

## STUDY OF THE EFFICACY OF DHANYAKA (CORIANDRUM SATIVUM) WITH SITA (SUGAR CANDY) AND DADHI (CURD) IN JAYPAL (CROTON TIGLIUM) POISONING IN ALBINO MICE

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### ABSTRACT

According to Ayurved, *Jaypal (Croton tiglium)* is one of the *upvisha* and after consuming it poisonous signs and symptoms occurs. In Ayurvedic texts, there are many formulations containing *Jaypal (Croton tiglium)* which were used as medicines. Even though these formulations are useful as medicines for diseases, unexpected poisoning may occur due to improper purification of the *Jaypal (Croton tiglium)* or due to its overdose. *Dhanyaak (Coriandrum sativum)* pestle with *Sita (Sugar candy)* and *Dadhi (Curd)* is mentioned as antidote for *Jaypal (Croton tiglium)* poisoning in *Rasjalnidhi*. So, to evaluate the efficacy of this yoga against *Jaypal (Croton tiglium)* poisoning in Albino mice, present study was taken for research work. Dose of *Jaypal (Croton tiglium)* was decided by LD50 method. Mice were observed for 14 days, in both groups for signs like drowsiness, distension of abdomen, tremors, excessive salivation, watery stool & death. From this study it can be stated that *Dhanyaka (Coriandrum sativum)*, *Sita (Sugar candy)*, *Dadhi (Curd)* is useful in *Jaypal (Croton tiglium)* poisoning because it delays the onset of signs & survival period in *Jaypal (Croton tiglium)* poisoning.

**Keywords:** *Jaypal (Croton tiglium)* poisoning, *Dhanyaka (Coriandrum sativum)*, *Sita (Sugar candy)*

### INTRODUCTION

According to Bhavprakash Nighantu, if *Jaypal (Croton tiglium)* is taken in excessive quantity then signs and symptoms occurs like *Daha*, *Udarshool*, *saraktadra-vamalpravrutti*.<sup>[1]</sup> According Modern science *Jaypal (Croton tiglium)* is included as an Irritant organic vegetable poison.<sup>[2]</sup> *Jaypal (Croton tiglium)* causes blistering externally, and on ingestion causes severe gastrointestinal irritation with burning pain in the abdo-

men, vomiting, powerful purging, and frequently a burning pain in the anus. In substantial dosage, collapse precedes death.<sup>[3]</sup> In *Rasajalanidhi*, an ancient text of *Rasshastra*, in the Eighth chapter of *Trutiya Khanda* it is stated that *Dhanyaka (Coriandrum sativum)* pestle with *Dadhi (Curd)* and *Sita (Sugar candy)* acts as antidote of *Jaypal (Croton tiglium)* poisoning.<sup>[4]</sup>

In Ayurvedic texts, there are many formulations containing *Jaypal (Croton tiglium)* which are used as medicines. Even though these formulations are useful as medicines for diseases, unexpected poisoning may occur due to improper purification, due to accidental use of this medicine or due to its overdose. Therefore, it may often results person's life in danger. When *Jaypal (Croton tiglium)* poisoning occurs, there must be an effective antidote. *Dhanyak (Coriandrum sativum)* pestle with *Sita (Sugar candy)* and *Dadhi (Curd)* is mentioned as an effective antidote for *Jaypal (Croton tiglium)* poisoning in Rasjalnidhi. As its all contents are easily available, and frequently used in the kitchen, did not need any specialized technique for its formation & administration, this *yoga* was selected for the study in Albino mice.

**Aim:** To study the efficacy of *Dhanyak (Coriandrum sativum)* pestle with *Sita (Sugar candy)* and *Dadhi (Curd)* in *Jaypal (Croton tiglium)* poisoning.

**Objectives:**

- To study the signs produced by *Jaypal (Croton tiglium)* poisoning.
- To assess changes in signs of *Jaypal (Croton tiglium)* poisoning in Albino mice after using *Dhanyak (Coriandrum sativum)* pestle with *Dadhi (Curd)* and *Sita (Sugar candy)*.
- To record any other effects of this antidote if occur during treatment.

