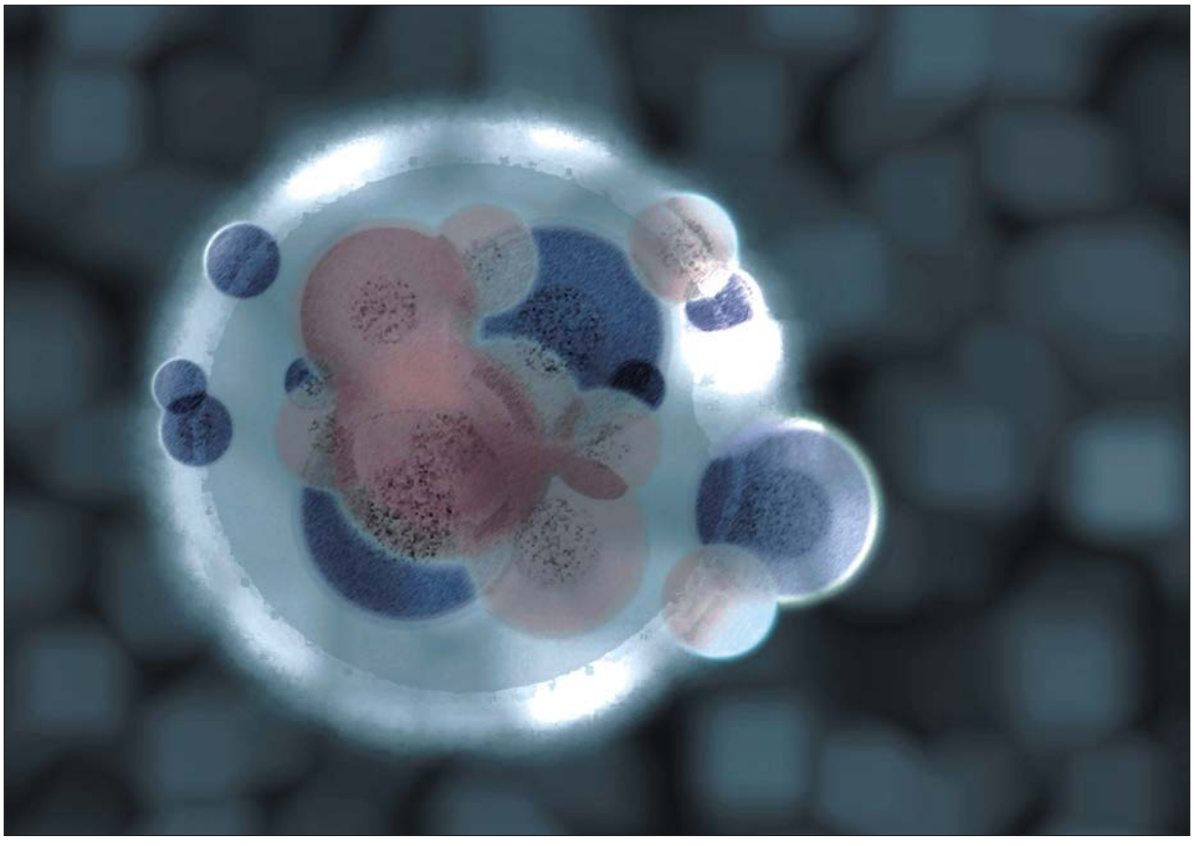

Journal of Biological Sciences

ISSN 1727-3048

science alert

ANSInet
an open access publisher
http://ansinet.com

Journal of Biological Sciences 6 (5): 950-953, 2006
ISSN 1727-3048

Response of Bovans Chicks to Dietary *Commiphora myrrha*, *Glycyrrhiza glabra* or Their Mixture

[1]Amel O. Bakhiet and [2]Emtithal A. Ibrahim
[1]College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology, P.O. Box 204, Khartoum North, Sudan
[2]Faculty of Science and Technology, El Neelain University, P.O. Box 12702, Khartoum, Sudan

Abstract: The effect of diet containing 10% of *Commiphora myrrha*, 10% of *Glycyrrhiza glabra* or their mixture (5+5%) to Bovans-type chicks treated for 2 weeks was investigated. The body weight and weight gain of the two plants and their mixture were significantly depressed compared to the control chicks. Significant changes in the activities of AST and ALT and the concentration of total protein, uric acid, albumin and globulin and cholesterol levels. Mild degenerative changes were observed in the liver and kidneys of chicks while no significant differences were recorded in hematological parameters.

