplementation restrained lipid peroxidation in rabbit liver microsomes, erythrocyte films and brain homogenates .Besides, lower helplessness of LDL to oxidation [19]. Based on these findings, we state that turmeric might play an important role as an exogenous antioxidant and could also be applicable as a protective agent against tissue damage.

MATERIALS AND METHODS

Curcumin was purchased from public market for medicinal herbs in Al-Bayda city. All other chemicals utilized within the explore were of expository review. Mature male New Zealand White rabbits age of 6 months were used. Animals were individually housed in cages and weighed weekly throughout 6-week experimental period. Feed and water were provided ad libtum. Rabbits fed pellets which consisted of 30 % berseem (Trifolium alexandrinum) hay, 25 % yellow corn, 26.2% wheat bran, 14 % soybean meal, 3 % molasses, 1 % CaCl2, 0.4 % NaCl, 0.3 % mixture of minerals and vitamins, and 0.1 % methionine. The vitamin and mineral premix per kg contained the following IU/gm for vitamins or minerals: vit A-4000,000, vit D3-5000, 000, vit E-16,7 g, K0.67 g, vit B1-0.67 g, vit B2-2 g, B6-0.67 g, B12-0.004 g, B5-16.7 g, Pantothinc acid-6.67 g, Biotein-0.07 g, Folic acid-1.67 g, Choline chloride400 g, Zn-23.3 g, Mn-10 g, Fe-25 g, Cu-1.67 g, I-0.25 g, Se-0.033 g, and Mg-133.4 g (Rabbit premix produced by Holland Feed Inter. Co.). The chemical analysis of the pellets19 showed that they contained 15.8 % crude protein, 11.3 % crude fiber, 3.7 % ether extract, 7.2 % ash, 92.9 % organic matter and 62.4 % nitrogen free extract % as DM basis. Ten develop male rabbits were arbitrarily separated into couple rise to bunches (each five rabbits): Bunch I: Rabbits were utilized as control and gotten an comparable volume of the vehicle (corn oil) alone by oral gavage daily for 6successive weeks. Group II: Rabbits were treated with curcumin. Curcumin was given daily by gavage at a dose

of 15 mg/kg B.W[20] which dissolved in corn oil for 6 successive weeks.

At the conclusion of the exploratory period, all rabbits were weighed at that point yielded beneath ether anesthesia. Blood tests were collected in clean dry centrifuge tubes. Plasma was separated by centrifugation at 3000 rpm for 10 minutes and then quickly frozen at -20°c for biochemical parameters analysis.

Stored plasma samples were analyzed for total protein (TP) by the Biuret method according to[21]. Plasma glucose, urea and creatinine concentrations were measured by the method of [22-24], respectively. Plasma total bilirubin was measured using the method of [25]. Plasma concentrations of cholesterol and triglycerides (TG) were determined according to the methods of[26],[27,28] respectively. High-density lipoprotein (HDL) was determined according to the methods of [29]. Low-density lipoprotein (LDL) was determined by the calculation (cholesterol-(TG/5+HDL). Very low-density lipoprotein (VLDL) was calculated by dividing the values of TG by factor of 5.

The activities of plasma aspartate transaminase (AST; EC 2.6.1.1) and alanine transaminase (ALT; EC 2.6.1.2) were assayed by the method of [30]. Alkaline phosphatase (AlP; EC 3.1.3.1) activity was determined in plasma according to the method of [31]. Plasma thiobarbituric acid-reactive substances (TBARS) were measured by the strategy of Tappel and Zalkin [32].

RESULTS

Table 1 showed the overall means of the activities of aspartate transaminase (AST), alanine transaminase (ALT), alkaline phosphatase (AlP), gamma glutamyl transferase activity (ɣ-GT), Lactate dehydrogenase (LDH), Plasma thiobarbituric acid-reactive substances (TBARS) and bilirubin in blood plasma as affected by treatment with curcumin throughout the 6-week experimental period. Treatment with curcumin resulted in significant ($P<0.05$) decrease in the activities of blood plasma AST and ALT, (ɣ-GT) , LDH,TBARS and bilirubin while ALP were significantly ($P<0.05$) increased compared with control group. Tables 2 The mean values of plasma total protein (TP), albumin (A), globulin (G), bilirubin, urea, creatinine and glucose after 6- week experimental period are shown in Table 2 . Treatment with curcumin increase plasma levels of TP, A and G, while decrease glucose, bilirubin, urea and creatinine in male rabbits. Tables 3 illustrated the effect of curcumin on the levels of total cholesterol (TC), triglyceride (TG), very low-density lipoprotein, high and low-density lipoprotein-cholesterol (HDL-c and LDL-c) in blood plasma of male rabbits. The levels of, TC, TG,and LDL-c were significantly ($P<0.05$) deceased , while HDL-c, were significantly ($P<0.05$) increased in plasma of rabbits treated with curcumin as compared with control group.