**Materials and Methods:**

**A. Collection of the raw materials:**

- *Jaypal (Croton tiglium)* seeds were collected from standard Ayurvedic pharmacy, which were having good quality, clean and non-infected.
- *Dhanyaka (Coriandrum sativum)* which having good quality, was procured from market.
- *Sita (Sugar candy)* was collected from market.
- Fresh *Dadhi (Curd)* was also purchased from market.

**B. Authentication & Standardization of the drugs:**

It was conducted in the standard laboratory of Smt. Kashibai Navale College of Pharmacy, Pune.

**C. Method of preparation:**

- **Preparation of *Jaypal (Croton tiglium)* churna:** *Jaypal (Croton tiglium)* seeds were placed in grinder for grinding. As *Jaypal (Croton tiglium)* seeds contain oil it was hard to make dry *churna*. After grinding, this material was pestle in *khala*, for making uniform and fine paste. Thus, fine material of *Jaypal (Croton tiglium)* seed powder was obtained.
- **Preparation of *Dhanyaka (Coriandrum sativum)* churna:** *Dhanyaka (Coriandrum sativum)* were placed in grinder for grinding. After this, powder was collected and sieved with 100 no. mesh. In this way fine powder of *Dhanyaka (Coriandrum sativum)* was obtained.
- **Preparation of *Sita (Sugarcandy)* churna:** *Sita (Sugar candy)* was placed in grinder for grinding. After that, *churna* of *Sita (Sugarcandy)* was obtained.
- **Preparation of *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)* and *Dadhi (Curd)* yoga:** First *Dhanyak (Coriandrum sativum)* *beeja-churna* and *Sita (Sugarcandy)* *churna* were taken of same quantity. *Dadhi (Curd)* was added in this mixture and pestle these three for making uniform material.

**D. Acute Toxicity Study:**

The acute Toxicological study was conducted as per the protocol approved by the Institutional Animal Ethics Committee. IAEC approval number is RP 25/1415 dated 25/07/2014.

Study was done in two steps:

**I) Determination of Dose of *Jaypal (Croton tiglium)* poison by LD50 method:**

The dose used in each step was as per the OECD Guidelines No. 423 for acute oral toxicity study. Animals were divided in two groups, consisting 6 animals, three males and three females each. Dose of *Jaypal (Croton tiglium)* was decided by LD50 method. *Jaypal (Croton tiglium)* was given to animals in loading dose of 2000mg/kg first group 1. And to that group 2, 1500mg/kg dose of *Jaypal (Croton tiglium)* was given. *Jaypal (Croton tiglium)* was in *churna* form, it was not possible to administer it in animals

directly. So distilled water was used to prepare the suspension of Jaypal (*Croton tiglium*) churna, which can be administered in the mice through the syringe with oral dosing needle.

**Study Design:**

1. Animal species used - Albino- mice
2. Place of experiment & animal - APT Centre
3. Sex of animals- 50% male and 50% female in each group.
4. Weight of mice- 20-40gms
5. Fasting period- One night
6. Temperature- 20<sup>0</sup> – 40<sup>0</sup>c
7. No. of animals- 12
8. No. of groups- 2
9. Vehicle- Water
10. Route of administration- Oral route

In every step animal were weighted, markings were done for identification and dose was calculated per kg of body weight.

**Marking of animals:**

The Albino mice were marked on head or tail or body by using picric acid, for identification and observation, during the experimental. For convenience of writing they were considered alphabetically or numerically in observation tables.

