International Journal of Pharmacy and Pharmaceutical Sciences
ISSN- 0975-1491 Vol 2, Issue 3, 2010

Research Article

SKELETAL MUSCLE ACTIVITY OF *CALOTROPIS GIGANTEA*

B. S. SHEELAA*[1], P. SAMPATHKUMAR[1], V.K. KALAICHELVAN[2]

[1] Faculty of Marine Science, Annamalai University, Parangipettai – 608 502, Tamil Nadu, India, [2] Department of Pharmacy, Annamalai University, Annamalai Nagar – 608 002, Tamil Nadu, India Email: sheelaa.biotech@gmail.com, sampathcas@gmail.com vkkalaichelvan@yahoo.co.in

Received: 24 March 2010, Revised and Accepted: 25 April 2010

ABSTRACT

Skeletal muscle activity of milky latex from *Calotropis gigantea* was studied in the green frog (*Rana hexadactyla*) by the rectus abdominis muscle preparation. The milky latex was diluted with distilled water T1 [1: 100], T2 [1:500] and T3 [1:1000] concentrations. The result indicated that the treatment of milky latex alone does not produce skeletal muscle activity. But significant result was produced when the milky latex was tested along with the standard drug acetylcholine (0.8ml + 0.8ml) rather than the result obtained when tested with acetylcholine alone. Thus from the present study it was concluded that higher the dilution, higher the relaxant property of skeletal muscle along with the standard drug acetylcholine.

Keywords: Skeletal muscle activity, *Calotropis gigantea, Rana hexadactyla,* Milky latex, Acetylcholine.

INTRODUCTION

Scientific interest in medicinal plants has burgeoned in recent times due to increased efficiency of new plant derived drugs and rising concerns about the side effects of conventional medicine. *Calotropis gigantea* belongs to the family asclepiadaceae commonly known as milkweed or swallow-wort in India. *C. gigantea* is a common wasteland weed found abundant throughout India right from Himalayas to southern India[3]. *C. gigantea* was regarded as a useful medicinal plant and used in folk medicine[1, 2]. Traditionally it is used for the treatment of different aliments in ayurvedic and unani systems of medicines. The plant has been known as "Vegetable Mercury" since it is used as a remedy for syphilitic affections, also advocated for a variety of diseased conditions including leprosy, ulcers, tumours and piles. The plant is reported to have diverse pharmacological actions like antifertility, cardiotonic, antimicrobial activities[4]. Thus the present investigation was carried out to evaluate the skeletal muscle potential of milky latex from *C. gigantea*

MATERIALS AND METHODS

Collection of milky latex

The milky latex was collected from the young stems of *C. gigantea* from Portonovo, Cuddalore district, Tamil Nadu (Lat. 11°37'30.42"N; Long. 79°43'39.32"E). Sterilized screw capped glass tubes, kept in hot air oven at 60°C for 12 h were used for collecting the milky latex. The young tender stem was cut opened and the drop of milky latex was collected carefully into the glass tube. The milky latex was collected approximately to 5 ml in the glass tube and kept in the refrigerator at -40°C until the experiment is started.

Preparation of extract

The latex oozing out from the plant was collected by making 'V' shaped incision on the branches of the plant, *C.gigantea*. The collected milky latex was diluted with distilled water T1 [1: 100], T2 [1:500] and T3 [1:1000] concentrations.

Effect of milky latex from *Calotropis gigantea* on the skeletal muscle of the frog

Since the antimigraine drugs were reported to have skeletal muscle activity, so this experiment was attempted to assess the effect of milky latex from *C. gigantea* on the frog rectus abdominis muscle preparation. The experiment was carried as per the method described by Kulkarni [5].

Frogs weighing 20-25 g 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 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 2-5g. An extra load of approximately 1g on the long arm was supplied because sometime the lever may not return to the base line after washing. The drug period allowed for stabilization was 30 minutes during which the muscle was subjected to 1g 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 log dose of acetylcholine, the test drug (milky latex) was added and their effects upon acetylcholine induced contractions as well as the effect of its own in the tissue was studied.

RESULTS AND DISCUSSION

The milky latex of *C. gigantea* was found to have skeletal muscle relaxant property at T1 (1:100), T2 (1:500) and T3 (1:1000), when tested along with acetylcholine. When the relaxant property was compared with the standard drug acetylcholine, the milky latex tested along with the acetylcholine produces more relaxant property than the standard drug acetylcholine (Table 1 & Fig. 1-2). Lesser the concentration of the test drug (milky latex) increases the responses of the skeletal muscle relaxant property. Maximum relaxant effect in T1 and T3 was found i.e. 22mm and 23mm at the dose of 16µg and T2 was 13mm at 2µg. Earlier studies have proved that chloroform extract of *Ervatamia crispa* and alcoholic extract of *Chonemorpha macrophylla* revealed skeletal muscle relaxant effect on an isolated frog rectus abdominis muscle preparation[6]. There are also results which indicate that the methanolic extract of *Clerodendron capitatum* roots does not produce blocking effect, since it fails to antagonize the stimulant effect of adrenaline, an adrenergic agonist[7], on isolated rabbit aortic strips. In addition, according to the earlier report the extract did not show any pharmacological activities on frog rectus abdominus muscles whereby, no contraction and relaxation or blocking properties towards acetylcholine induced contraction of the skeletal muscle were observed. Hence earlier report concludes that the methanolic extract of *Clerodendron capitatum* revealed no pharmacological activity (cholinergic and adrenergic agonism and antagonism) on both skeletal and smooth muscle of frog and rat respectively. Thus, the present investigation

proves that the milky latex of *C.gigantea* at higher dilution produces a significant skeletal muscle relaxant activity along with the standard drug acetylcholine. The result also shows that the milky latex possesses an excellent antagonistic property when compared to the standard drug and evidenced by earlier studies.