Key words: *Commiphora myrrha*, *Glycyrrhiza glabra*, bovans-type chicks

INTRODUCTION

Commiphora myrrha is a member of the family Burseraceae and is locally known as *Morr Higazi* or *Myrrh* and commercially as *Arabian Myrrh* or *Karam*. *C. myrrha* has numerous applications. In Sudan, it is used as astringent, antiseptic, expectorant and carminative (Omer, 1997) and in Saudi Arabia as a tonic in dyspepsia, an anti-inflammatory, an antirheumatic and emmenagogue and as a remedy for vaginitis and ulcers (Tariq *et al*., 1985).

C. myrrha contains oils, gum (Brieskorn and Noble, 1982), terpenes, sesquiterpenes, and aldehydes, other substances with antilipaemic potentials (Wiendl and Franz, 1994), resin acid and proteins (Provan and Waterman, 1988).

Glycyrrhiza glabra/Licorice locally known as Irg Sus is one of the most widely used herbs. Form the ancient medical history of Ayurveda, both as medicine and also as flavoring herb to disguise the unpleasant flavor of other medication. It is very sweet, moist, soothing herb that detoxifies and protects the liver and is also powerful anti-inflammatory, being used in conditions as varied as arthritis and mouth ulcers.

It is well known that a plant or drug may interact with another plant or drug and as a consequence modifications in activity and/or toxicity can be observed (Laskar *et al*., 1998; Adam *et al*., 2001).

The objective of the present study was to investigate the effect on Bovans-type chicks fed the plants singly or combined through pathological, hematological and serobiochemical parameters in pursuance of our investigations of the toxicity of traditionally used medical plants (El Badwi *et al*., 1992; Bakhiet and Adam, 1995; Adam *et al*., 2000).

MATERIALS AND METHODS

Plant material: *C. myrrha* and *G. glabra* were purchased from a local market in Omdurman, Sudan; ground separately with mortar and pestle and then mixed in a basal diet (Table 1).

Experimental design: Forty one day-old Bovans chicks were purchased from Coral Company Ltd., Khartoum and housed within the premises of the College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology, Khartoum-North, Sudan under illumination (23 h/day) with starter diet and water provided *ad Libitum*. The study was conducted in May

Table 1: Percent composition of basal diet

Ingredients	(%)
Sorghum	58
Soybean	4
Sesame cake	14
Groundnut cake	12
Wheat bran	5
Marble dust	1
Declaim phosphate	1
Super concentrate	5
Total	100

Corresponding Author: Amel O. Bakhiet, College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology, P.O. Box 204, Khartoum North, Sudan
Tel: +24912347090 Fax: +249183497001

Table 2: Weight gain of Bovans-type chicks fed *Commiphora myrrha* and *Glycyrrhiza glabra* for 14 days

	Parameters		
Groups	Body weight in day 1 g^{-1}	Weight gain in day 8 g^{-1}	Weight gain in day 14 g^{-1}
G1 (Control)	63±1.67	94±5.17	140±11.54
G2 (10% *C. myrrha*)	61±2.45^{NS}	85±1.7 *	73±5.84 *
G3 (10% *G. glabra*)	62±2.72^{NS}	94±3.1^{NS}	96±8.28 *
G4 (5 *C. myrrha*+5% *G. glabra*)	65±2.85^{NS}	97±2.55 ^{NS}	88±6.83 *

Values are expressed as mean±SE NS not significant, *significant is ($p<0.05$)

Table 3: Serobiochemical changes of Bovans-type chicks fed *Commiphora myrrha* and *Glycyrrhiza glabra* for 14 days

	Groups			
Parameters	G1 (Control)	G2 (10% *C. myrrha*)	G3 (10% *G. glabra*)	G4 (10% *C. myrrha* 5%+ *G. glabra*)
AST(i u)	38.2±0.6	49±0.98*	44.4±2.1*	36.0±0.45^{NS}
ALT (i u)	34.6±0.93	48.6±0.93*	37.4±2.1^{NS}	32.6±1.0 ^{NS}
Total protein (g dL^{-1})	2.54±0.13	2.16±0.2*	3.21±0.2*	2.61±0.38 ^{NS}
Albumin (g dL^{-1})	1.5±0.08	1.46±0.36^{NS}	2.05±0.2*	1.91±0.25*
Globulin (g dL^{-1})	1.04±0.2	0.66±0.26*	1.16±0.13 ^{NS}	0.69±0.15*
Cholesterol (g dL^{-1})	156.5±5.7	197.4±18.8*	117.8±20.8*	215.5±19.6*
Uric acid (mg dL^{-1})	4.64±0.19	7.04±0.43*	6.45±0.32*	5.37±0.38 *

