Research Article

Toxicity Studies of the Glucosamine Sulfate Capsules

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INTRODUCTION

Toxicology is the science of the adverse effect of chemicals on living organisms. Toxicity study aims at discerning the complications arising from the pharmacological action of the drugs. Special care should be taken to the solvent (or) dispersing agent of the drugs as the toxic effect may arise from the solvent as well so, here we have performed the control test animal care during the time of toxicity study is also of paramount importance.

The newly formulated anti-arthritic capsule powder was screened for the following

1. LD 50 study
2. Acute toxicity study
3. Subacute toxicity study

To determine the toxicity study the healthy albino mice were selected. Each weight of the mice was 25g.

1) **Methods adopted for LD50 determination**

LD50 is lethal dose required to kill 50% of the test population is an index of safety of test formulation.

Experimental groups

For determination of LD50, 6 groups of each of albino mice of either sex whose average weight was about 25gms were selected and fasted overnight before testing.

Route of administration

The glucosamine sulfate powder mixed in distilled water and forced per orally using oral canula.

Dose level

The dose of 3.125mg, 6.25mg, 12.5mg, 25.0mg, 50mg, 100mg/mice was administered by orally for each group animals. The dose up to 100mg/mice by orally administered.

Treatment period

The incidence of any abnormally (or) death was noted in the orally fed animal over a period of 24hours the behaviors of the animal were also observed.

The animal were sacrificed at the end of 24hours by cervical dislocation. Vital organs were observed for any toxic symptoms and rewarded in post mortem report.

1) Method adopted for determining acute toxicity

The purpose was to determine lethality of agent as well as to again other information on its acute toxicity. Acute toxicity has been defined as the adverse effect appearing with in and short time following the administration of a single dose of a substance.

Experimental group

Fifteen albino mice of either sex, whose average weight 25g were selected, out of this five animals (group) were treated as control group balance 10 animals were divided into 5 animals each as group II and group III.

Route of administration

The glucosamine sulfate powder mixed in distilled water and forced per orally using oral canula.

Dose levels

Two dose levels of 10 times. (6.25mg/mice/day/p.o) and 20 times 12.5mg/mice/day/p.o) of the therapeutic dose was administered to group II and group III animal as single dose.

Treatment period
The orally fed animals were observed after 7 days of the single dose administration to check for any signs of abnormality and behavior changes when compared with control animals and the same was recorded in behavior data sheet.
At the end of 7 days the animal were killed and by cervical dislocation the vital organs were examined for any signs of toxicity and abnormalities which were recorded in the post mortem report.

2) Methods adopted for determining sub acute toxicity
The purpose of the study was to evaluate the toxicity of the product which may occur in the animals during the chronic administration of the test agents.

Experimental groups
Fifteen albino mice of either sex average weight 25g were selected out of this five animal (group I) were treated as control group while group II and III served as test groups.

Route of administration
The glucosamine sulfate powder mixed in distilled water and forced per orally using oral canula.

Dose levels
Two dose levels of 10 times (6.25mg/mice/day/p.o) and 20 times (12.5mg/mice/day/p.o) of the therapeutic dose was administered to group II and group III animals.

Treatment period
The animal were fed orally with the drug for 14 days and the animals were observed up to 21 days after administration of the drug.
At the end of 21 days the animals were killed and cervical dislocation. The vital organs were examined for any toxic symptoms and abnormalities which was recorded in the postmortem report.

Table : Glucosamine sulfate capsules LD50 behavior of mice

S.No.	Behaviour	Control group of animals	Test group of animals
1	Alertness	Normal	Normal
2	Passive/Active	Active	Active
3	Grooming	Normal	Normal
4	Restlessness	Absent	Absent
5	Aggressiveness	Normal	Normal
6	Touch response	Normal	Normal
7	Pain response	Normal	Normal
8	Tremors	Absent	Absent
9	Convulsions	Absent	Absent
10	Righting reflex	Normal	Normal
11	Gripping strength	Normal	Normal
12	Pinna reflex	Normal	Normal
13	Corneal reflex	Normal	Normal
14	Writhing	Absent	Absent
15	Pupils	Normal size	Normal size
16	Urination	Normal	Normal
17	Salivation	Normal	Normal
18	Skin colour	Normal	Normal
19	Lacrimation	Absent	Absent
20	Respiration	Normal	Normal

Acute toxicity study

Acute toxicity study was done by administration of the glucosamine sulfate capsule dose as 10 times. (6.25mg/mice/day/p.o) and 20 times (12.5mg/mice/day/p.o) therapeutic dose level. After 7 days the animals were observed for any signs of toxicity or abnormalities of vital organs. At both the dose levels tested, no deviation from the normal behavior was exhibited by the mice during the entire period of study (7days).