Table 1: Changes in the biochemical parameters and the level of thiobarbituric acid-reactive substances (TBARS) during treatment of male rabbits with 100 mg/kg doses of curcumin

Parameters	**Animal Groups**	
	Control	**Curcumin**
AST (U/L)	43.30±1.032[a]	39.19±3.443[a]
ALT (U/L)	45.35±0.706[a]	39.18±2.809[a]
ALP (U/L)	144.89±3.769[a]	153.48±6.941
ɣ-GT (U/L)	7.13±0.029 [a]	6.60±0.081 [b]
Bilirubin (mg/dl)	1.56 ±0.009 [a]	1.47 ±0.024 [b]

TBARS (nmol/m	0.701 ± 0.019[a]	0.602 ± 0.039
TP(g/dl)	6.83±0.021 [a]	6.98 ± 0.119 [a]
Glucose (mg/dl)	115.36 ± 0.51(	113.43 ±1.50
Urea (mg/dl)	37.97±0.277 [a]	34.05± 0.710
Creatinine(mg/dl	0.63 ±0.005 [a]	0.53±0.030 [b]
Cho	120.40 ± 0.49	118.05 ±0.70(
TG	55.75 ± 0.693	54.22 ±1.078
HDL	57.47± 0.618 [b]	61.31 ± 7.25
LDL	59.33 ± 0.840	54.93 ± 0.693

DISCUSSION

The protective effect of curcumin may be explained by the fact that it prevents cellular damage occurring as a result of oxidative stress[33].Administration of turmeric resulted in slight decrease level of liver enzymes as compared to sodium nitrite treated group indicate to ameliorative effect of turmeric ,These results are in harmony with[34,35], they stated that curcumin administration prevented ALT and AST increases and improved liver function.

The obtained results were in agreement with [36]who found that triglycerides, total cholesterol and low density lipoprotein concentrations were linearly and quadratically decreased with increasing the dietary proportion of turmeric. Also, [37]clearly found that triglycerides and total cholesterol were significantly decreased with increasing turmeric levels to 7 g/kg diet. The reduction of lipids profile (triglycerides, total cholesterol and low density lipoprotein concentrations) may be due to curcumin that enhances bile production and hence lipid digestion [38].[39] indicated that liver triacylglycerol and cholesterol concentrations were significantly lower in rats fed curcumin than in control animals. Plasma triacylglycerol in the very low-density lipoproteins fraction were also lower in curcumin fed rats. Hepatic acyl-CoA oxidase activity of the curcumin group was significantly higher than that of the control. The obtained results in the present study contrast with the results reported by [40] who demonstrated that turmeric supplementation into the basal diets of broilers significantly increased total cholesterol and HDLcholesterol and decreased LDL-cholesterol, but did not affect total-triglycerides.

Table 1 presents the results on the effects of different supplementations on serum malondialdehyde concentrations of rabbits. turmeric supplemented diet reduced the MDA concentration in comparison with the control group. [41] reported that supplementation with Curcuma longa reduces oxidative stress and attenuates the development of fatty streaks in rabbits fed a high cholesterol diet. Such antioxidant effects would be expected to improve the health of rabbits. From these results, it can be stated that supplementation with phytogenic additives as turmeric could be applied in the future to improve the nutritional quality of rabbit meat. It seems that turmeric supplementation to basal con-

trol diet was effective in enhancing the antioxidant ability of rabbits. These effects are due to the antioxidant property of turmeric [42]. [18] found that curcumin supplementation inhibited lipid peroxidation in rat liver microsomes, erythrocyte membranes and brain homogenates. Moreover, it lowered susceptibility of LDL.[43]found that curcumin protects against chemical toxicity.

CONCLUSION

Based on experiment findings, we state that turmeric could have beneficial effects on biochemical parameters and may be play an important role as an exogenous antioxidant.

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