**Observations:** Animals, in both groups were observed during first 4 hours with special attention for immediate signs and daily thereafter for delayed signs up to 14 days. Mice were observed for 14 days, in both groups for following signs and symptoms:

1. Drowsiness.
2. Distension of abdomen.
3. Tremors.
4. Excessive salivation.
5. Watery stool.
6. Death.

**Dosage calculation of Dhanyak (Coriandrum sativum), Sita (Sugarcandy), Dadhi (Curd) yoga:**

The above reference of antidote was taken from Ras-jalnidhi text, but dosage was not explained in this text. In this formulation Dhanyak (*Coriandrum sativum*) and Sita (*Sugarcandy*) churnas were used. When there was no specific dose of churna mentioned then it should be taken in quantity of 1 Kol. And 1 Kol is half of 1 Tola. 1 Tola is 12 gm hence 1 Kol is 6 gm. In this formulation churna was taken 6 gm. According to 49<sup>th</sup>Shloka of First Adhyaya of purva Khanda of Sharangdhara Samhita when combination ratio not described then as per anukta paribhasha every drug was taken in equal quantity.<sup>[5]</sup> Hence to make churna of 1 kol, both dhanyak (*Coriandrum sativum*) and Sita (*Sugarcandy*) were taken 3gm each.

In this formulation Dadhi (*Curd*) also used as an anupana, as Dadhi (*Curd*) is Ahariya Dravya. Its specific matra is not mentioned. Hence it was taken in a quantity such as above churna should liquefy. When all the mixture was weighted it was 9 gm.

**Calculation:**

Human dose X conversion factor

Human Dose= 9 gm

Conversion factor for mice = 0.0026gms

After calculation dose of antidote was 1170mg/kg. It was dissolved in 10ml of water and the dose was given according to weight of mice in the form of suspension.

**II) Experimental Study:** Animal Study design was same as explained in the LD 50 study. Dosing groups were as follows.

Groups	Details	No. Of Animals
GROUP- 1	Jaypal ( <i>Croton tiglium</i> ) beejachurna was given in suspension form.	6
GROUP- 2	Jaypal ( <i>Croton tiglium</i> ) beejachurna given. After that Dhanyaka ( <i>Coriandrum sativum</i> ), Sita ( <i>Sugarcandy</i> ) and Dadhi ( <i>Curd</i> ) yoga was given.	6

**Procedure:**

- 1) Twelve Albino mice were randomly selected for this experiment. There were two groups having six mice in each group. Male female ratio was maintained equally.
- 2) All mice were weighted with digital weighing machine.
- 3) Calculated dose of Jaypal (*Croton tiglium*) churna was given orally in the form of suspension prepared by water.

- 4) After that *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)* and *Dadhi (Curd)* yoga was given orally in the form of suspension to animals of group 2.
- 5) All mice were observed for drowsiness, distension of abdomen, tremors, excessive salivation, watery stool and death.
- 6) All these observations were noted for every 15 min for each and every animal in both groups.
- 7) All observations were compared between two groups.
- 8) All data were tabulated in tables; time is noted in seconds and graph drawn.

#### **Observations:**

##### **Acute Toxicological study:**

##### **1) Observation after given loading dose of 2000mg/kg (Table no.1)**

As per observations in table no.1, it was seen that, in acute toxicity study at the quantity of 2000 mg/kg of *Jaypal (Croton tiglium)*, 4 animals died. Remaining 2 animals were alive during observation. 66% animal death occurred.

##### **2) Observation after given loading dose of 1500mg/kg (Table no.2)**

After this observation, resulted that, after dosing 2000mg/kg dosing, animals were died more than 50% and after dosing 1500mg/kg dosing, animals were died less than 50%; hence 2000mg/kg dose was decided as LD50 of *Jaypal (Croton tiglium)*.

##### **Observation of Experimental study:**

##### **Observation of Group 1: (Table No.3)**

All parameters were observed in all animals in Group no.1. During observation of parameters, time was noted in seconds in table no.3.

##### **Observation of Group 2: (Table No.4)**

All parameters were observed in all animals in Group no.2. During observation of parameters, time was noted in seconds in table no.4.

##### **Results:**

- 1) **Drowsiness(Graph No.1):**It was seen in Group 1 Males (average) after 2660sec. and that of in Group 2 Males (average) was after 3420 sec. Drowsiness was seen in Group 1 Females (aver-

age) after 2600 sec. and that of in Group 2 Females (average) was after 3260 sec.

