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Evaluation of Acute Oral Toxicity of a Polyherbal Liver Tonic for Poultry

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The current study was designed to evaluate the acute oral toxicity potential of Superliv Gold liquid (M/s Ayurvet Limited, Baddi, India) according to OECD 423 guidelines. Superliv Gold liquid is a polyherbal hepatoprotective and hepatoregenerative liver tonic for poultry. Nine female Swiss albino mice were used for the study. Each animal served as its own control. Following the oral administration of the test substance, the animals were observed for manifestation of toxic effects and deaths. No toxic effects or mortalities were observed. The estimation of biochemical parameters (AST, ALT, ALP and creatinine) and histopathological studies also did not reveal any significant findings. Hence, Superliv Gold liquid was found to be safe for use.

Keywords: Acute oral toxicity, Superliv Gold liquid, OECD 423, safety, limit test.

Liver is an important organ involved in a number of digestive, metabolic and productive activities regulating growth and productivity in poultry. Being the central organ for various activities, it is highly vulnerable to diseases. Particularly in broilers, the liver has to cope with various situations including high energy diet, use of coccidiostats and chemotherapeutic agents, posing risks to health and create situations of difficult prognosis. Researchers are actively looking for viable alternative to replace antibiotics due to ban on their use and increasing concerns over the rise of antimicrobial resistance. One class of such alternatives is herbs and medicinal plants. Herbal liver tonics act by protecting the liver from toxins and stimulating the liver function and, thus, enhance growth and production performance.Superliv Gold liquid contains herbs *viz*. *Andrographis paniculata*, *Azadirachta indica*, and *Boerhaavia diffusa* possessing hepato protective, choleretic, immunomodulatory, immuno stimulatory and free radical scavenging activities. Superliv Gold liquid may also act as a depurative, enhancing erythropoiesis and immune system[1,2].Superliv Gold liquid is recommended for offsetting the damaging effects of aflatoxins, restoring reduced feed intake, for improving liver functions, and for better feed utilization, growth and production. In a study,

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Superliv Gold liquid has been found to improve feed efficiency, body weight, breast muscle mass and reduced fat pad size[3] which suggests an enhancement of muscle protein synthesis and reduction of fat deposition through inhibition of lipogenesis or increase of lipolysis process[4].The present study aimed at determining the acute oral toxicity potential of Superliv Gold liquid.

MATERIAL AND METHODS

The animals for the current study were procured from CPCSEA-registered breeding source *viz*. laboratory animal resource section of Department of Pharmacology and Toxicology, PGIVAS, Akola. Nine healthy, adult, nulliparous and non-pregnant female Swiss albino mice (20-25g) were used. Animals were kept in the cages for five days for acclimatization. The animals were fasted over-night, food but not water was withheld for 3-4 hours. Following the period of fasting, the animals were weighed and the test substance was administered orally. The animals were identified by appropriate means. The number of animals per cage was kept at three for clear observation of each animal; housing conditions were conventional. The ambient temperature was 25°C and relative humidity of 70%. The animals were exposed to 12 hour light-dark cycle and provided with standard pelleted diet and water *ad lib*[5]. After the administration of the test substance @ 300 mg/Kg (P.O.) in normal saline and 2000 mg/Kg with maximum volume 2 mL/ 100 g body weight, food was withheld for 1-2 hours. The animals were observed for 24 h, then for further 14 days for manifestation of toxic effects and deaths; LD_{50} value was also estimated. The observations included changes in skin, fur and eyes; and changes in respiratory, circulatory, CNS, autonomic, somatic activity and behavior. Clinical signs like muscular tremors, convulsions, salivation, diarrhea, lethargy, sleep, and coma, if any, observed during study period were recorded.

RESULTS AND DISCUSSION

Individual body weights of mice were recorded on days 0, 7 and 14 of the study and body weightsin both thegroups (I and II) continued to increase throughout the study period (Table 1).

No mortality was observed throughout the period of observation.In the six mice receiving the limit dose of Superliv Gold liquid at 2000 mg/Kg, *i.e.* the maximum dose which can be administered by oral route, no mortality occurred and hence, the LD_{50} was beyond this limit. Similarly, no abnormal

Table 1. Individual body weights of experimental mice

Formulation and Dose	Mice No	Body Weight (g) on Day		
		0	7	14
Superliv Gold liquid @ 300 mg/Kg b.wt. orally(Group I)	1	21	23	25
	2	20	23	25
	3	24	26	27
	Mean±SE	21.67±1.52	24.00±1.26	25.6±0.84
Superliv Gold liquid @2000 mg/Kg b.wt. orally(Group II)	1	22	23	25
	2	21	23	24
	3	25	26	28
	4	20	23	25
	5	22	23	25
	6	24	25	26
	Mean±SE	22.3±0.76	23.83±0.54	25.50±0.56

Table 2. Biochemical findings in experimental mice

Dose	AST (IU/L)	ALT (IU/L)	ALP (IU/L)	Creatinine (mg/dL)
300 mg/Kg	71.93	82.86	89.53	0.77
2000 mg/Kg	86.73	106.5	97.96	0.49

symptoms, including lethargy, tremor, abdominal breathing, piloerection were observed up to 14 days of Superliv Gold liquid administration.Necropsy on day 14 did not show any remarkable findings in the gross or microscopic appearance of liver, kidney, spleen, heart, lungs, and genital organs in any of the animals.Pooled serum samples were analyzed in triplicate for AST, ALT, ALP and creatinine and all were within their normal ranges (Table 2).

Superliv Gold liquid contains herbs *viz*. *Andrographis paniculata*, *Azadirachta indica*, and *Boerhaavia diffusa*, that fall under the category of Generally Regarded As Safe (GRAS). A composition based on these GRAS constituents is least likely to be toxic in practical doses. Due to the presence of multiple active ingredients, Superliv Gold liquid may exert multifarious benefits on animals, including the stimulation of their growth, performance; thereby improving digestion, body weight and feed efficiency.

CONCLUSION

Superliv Gold liquid did not produce acute oral toxicity, evident as absence of mortality or any toxic clinical symptoms, when administered up to limit dose (2000mg/Kg) in mice. Based on this study, the formulation was found safe for oral use.

REFERENCES

1. Mishra S. K, Sangwan N. S, and Sangwan R. S. Plant Review Andrographis paniculata (Kalmegh): *A Review. Pharmacog. Rev*., 2007; **2**: 283-298.
2. Manu K. A. and Kuttan G. Immunomodulatory activities of Punarnavine, an alkaloid from *Boerhaavia diffusa*. Immunopharmacol. *Immunotoxicol***.**, 2009; **31:** 377-387.
3. Flees J, Greene E, Ganguly B, and Dridi S. Phytogenic feed-and water-additives improve feed efficiency in broilers via modulation of (an)orexigenic hypothalamic neuropeptide expression. Neuropeptides, 2020;doi:10.1016/j.npep.2020.102005.
4. Orlowski S, Flees J, Greene E. S, Ashley D, Lee S, Yang F. L, Owens C. M, Kidd M, Anthony N. and Dridi S. Effects of phytogenic additives on meat quality traits in broiler chickens. *J. Ani. Sci.,* 2018; **96**: 3757-3767**.**
5. No. OECD Test 423: Acute oral toxicity-acute toxic class method. OECD guidelines for the testing of chemicals (section 4: health effects) 1. 2001; **14**.