The animals were observed for 7 days and were normal when compared to the control group, which indicates the safety of the glucosamine sulfate formulation.

The behavior exhibited by control (I) group II, & group III animal during the 7 days. Acute study is given in the table.

Table : Acute toxicity study-behavior of mice

S.No.	Behavior	Control group of animals	Test group of animals
1	Alertness	Normal	Normal
2	Passive/Active	Active	Active
3	Grooming	Normal	Normal
4	Restlessness	Absent	Absent
5	Aggressiveness	Normal	Normal
6	Touch response	Normal	Normal
7	Pain response	Normal	Normal
8	Tremors	Absent	Absent
9	Convulsions	Absent	Absent
10	Righting reflex	Normal	Normal
11	Gripping strength	Normal	Normal
12	Pinna reflex	Normal	Normal
13	Corneal reflex	Normal	Normal
14	Writhing	Absent	Absent
15	Pupils	Normal size	Normal size
16	Urination	Normal	Normal
17	Salivation	Normal	Normal
18	Skin colour	Normal	Normal
19	Lacrimation	Absent	Absent
20	Respiration	Normal	Normal

Acute toxicity study –data sheet

Drug : Glucosamine sulfate capsule
Species : Albino mice
Group no. : control (I)
Treatment period : 7
Dose : Nil
No.of animals : 5

Table : Control (body weight) (in grms)

	Days							Mean	±S.D
	1	2	3	4	5	6	7		
No marking	20.0	20.0	20.5	21.0	21.0	21.5	21.5	20.78	±0.636
Head	21.0	21.5	21.5	22.0	22.5	22.5	23.0	22.00	±0.707
Neck	21.0	21.0	21.0	21.5	22.0	22.0	22.5	21.57	±0.616
Back	22.0	22.0	22.0	22.5	22.5	23.0	23.5	22.50	±0.577
Tail	21.0	21.5	21.5	21.5	22.0	22.0	22.5	21.71	±0.487

Acute toxicity study – data sheet

Drug : Glucosamine sulfate capsules
Species : Albino mice
Group No. : II
Treatment period : 7 days
Dose : 6.25mg (10 times)
No.of animals : 5

Table : Body weight (in grms)

	Days							Mean	±S.D
	1	2	3	4	5	6	7		
No marking	21.0	21.5	21.5	22.0	22.5	22.5	23.0	22.0	±0.707
Head	21.0	21.5	22.5	22.5	22.5	23.0	23.5	22.28	±0.895
Neck	22.0	22.0	22.5	23.0	23.0	23.5	23.5	22.78	±0.646
Back	21.0	21.0	21.5	22.0	23.0	23.0	24.0	22.21	±1.149
Tail	22.0	22.5	22.5	23.0	23.5	23.5	24.0	23.00	±0.816

Acute toxicity study – data sheet

Drug : Glucosamine sulfate
Species : Albino mice
Group No. : III
Treatment period : 7 days
Dose : 12.5 mg (20 times)
No.of animals : 5

Table : Body Weight (grms)

	Days							Mean	±S.D
	1	2	3	4	5	6	7		
No marking	22.0	22.5	23.0	23.5	24.0	24.5	25.0	23.50	±1.108
Head	21.0	21.5	22.0	23.0	23.5	23.5	24.0	22.64	±1.025
Neck	22.0	22.5	22.5	23.0	23.5	23.5	24.0	23.00	±0.70±7
Back	23.0	23.5	24.0	24.5	24.5	25.0	25.5	24.28	±0.859
Tail	21.0	21.5	22.0	22.5	23.0	23.5	24.0	22.50	±1.080

Table : Acute toxicity study – postmortem report of vital organs

Vital organs	Control group-I animals					Group-II animals					Group- III animals				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Heart	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lungs	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Liver	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Kidney	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Spleen	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Stomach	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Intestine	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N = Normal

On macroscopic observation of the vital organs of Group II and Group III when compared to the control group I, it was found that there was no remarkable difference indicating the non-toxic property of the newly formulated glucosamine sulfate on acute administration.

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