- 2) **Distension of abdomen (Graph No.2):** It was seen in Group 1 Males (average) after 3900sec. and that of in Group 2 Males (average) was after 5613.33sec. Distension of abdomen was seen in Group 1 Females (average) after 4300 sec. and that of in Group 2 Females (average) was after 5613.33 sec.

- 3) **Tremors (Graph No.3):** Tremors were seen in Group 1 Males (average) after 3640sec. and that of in Group 2 Males (average) was after 4780sec. Tremors were seen in Group 1 Females (average) after 4480 sec. and that of in Group 2 Females (average) was after 5520 sec.

- 4) **Watery stool (Graph No.4):** Watery stool was seen in Group 1 Males (average) after 5100 sec. and that of in Group 2 Males (average) was after 6240 sec. Watery stool was seen in Group 1 Females (average) after 4760 sec. and that of in Group 2 Females (average) was after 5800 sec.

- 5) **Excessive salivation (Graph No.5):** Excessive salivation was seen in Group 1 Males (average) after 6900 sec. and that of in Group 2 Males (average) was after 8480 sec. Excessive salivation was seen in Group 1 Females (average) after 6700 sec. and that of in Group 2 Females (average) was after 7880 sec.

- 6) **Death (Graph No.6):** death was seen in Group 1 Males (average) after 9516.66 sec. and that of in Group 2 Males (average) was after 12600 sec. Death was seen in Group 1 Females (average) after 9833.33 sec. and that of in Group 2 Females (average) was after 13193.33 sec.

## **DISCUSSION**

*Jaypal (Croton tiglium)* is easily available all over in India. After purification of *Jaypal (Croton tiglium)* seed, it is used in many Ayurvedic formulations, like *Ichhabhedi rasa*, *Narach rasa*, *Jalodarari rasa*. These formulations are mostly used by many *Vaidyas* for treating patients.

If these *Jaypal (Croton tiglium)* seeds are used in impure form in formulation, then poisonous effects occur

on that patient. When *Jaypal (Croton tiglium)* poisoning occurs, an effective antidote is essential, that should be non-expensive, easily available even for common man.

In Ayurved, many antidotes are described. Reason of selection of this antidote is that, all the contents in this are easily available; there is no need of any specialist. All the content in this like *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* are easily available in kitchen of Indian peoples.

*Dhanyaka (Coriandrum sativum)* is *laghu, snigdha, madhur, tikta & kashay rasatmaka* and having *ushna-veerya*. In *Jaypal (Croton tiglium)* poisoning, there is *dah* and *udarshool*. *Dhanyaka (Coriandrum sativum)* alleviates *dah* and *udarshool* by its *gunas*. According to Modern science, *Dhanyaka (Coriandrum sativum)* acts like an antispasmodic and expectorant. Due to this action it helps to reduce abdominal pain occurs during *Jaypal (Croton tiglium)* poisoning.

As *Dadhi (Curd)* is *madhur vipakee, grahee*, it helps to reduce signs and symptoms of *Jaypal (Croton tiglium)* poisoning. According to modern science, *Dadhi (Curd)* is used in treatment of diarrhea and dysentery because it absorbs water from intestine and acts as a stool binder. This property of curd is very useful in *Jaypal (Croton tiglium)* poisoning.

*Sita (Sugar candy)* act as *raktapitta prashamana, trushna prashmana, daha prashmana*. As it is *vata-pitta shamaka*, it is useful in treating *murcha, klama & bhrama*. Due to these properties *Sita (Sugar candy)* plays very important role in *Jaypal (Croton tiglium)* poisoning.

Above three contents of antidotes counteract the signs and symptoms which are seen in *Jaypal (Croton tiglium)* poisoning due to their properties.

Animal experiment was done in two steps:

1) Determination of LD50 Value of *Jaypal (Croton tiglium)* poison: In this study, 4 mice were died out of 6 animals at 2000mg/kg i.e. 66% mortality seen and after 1500mg/kg dosing, 2 animals were died. Hence 2000mg/kg dose was finalized.