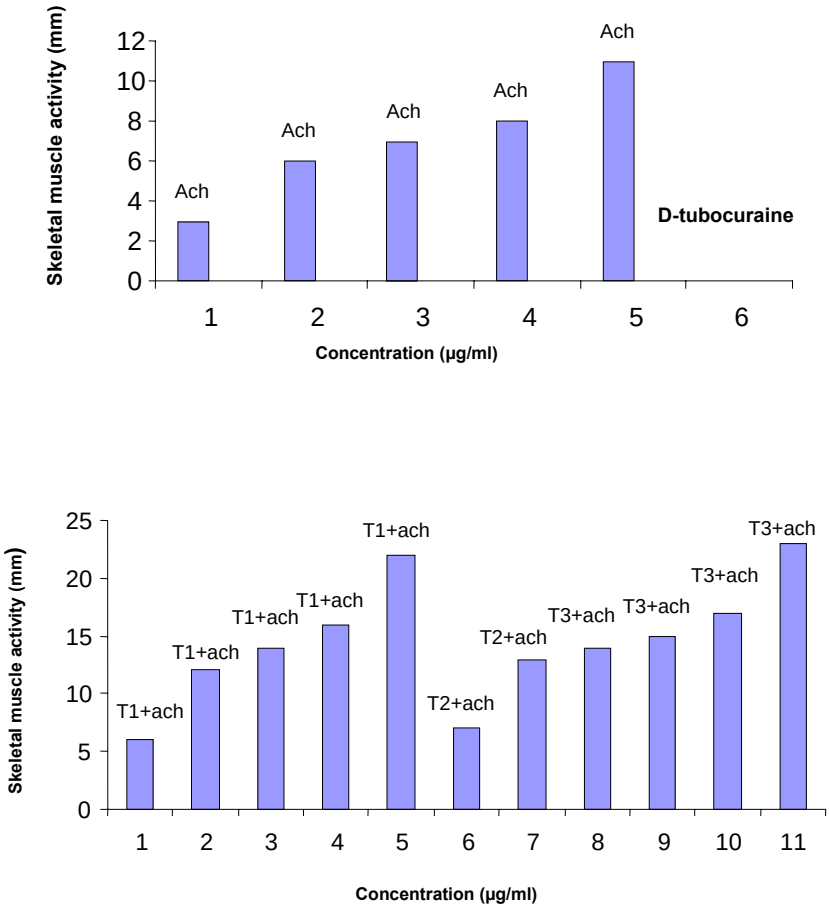

Fig. 1-2: Comparison of skeletal muscle activity of acetylcholine and test drug at different concentration

Table 1: Skeletal muscle activity of milky latex from *Calotropis gigantea*

Drug	Volume (ml)	Dose (µg)	Height(mm)	Responses
Acetylcholine	0.1	1	3	Increased
Acetylcholine	0.2	2	6	Increased
Acetylcholine	0.4	4	7	Increased
Acetylcholine	0.8	8	8	Increased
Acetylcholine	1.6	16	11	Increased
d-tubocuraine	0.4	4	-	-
T1 (1:100)	0.4	4	-	-
T1 + ach	0.1	1	6	Increased
T1+ach	0.2	2	12	Increased
T1+ach	0.4	4	14	Increased
T1+ach	0.8	8	16	Increased
T1+ach	1.6	16	22	Increased
T2 (1:500)	0.4	4	-	-
T2 + ach	0.1	1	7	Increased
T2 + ach	0.2	2	13	Increased
T3(1:1000) + ach	0.3	3	14	Increased
T3 + ach	0.4	4	15	Increased
T3 + ach	08	8	17	Increased
T3 + ach	1.6	16	23	Increased

ACKNOWLEDGEMENT

The authors are grateful to the Dean Prof. T. Balasubramanian, CAS in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu and heartfelt thanks to the Professor and head Dr.R.Manavalan, Department of Pharmacy, Annamalai University, Chidambaram for their encouragement and providing necessary facilities to carry out the research work sucessfully.

REFERENCES

1. Bhuyan DK. Herbal drugs used by the tribal people of Lohitdistrict of Arunachal Pradesh for abortion and easy delivery- a report. Adv Plant Sci 1994; 7: 197
2. Dhanukar KA, Kulkarni RA, Rege NN. Pharmacology of medicinal plants and national products. Indian J Pharmacol 2000; 32 : 81
3. Mueen Ahmed KK, Rana AC, Dixit VK. *Calotropis* Species (Ascelpediaceae) – A Comprehensive Review. Phcog. Mag 2005; 2 Suppl 1: 48
4. Mueen Ahmed KK, Rana AC, Dixit VK. Free radical scavenging activity of *Calotropis* species. Indian Drugs 2003; 40 Suppl 11: 54
5. Kulkarni SK. Handbook of experimental Pharmacology. 3 rd ed edition, New Delhi: Vallabh Prakashan; 1999.
6. Roy RK, Ray NM, Das A k. Skeletal muscle relaxant effect of chonemorpha macrophylla in experimental animals. Indian. J. Pharmacol 2005; 37: 116-119.
7. Pupo AS, Cavenaghi DL, Campos M, Lucena MP, Jurkiewicz NH Jurkiewicz A. Effects of indoramin in rat vas deferens and aorta: Concomitant alpha1-adrenoceptor and neuronal uptake blockade. Br. J. Pharmacol 1999; 127: 1832-1836.