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ACUTE TOXICITY STUDY OF *CISSUS QUADRANGULARIS* IN SWISS ALBINO MICE

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Abstract:

The aim of the present study is to examine acute toxicity studies for extracts of whole plant of *cissus quadrangularis* in the form of aqueous slurry as per the organization for economical and cooperation development (OECD) guidelines in Swiss albino mice weighing 23-30 g. The dose of 50, 100, 200, 500, 1000, 1500, 2000 2500 and 3000 mg per kg body weight of aqueous extract was administered orally. All the groups animals were almost continuously observed for mortality and behavioral changes during first 24 h and then daily for 14 d. On 15th day the observations of behavioral changes and changes in body weight, food and water intake as well as cage side observations were reported. There was no abnormality observed in all groups. The whole plant aqueous extract have no any significant toxic effect in Swiss albino mice and the plant material was found to be non-toxic.

Keywords: *cissus quadrangularis*, acute toxicity, whole plant powder, aqueous extract

INTRODUCTION:

The ancient humans categorized some plants as harmful and some as safe. All the organism are always exposed constantly and unavoidably to foreign chemicals of xenobiotics, which include both manmade chemicals such as drugs industrial chemicals pesticides, pollutants pyrolysis products in cooked foods, alkaloid secondary plant metabolites, and toxins produced by moulds, plants and animals. Poisons are any agent capable of producing a deleterious response in a biological system, seriously injuring function or producing death. Toxicologists usually divide that exposure of animals into four categories which are acute, sub-acute, sub-chronic, chronic toxicity.[1-3] *Cissus quadrangularis* is a widely used folk and ayurvedic system of medicines[4]. The review presents a detailed survey of the literature on chemistry and medicinal properties of *C.quandrangularis*. The chemical constituents reported from this plant belong to different classes such as alkolloids, diterpinoid lactones glycosides, steroids, sesquiterpinoid, phenolics, aliphatic compounds and polysaccharides[5-6]. The notable medicinal properties reported are anti-osteoporotic activity, Antioxidant activity, anti-inflammatory, Antiulcer activity, Anabolic and androgenic activity, anti microbial and antibacterial activity, bone healing activity, Central nervous system activity, Antihemorrhoidal activity, anti-obesity property, proteolytic activity[7]. Toxicity is the fundamental science of poisons. The organization for economical and cooperation development (OECD) mentioned acute toxicity as the advance effect occurring within a short time of oral administration of a simple dose of a substance or a multiple doses given within 24 h. phytochemical interactions of poisons leads to injury or death of living tissues. Toxicology is like science and an art like medicine. It includes observational data gathering and data utilization to predict outcome of exposure in human and animals[8-11]. The aim of the present work is to study the toxicity nature of the *C.quandrangularis* aqueous extract of whole plant powder.

Materials and Methods:

C.quandrangularis whole plant collects from Guntur, Andhra Pradesh, India. Herbarium of the plant was prepared authenticated form Department of Botany, ANU, Guntur, Andhra Pradesh, India. After collection of the required quantity of the plant material, it

was then carefully segregated, cleaned and dried in preset oven for few days at 45^{o}C. The completely dried plant material free of moisture was powdered and sieved through a BSS mesh No. 85 sieve and then stored in an airtight plastic container. Further air-dried powders (30g) of the resins were extracted with water for three days by using Sox let apparatus. After that the extracts were concentrated with rotary evaporator and dried in vacuum. The extract washed with 3N HCl and fractions were taken for study. The study protocol used for the study is given in Table-1

Table-1: study protocol

Name of the study	Acute toxicity study
Test material	*C.quandrangularis*
Animal model	Albino Swiss mice
Animal procured from	Chalapathi Institute of Pharmaceutical Sciences, Lam, Guntur, Andhra Pradesh.
Weight range of animals	23-30g
Sex	Female
Number of dose groups	Two groups for each
Animals per group	4
Route of administration	Intragastric administration with the help of oral gavage
Vehicle	Normal saline
Number of administrations	Single
Concentration of doses	Whole plant aqueous extract 50-3000mg/kg body weight
Study duration	Acclimatization for 14 days one day drug administration and 14 days observation period included.
Parameters observed	Case side observations, daily food and water intake, daily mortality record e.t.c.

Animal Maintenance:

All animals were housed in polyurethane cages. The cages were provided with wheat husk bedding and were cleaned daily. The animals were provided with drinking water *ad libitum* and were fed on commercially available mice feed supplied by Amrut feed. The feed was enriched with stabilized vitamins such as vitamin A and D_3, vitamin B_{12} , Thiamine, Riboflavin, folic acid and supplemented with all minerals and microelements. Measures quantity of water and feed was recorded from the amount of water left in the feeding bottles and from the amount of feed left in the feed hopper.