2) Experimental study to see the efficacy of *Dhanyaka (Coriandrum sativum)* pestle with *Sita (Sugarcandy)* and *Dadhi (Curd)* in *Jaypal (Croton tiglium)*

poisoning: *Churn matra* is 1 Kol, hence in this antidote; *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy) churna* was taken 1 kol, according to *anuk-tapramana* both were taken in equal quantity i.e. 3gm each. *Dadhi (Curd)* was taken to make that *churna* liquefy. That formulation was weighted as 9 gm. By using conversion factor of animal, dose was decided as 1170mg/kg. That formulation was dissolved in 10ml water and the dose was given according to weight of mice in the form of suspension.

There were two groups of animals. *Jaypal (Croton tiglium)* poison was induced into group 1 and *Jaypal (Croton tiglium)* poison and antidote was given to group 2.

In above groups, drowsiness, and distension of abdomen, tremors, watery stool, excessive salivation and death those parameters were observed. Reading of those observations was note down. Comparison of average reading was done of one group's male to another group's male and one group's female to one group's female.

After observation, it was seen that, time period of parameter in Group 2 was longer than that of Group 1.

- **Drowsiness (Table no.5):** In Group 1, appearance of drowsiness was observed after 2630 sec (average) and that of group 2 was after 3340 sec (average) i.e. Appearance of drowsiness was delayed by 710 sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.0253 (two tail).
- **Distension of abdomen (Table no.6):** In Group 1, appearance of distension of abdomen was observed after 4100 sec (average) and that of group 2 was after 5613.3 sec (average) i.e. Appearance of distension of abdomen was delayed by 1513.3 sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.025 (two tail).
- **Tremors (Table no.7):** In Group 1, appearance of tremors was observed after 4060 sec (average) and that of group 2 was after 5150 sec (average) i.e. Appearance of tremors was delayed by

1090sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.0298 (two tail).

- **Watery stool (Table no.8):** In Group 1 appearance of watery stool was observed after 4930 sec (average) and that of group 2 was after 6020 sec (average) i.e. Appearance of watery stool was delayed by 1090sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.0043 (two tail).
- **Excessive salivation (Table no.9):** In Group 1, appearance of excessive salivation was observed after 6080 sec (average) and that of group 2 was after 8180 sec (average) i.e. Appearance of excessive salivation was delayed by 2100 sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.0133 (two tail).
- **Death (Table no.10):** In Group 1 appearance of death was observed after 9675 sec (average) and that of group 2 was after 12897 sec (average) i.e. Appearance of death was delayed by 3222 sec (average); in *Dhanyaka (Coriandrum sativum)*, *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga group, which is statistically significant. P value is 0.0010 (two tail).

## CONCLUSION

Signs of *Jaypal (Croton tiglium)* poisoning were delayed with significant reduction in severity of poison and it has significantly increased the survival period. *Jaypal (Croton tiglium)* poisoning may be occurred accidentally or by eating overdose of *Jaypal (Croton tiglium)* seeds. This antidote is useful for such cases for reducing *Jaypal (Croton tiglium)* poisoning effect. Statistically it was concluded that Group 2 was significant, as compared with Group 1.

Hence efficacy of *Dhanyaka (Coriandrum sativum)* pestle with *Sita (Sugarcandy)*, *Dadhi (Curd)* yoga against *Jaypal (Croton tiglium)* poisoning is proved.