Values are expressed as mean±SE, NS Not Significant, *significant is ($p<0.05$)

2005. After two weeks, the chicks were allotted at random to 4 groups of 10 chicks each. Group (1) was the control and fed normal basal diet. *C. myrrha* and *G. glabra* were finely ground, thoroughly mixed with the normal basal diet and fed to chicks at 10% each (group 2) and (group 3) respectively for two weeks. Group 4 chicks were fed 10% of both tested plants at equal amounts (5:5%). Feeding the control and test diets continued for 2 weeks.

Average body weight and weight gain were measured weekly for each group. Chicks were slaughtered after two weeks for pathological examinations. Blood samples were collected from each chick at slaughter for hematology and serum chemistry analysis.

Blood analyses: Red Blood Cell (RBC) count, Hemoglobin (Hb) concentration, Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) were evaluated (Schalm *et al*., 1975).

Serum samples were analyzed for the activities of aspartate transaminase (AST) and alanine transaminase (ALT), total protein, albumin, globulin, cholesterol and uric acid concentrations using commercial kits (Linear Chemicals, Spain)

Pathological examinations: Post-mortem examinations were conducted on all chicks to identify gross lesions and specimens of intestine, liver, spleen, proventriculus, kidneys and heart were fixed in 10% neutral buffered formalin, embedded in paraffin wax, sectioned of 5 μm and stained with hematoxylin and eosin (H and E) for histopathological examinations.

Statistical analysis: The significance of differences between means was compared at each time point using Duncan's multiple range test after ANOVA for one-way classified data (Snedecor and Cochran, 1989).

RESULTS

Clinical observations: All treated groups were clinically healthy and there were no mortality along the period of 10%*C. myrrha* (Group 2), 10% *G. glabra* (Group 3) and their combination feeding (Group 4).

Effect on growth: The effects of dietary *C. myrrha* and *G. glabra* and their mixture when fed at 10% (group 2), 10% (group 3) or 5+5% (group 4) respectively, of the basal diet on mean body weights and weight gains are presented in Table 2. The body weights of the control chicks (group 1) were significantly higher ($p<0.05$) than chicks in group 2 at the first week and the second; and significantly higher ($p<0.05$) than chicks in group 3 and 4 at the second week.

Pathological changes: No significant changes were observed in the control chicks group (1). However, mild degenerative changes were observed in the liver and kidneys of group (4) chicks. The kidneys of group (3) had degeneration and/or necrosis of the epithelial cells of the proximal convoluted tubules and shrinkage of the glomerular tufts. Chicks fed 10% *C. myrrha* group (2) feed showed liver congestion with lymphocytic infiltration.

Hematological changes: No significant differences in the values of Hb, RBC, PCV, MCV, MCH or MCHC were observed during the 2 weeks feeding in the test chicks than the controls.

Serum chemistry: The effects of *C. myrrha* and *G. glabra* and their mixture on AST and ALT activities and concentrations of total protein, albumin, globulin, cholesterol and uric acid in the serum of Bovans-type chicks are given in Table 3. Analysis showed significant differences ($p<0.05$) in AST and ALT between the *C. myrrha*-fed chicks groups (2), the combination group (4) and the controls group (1).Total protein concentration was higher ($p<0.05$) in group (3) and lower ($p<0.05$) in group (2). Uric acid concentration was lower ($p<0.05$) in groups (2), (3) and (4) than the control group. Cholesterol concentration was only increased ($p<0.05$) in group (4) compared to the other two groups and lower in group (3). There were no significant differences in serum albumin and globulin.

DISCUSSION

The results of the present study indicated that feeding Bovans-type chick, with either *C. myrrha* or *G. glabra* at 10 % and their mixture at 5% each of the normal diet is toxic but not lethal as evidenced by impairment of growth, lesions in vital organs and hematological and serobiochemical alterations.

The incorporation of *C. myrrha* or *G. glabra* in the normal diet at 10% or their mixture at 5% each was chosen for several reasons. For chickens, these dietary levels represent non-toxic concentrations of some plants exemplified by *Nigella sativa* (Al-Homidan *et al*., 2003). On the other hand, concentrations of 2 or 5% of dietary *Azadirachta indica* and *Rhazya stricta* have been found toxic to chickens (Ibrahim *et al*., 1992) and rodents (Adam, 1999). It seems, therefore, that the susceptibility of animal to feeding with plant materials is dependent at least on the type of the active constituents and concentration in the amount added to the diet as well as on the rate of their metabolic conversion in the liver to metabolites and consequent excretion.

