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Evaluation of Skeletal Muscle Activity of Areca Catechu in Frog Rectus Abdominis

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ABSTRACT

Skeletal muscle activity of ethanol extract of areca catechu was studied in the green frog (Rana hexadactyla) by the rectus abdominis muscle preparation. The ethanol extract was diluted with distilled water T1 [1: 100], T2 [1:500] and T3 [1:1000] concentrations. The result indicated that the treatment of areca produce skeletal muscle activity. But significant result was produced when the milky latex was tested along with the standard drug acetylcholine (0.6ml + 0.6ml) 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

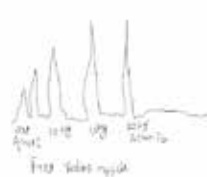
KEYWORDS Skeletal muscle activity, Areca catechu, Rana hexadactyla, Acetylcholine.

Introduction: Areca catechu is a medium-sized and palm tree, growing straight to 20 m tall, with a trunk 10–15 cm in diameter. The leaves are 1.5–2 m long, pinnate, with numerous, crowded leaflets. It is also known as puga in Sanskrit,"puwak" in sinhala and supari in Marathi and Gujarati. Normally areca catechu known as pinang tree in Malaysia. In Ayurvedic medicine betel nut is used as a diuretic, digestive, anthelmintic, astringent, and cardiotonic. The nuts are used in Traditional Chinese Medicine to treat diarrhoea, low blood pressure, slow heart rate, and other intestinal troubles. The leaves of the plant are consumed in Cambodia as a tea to treat lumbago and bronchitis. They use the root for liver disease and the fruit along with opium for the treatment of intestinal troubles. A. catechu is used as an abortifacient in Malaysia, and the young shoots and flowers are eaten as food. Betel nuts have been used as a narcotic (in the true definition of the word, not the connotation it now has) for thousands of years. The practice is thought to have started in south-east Asia and there is archaeological evidence to support this view. The Spirit Cave site in Thailand has yielded palaeobotanical remains of Areca catechu, Piper betel, and edible lime. As it is this combination that is still chewed today for its psychoactive properties, this find provides circumstantial evidence for the practice of betel chewing in prehistoric times. These remains are between 7,500 and 9,000 years old. If the dating is accurate, this would make betel one of the earliest known psychoactive substances to be used by humans.

The betel nut can cause black stained teeth and gums to those who chew it regularly, although it is excellent for maintaining a healthy digestive tract, especially in disease-ridden areas. However, it has been proposed that betel nut is a carcinogen, though this may be due to the common modern addition of tobacco products. Betel nut can also cause bronchoconstriction, and so should be avoided by asthmatics. The effects of betel nuts are stimulating and can be compared to a mild amphetamine dose. There is also an appetite suppressing effect. Betel nuts have a spicy taste, and large amounts of saliva are usually produced when chewing them. Overuse of betel nuts can cause a feeling of intoxication, convulsions, diarrhea, dizziness, or vomiting. After years of daily use, long term betel chewers will eventually develop a distinctive red stain of the mouth, teeth, and gums.

Fig.1.Seeds of Areca catechu

Fig.2.Skeletal muscle activity of areca



Materials and Methods:
Extract preparation:

The 100gms seeds were collected and dried up to make powder form.Test solution was prepared using ethanol as solvent.

Frog muscle preparation:
Frogs weighing 30- 35 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 0^{th} min - the ky-

mograph 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 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 areca catechu was found to have skeletal muscle contraction property at T1 (1:100), T2 (1:500) and T3 (1:1000), when tested along with acetylcholine. When the skeletal muscle contraction property was compared with the standard drug acetylcholine, the areca extract tested along with the acetylcholine produces more contractality property than the standard drug acetylcholine (Table 1 & Figure.2). Lesser the concentration of the test drug increases the responses of the skeletal muscle contractality. Maximum contractability effect in T1 and T3 was found i.e. 20mm and 21mm at the dose of 14µg and T2 was 13mm at 2µg. Thus, the present investigation proves that the areca extract at higher dilution produces a significant skeletal muscle contraction along with the standard drug acetylcholine. The result also shows that the areca extract possesses an excellent agonistic property when compared to the standard drug and evidenced by earlier studies.

Table.1.Comparision of skeletal muscle activity

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	14	12	Increased
d- tubocuraine	0.4	4	-	-
T1 (1:100)	0.4	4	-	-
T1 + ach	0.1	1	6	Increased
T1+ach	0.2	2	11	Increased
T1+ach	0.4	4	12	Increased
T1+ach	0.8	8	14	Increased
T1+ach	1.6	14	20	Increased
T2 (1:500)	0.4	4	-	-
T2 + ach	0.1	1	6	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	14	21	Increased

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