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## Tables

**Table 1:** Observation after given loading dose of 2000 mg/kg

Parameters	Male A	Male B	Male C	Female D	Female E	Female F
Drowsiness	50min	45min	80min	50min	-	-
Distension of Abdomen	65min	75min	96min	69min	90min	98min
Tremors	67min	80min	153min	75min	-	-
Excessive salivation	86min	152min	-	122min	-	-
Watery stool	70min	200min	230min	165min	152min	-
Death	120min	360min	320min	410min	-	-

**Table 2:** Observation after given loading dose of 1500 mg/kg

Parameters	Male G	Male H	Male I	Female J	Female K	Female L
Drowsiness	120min	80min	-	90 min	-	120 min
Distension of Abdomen	-	140min	-	120 min	-	142 min
Tremors	-	-	-	142 min	-	152 min
Excessive salivation	-	-	-	155 min	-	132 min
Watery stool	-	200 min	120 min	147 min	146 min	168 min
Death	-	-	-	205 min	-	251min

**Table 3:** Observation of Group 1: (Only Jaypal (*Croton tiglium*) churna)

Signs	Male A	Male C	Male F	Female B	Female D	Female E
Drowsiness	2700	2400	2880	3000	2700	2100
Distension of abdomen	3000	4200	4500	2700	4800	5400
Tremors	3720	3120	4080	3600	5040	4800
Watery stool	4800	5100	5400	4200	4320	5760
Excessive salivation.	6000	7200	7500	5700	7800	6600
Death	8050	9000	11500	8500	11100	9900

**Table 4:** Observations of Group 2: (Jaypal(*Croton tiglium*)churna + Dhanyaka (*Coriandrum sativum*)yog)

Sings	Male C	Male B	Male A	Female D	Female E	Female F
Drowsiness	3120	3840	3300	2700	3600	3480
Distension of abdomen	4680	6160	6000	4200	6560	6080
Tremors	5040	4020	5280	4920	6360	5280
Watery stool	6120	6000	6600	5520	5640	6240
Excessive salivation	7680	8760	9000	7200	8760	7680
Death	12000	11800	14000	12500	13000	14080

**Table 5:** Statistical Analysis: Drowsiness

Parameters	Group I	Group II
Standard Deviation (SD)	329.55	399.20
Standard Error (SE)	134.54	162.97
t value	2.628	

**Table 6:** Statistical Analysis: Distention of abdomen

Parameters	Group I	Group II
Standard Deviation (SD)	1050.7	941.37
Standard Error (SE)	428.95	384.31
t value	2.628	

**Table 7:** Statistical Analysis: Tremors

Parameters	Group I	Group II
Standard Deviation (SD)	737.46	753.63
Standard Error (SE)	301.06	307.67
t value	2.532	

**Table 8:** Statistical Analysis: Watery stool

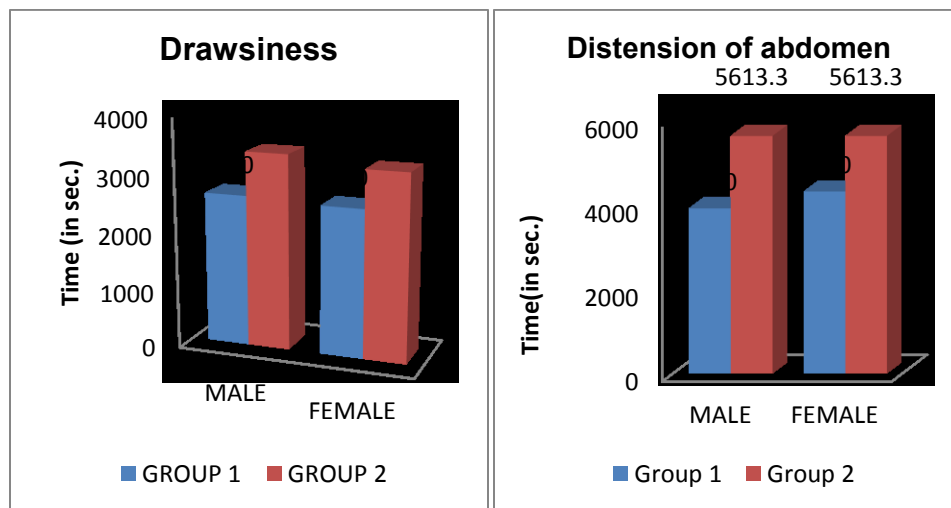
Parameters	Group I	Group II
Standard Deviation (SD)	610.02	397.39
Standard Error (SE)	249.04	162.23
t value	3.667	