The results of the present study suggested that the degree of seriousness of feeding *C. myrrha* or *G. glabra* is related to the concentration and characteristics of the active constituents in the plant. In the chicks fed a diet consisting of 10% *C. myrrha* or *G. glabra*, severe damage to liver and kidneys could explain the depression of growth. The mechanism whereby the plant constituents injure body tissues cannot be derived from the present investigation but the damage to these vital organs probably contributed to the increased serum AST and ALT activities and uric acid concentrations. *G. glabra* at 10% leaded to decrease in serum cholesterol and this agreed with other studies reporting that this plant considered is as hypoglycemic. The damage to vital organs of the chicks on 5% *C. myrrha* and 5% *G. glabra* was less intense.

There were no changes in Hb, RBC, PCV, MCV and MCHC in this study while in other previous studies showed macrocytic anemia in chickens which had been fed a diet containing 10% *Cassia italica* seed (Bakhiet and Adam, 1996) or in rats which had been fed a diet consisting of 10% *Artemisia abyssinica* (Adam *et al*., 2000).

In conclusion, this study demonstrated that *C. myrrha* or *G. glabra* at 10 % and their mixture at 5% are toxic but not lethal to Bovans chicks at concentrations used in the test diet. The toxicity of *C. myrrha* and *G. glabra* were severe and was evidenced by a consistently lower body weight gain and extensive tissue lesions.

REFERENCES

Adam, S.E.I., 1999. Experimental *Rhazya stricta* toxicosis in rats. Vet Hum Toxicol., 41: 5-8.

Adam, S.E.I., A. A. Al-Qarawi and E.A. Elhag, 2000. Effects of various levels of dietary *Artemisia abyssinica* leave in rats. Lab Anim., 34: 307-312.

Adam, S.E.I., M.A. Al-Yahya and A.H. Al-Farhan, 2001. Combined toxicity of *Cassia senna* and *Citrullus colocynthis* in rats. Vet. and Hum. Toxicol., 43: 70-72.

Al-Homidan, A.A., A.A. Al-Qarawi and S.A. Al-Waily, 2003. Response of Hibro chicks to low dietary levels of *Rhazya stricta* and *Nigella sativa*. Br. Poult. Sci., 43: 291-296.

Bakhiet, A.O. and S.E.I. Adam, 1996. Toxicity to Bovans chicks of *Cassia italica* seeds. Phytother Res., 10: 156-160.

Brieskorn, C.H. and P. Nobel, 1982. Constituents of essential oils of *myrrh*. Part 2: Sesquiterpene and furanoses quiterpenes. Planta Medica, 44: 87-90.

El Badwi, S.M.A., S.E.I. Adam and H.J. Hapke, 1992. Experimental *Ricinus communis* poisoning in chicks. Phytother. Res., 6: 205-207.

Ibrahim, I.A., S.A. Omer and F.H. Ibrahim, 1992. Experimental *Azadirachta indica* toxicosis in chicks. Vet. Hum. Toxicol., 34: 221-224.

Laskar, S., U.K. Bhattacharyya, A. Sinhababu and B.K. Basak, 1998. Antihepatotoxic activity of Kulthi (*Dolichos biflorus*). Fitoterapia, 69: 401-402.

Omer, S.A., 1997. Studies on *Commiphora myrrha* (*Morr higazi*). Thesis, University of Khartoum, Sudan.

Provan, C.T. and P.G. Waterman, 1988. Major triterpenes from the resins of *Commiphora incisa* and *C. kua* and their potential chemotaxonomic significance. Proceedings of the Society for Experimental Biology and Medicine.

Schalm, O.W., N.C. Jain and G.H. Carroll, 1975. Veterinary Hematology 3rd Edn., Lea and Febiger, Philadelphia.

Snedecor, G.W. and W.C. Cochran, 1989. Statistical Methods, 8th Edn., Iowa State University Press, Ames, Iowa.

Tariq, M., M.A. AI Yahya, J.S. Mossa, I.A. AI Meshal, and A.A. Al Badr, 1985. Pharmacological studies on C.N.S. depressant plants of Saudi Arabia. Proceedings of the pharmacological society of Canda, pp: 122.

Wiendl, R.M. and G. Franz, 1994. Myrrh: New Chemistry of an old crude drug. Dtsch. Apoth. Ztg., 134.