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Evaluation of skeletal muscle activity of *Coffea arabica* leaves extract on isolated frog's rectus abdominus muscle

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Abstract

Skeletal muscle activity of *Coffea arabica* leaves extract was studied in the green frog (*Rana hexadactyla*) by the rectus abdominus muscle preparation. *Coffea arabica* leaves extract with distilled water 1μg/ml, 10μg/ml and 100μg/ml concentrations. The result indicated that the treatment of *Coffea arabica* leaves extract alone and combination with acetylcholine produce skeletal muscle activity. Thus from the present study it was concluded that *Coffea arabica* leaves extract have good skeletal muscle activity alone and in combination with Acetylcholine.

Keywords: Skeletal muscle activity, *Coffea arabica*, rana hexadactyla, acetylcholine

1. Introduction

Coffee is a brewed drink which is prepared from roasted and grinded coffee beans with or without the addition of water, milk, sugar and other ingredients. Coffee beans or seeds are obtained from coffee berries, which grow in coffee plants. Coffee plants are ever-green small shrubs that are native to Asia and Africa.

Different species of coffee plants are available, out of *which Coffea robusta, Coffee arabica and Coffea liberrica* enjoys economic importance. Out of the three, in southern part of India, *Coffea arabica* is cultivated. *Coffea robusta* is also cultivated in India but cultivation of *Coffea liberica* hasn't been so much popular since it gets too much affected by diseases. *Coffea robusta* yields lower quality beans than *Coffea arabica*, which is known for best quality coffee beans [1].

Top ten coffee producing countries are Brazil, Vietnam, Colombia, Indonesia, India, Ethiopia, Mexico, Guatemala, Honduras and Peru. The names of countries are listed in descending order according to coffee production, i.e., Brazil is the leading coffee producing country and India ranks fifth in coffee production [2].

The study was aimed at studying the effect of coffee leaves extract on skeletal muscle contraction by using the isolated Frog rectus abdominus muscle preparation.

2. Materials and methodology
2.1 Collection of plant material & preparation of plant extract:
The coffee plant leaves were collected at botanical garden, karimnagar. The plant extracts were prepared by mixing 100 g of crushed leaves with 100 ml water (aqueous) and this was left to stand for 16 hours {crushing fresh plant leaves using a pestle and mortar before extraction}. After 16 hours the soaked extracts were then be filtered through a fine cloth and centrifuged at 600 rpm for 10 minutes to produce 100% (neat) extract. 50% leaf extract was prepared by mixing one part neat extract with one part distilled water and 25% mixed at the ratio of 1 part neat extract to 3 parts distilled water [3]

Fig 1: Coffee plant leaves

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2.2 Effect of *coffea arabica* leaves extract (cle) on the skeletal muscle of the frog

This experiment was attempted to assess the effect of Hibiscus leaves extracts on the frog rectus abdominis muscle preparation. The experiment was carried as per method described by Kulkarni (The text book of experimental pharmacology).

Frogs weighing 20-25 gm were used in this study. The frog was stunned and decapitated and the spinal cord was destroyed. A frog was pithed and the skin of the anterior and abdominal wall was cut by a midline incision and then it was cut laterally to expose the anterior abdominal wall. The two rectus muscle were seen running from the base of sternum. The muscles were cut across just above the sternum at its base and the pair of muscles attached to it were dissected and transferred to a dish containing frog ringer solution at room temperature. The muscles were then carefully cleaned and one of them was trimmed to the desired size and mounted in an organ bath filled with ringer solution at room temperature and aerated by stream of fine bubbles emerging near the bottom of the bath. Isotonic contractions were recorded using gimbel lever with a sideways writing point. The lever was balanced for a tension of approximately 2-5 gm. An extra load of approximately 1gm on the long arm was supplied because some time the lever may not return to the base line after washing. The drug period allowed for stabilization was 30 min during which the muscle was subjected to 1gm stretch. At 0th min- the kymograph was started after raising the extra load; in the 1st min –the drug was added and in the 2nd min - the kymograph was stopped. The tissue was washed and allowed to relax by applying an extra load. At the 5th min- the lever point was brought to the base line and the next cycle was started. After recording the graded responses to different long dose of acetylcholine, the *Coffea arabica* leaves extract was added and their effect upon acetylcholine induced contraction as well as the effect of its own in the tissue was studied [4-12].

3. Results

Table 1: Skeletal muscle activity of Acetylcholine, d-tubocuraine, CLE, Acetylcholine+HLE

S.N O	Drug	Dose (µg/ml)	Height (mm)	Response
1	Acetylcholine	1	3	Increased
2	Acetylcholine	2	6	Increased
3	Acetylcholine	4	8	Increased
4	Acetylcholine	8	9	Increased
5	Acetylcholine	16	13	Increased
6	d-tubocuraine	4	-	-
7	CLE	1	3	Increased
8	CLE	10	6	Increased
9	CLE	100	9	Increased
13	Acetylcholine +	1	6	Increased
	CLE	1		
14	Acetylcholine +	1	9	Increased
	CLE	10		
15	Acetylcholine +	1	11	Increased
	CLE	100		

4. Discussion

The *Coffea arabica* leaves extract was found to have skeletal muscle activity with the concentration of 1µg/ml, 10µg/ml, and 100µg/ml.

When the activity was compared between the standard drug i.e, Acetylcholine and test drugs *Coffea arabica* leaves extract. The activity of the standard drug is more compare to test drugs and it is above reach with the standard drug.

The skeletal muscle activity was evaluated first by the acetylcholine of different doses like 1µg/ml, 2µg/ml, 4µg/ml, 8µg/ml and 16µg/ml and with d-tubocuraine of dose about 4µg/ml. The acetylcholine were activity by increasing the dose response whereas, the drug d-tubocuraine has shown no effect and no action it neither contraction nor depolarization because it inhibits muscular contraction by the application of acetylcholine.

Then skeletal muscle activity is evaluated by using test drugs *Coffea arabica* leaves extract of using different doses like 1ug/ml, 10ug/ml and 100ug/ml. For both the test drugs the response have been increased.

Thus, the present investigation proves that *Coffea arabica* leaves extract were have good skeletal muscle activity alone and combination with acetylcholine and it produces the significant skeletal muscle activity at high concentration.

5. Conclusion

The *Coffea arabica* leaves extract was found to good skeletal muscle activity with different concentrations. When the activity was compared between the standard drug i.e, acetylcholine and test drugs Hibiscus leaves extract. The activity of the standard drug is more compare to test drugs.

The skeletal muscle activity is evaluated by using test drugs Hibiscus leaves extract of using different doses like 1 g/ml, 10 g/ml and 100 g/ml. for both the tests drugs the response have been increased. The effect of acetylcholine and *Coffea arabica* leaves extract (CLE) were compared and the results show the more active response with the acetylcholine rather than the Hibiscus leaves extract.

This study finally concluded that the effect of *Coffea arabica* leaves extract and combination of *Coffea arabica* leaves extract and acetylcholine were shown good skeletal muscle activity.

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