**Table 9:** Statistical Analysis: Excessive salivation

Parameters	Group I	Group II
Standard Deviation (SD)	841.43	749.08
Standard Error (SE)	343.51	305.81
t value	3.001	

**Table 10:** Statistical Analysis: Death

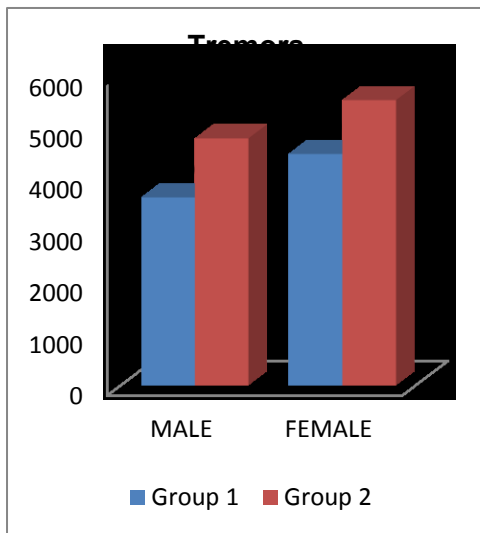
Parameters	Group I	Group II
Standard Deviation (SD)	1406.3	979.01
Standard Error (SE)	574.13	399.68
t value	4.605	



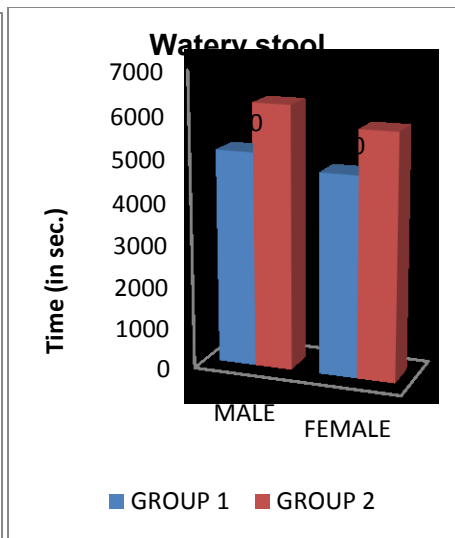
Graph 1

Graph 2

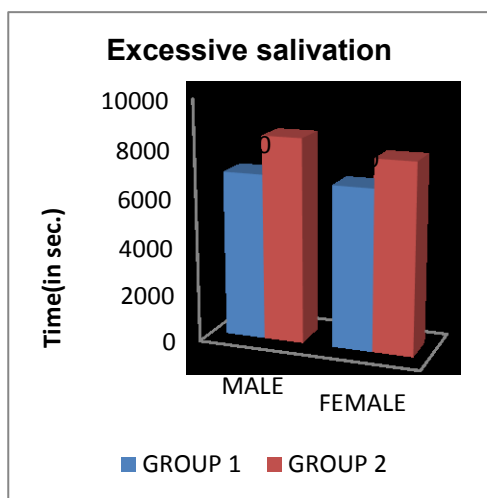




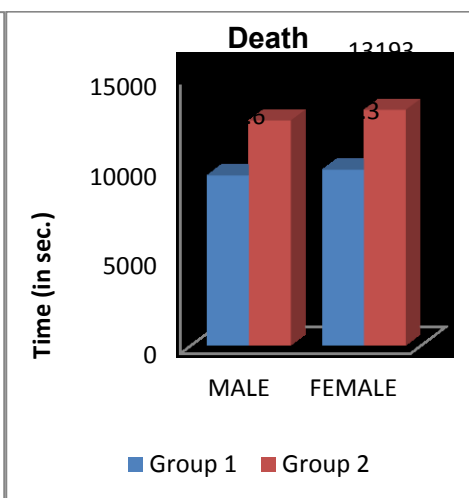
Graph 3



Graph 4



Graph 5



Graph 6

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**Conflict of Interest: None Declared**

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