Cage Side Observation:

The examination of the behavior of animals was reported by recording general observations of each animal on the daily basis from the stage of dosing to the end of the study. Any changes or abnormalities recorded could be an indication of toxicity. The test animals at all dose levels of *C.quandrangularis* showed no significant changes in behavior before and after administration. Table-1 indicates the general cage side observations for all parameters studied. Table-2 shows the mortality record for aqueous extract of *C.quandrangularis*.

Body Weight Changes:

Body weight is an important factor to monitor the health of an animal. Loss in body weight is frequently the first indication of the onset of an adverse effect, a dose, which causes 10% or more reduction in body weight, is considered to be a toxic dose. It is considered to be the dose, which produces minimum toxic effect, irrespective of whether or not it is accompanied by any other changes. All the animals from treated groups did not show any with the zero day values. There was no significant change in food and water intake of the test animals at all a dose level of the extract. Table-3 shows changes in body weight for aqueous extract of *C.quandrangularis*.

Table-2: Examination of the behavior of animals

Note: - Normal (+), Absent (-)

Observations	Treatment Response									
	Control	50mg/kg	100mg/kg	200mg/kg	500mg/kg	1000 mg/kg	1500 mg/kg	2000 mg/kg	2500 mg/kg	3000 mg/kg
Consciousness	+	+	+	+	+	+	+	+	+	+
Grooming	-	-	-	-	-	-	-	-	-	-
Touch response	+	+	+	+	+	+	+	+	+	+
Sleep duration	+	+	+	+	+	+	+	+	+	+
Moment	+	+	+	+	+	+	+	+	+	+
Gripping strength	+	+	+	+	+	+	+	+	+	+
Right reflex	+	+	+	+	+	+	+	+	+	+
Food intake	+	+	+	+	+	+	+	+	+	+
Water consumption	+	+	+	+	+	+	+	+	+	+
Tremors	-	-	-	-	-	-	-	-	-	-
Diarrhoea	-	-	-	-	-	-	-	-	-	-
Hyper activity	-	-	-	-	-	-	-	-	-	-
Pinna reflex	+	+	+	+	+	+	+	+	+	+
Salivation	+	+	+	+	+	+	+	+	+	+
Skin colour	+	+	+	+	+	+	+	+	+	+
Lethargy	-	-	-	-	-	-	-	-	-	-
Convulsions	-	-	-	-	-	-	-	-	-	-
Morbidity	-	-	-	-	-	-	-	-	-	-
Sound response	+	+	+	+	+	+	+	+	+	+

Table-3: Changes in body weight

Group	Body Weight of Mice			
	Initial	**After 5 Days**	**After 10 Days**	**On 15th Day**
Control	26.2±0.23	28.42±0.35	32.64±1.52	35.28±3.06
50mg/kg	25.67±0.8	27.84±0.61	32.51±0.91	34.82±1.09
100mg/kg	24.27±0.51	26.94±1.06	30.84±0.3	33.50±0.66
200mg/kg	25.18±0.26	27.74±0.59	29.96±0.25	34.03±1.76
500mg/kg	24.96±1.29	27.18±0.35	30.56±0.54	33.68±0.10
1000mg/kg	25±0.37	26.83±0.5	29.83±0.32	34.13±0.08
1500mg/kg	26.12±0.46	28.03±1.79	30.26±2.38	34.04±0.02
2000mg/kg	26.29±0.09	28.49±0.66	30.97±0.41	33.57±0.14
2500mg/kg	24.96±0.62	27.05±1.51	31.62±4.33	34.64±0.54
3000mg/kg	24.28±0.25	28.94±0.63	31.04±0.89	33.94±2.64

Mortality:

Mortality is the main criteria in assessing the acute toxicity (LD_{50}) of the any drug. There was no mortality recorded even at the highest dose level i.e. 3000mg/kg for extract of *C.quandrangularis*.Table-4 shows the mortality record for aqueous extract of *C.quandrangularis*.

Table-4: Mortality record

Group	Control	50 mg /kg	100mg /kg	200mg /kg	500mg/ kg	1000 mg/kg	1500mg/ kg	2000 mg/kg	2500mg/kg	3000 mg/kg
Hr-1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Hr-2	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Hr-3	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Hr-4	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-2	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-3	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-4	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-5	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-6	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-7	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-8	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-9	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-10	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-11	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-12	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-13	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Day-14	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Mortality	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**	**0/4**

Conclusion:

The acute toxicity study of *C.quandrangularis* was carried out on the Swiss albino mice with a dose of 50-3000 mg/kg extract orally. The single administration exposure of the *C.quandrangularis* in the form of aqueous slurry was carried out and exposure route was oral with water as a vehicle. From the result of this study, it is observed that there is no change in body weight, food and water consumption by the animals from all dose groups. There was no mortality recorded even at the highest dose level i.e. 3000 mg/kg for extract of *C.quandrangularis.* The observations of changes in body weight, food and water intake as well as cage side observations were reported. There is no any sign of toxicity. There was no mortality recorded even at highest dose level of plant material.

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