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"A REVIEW ON STUDY OF ANALGESIC ACTIVITY OF COLOCASIA ESCULENTA (LINN.) SCHOTT IN EXPERIMENTAL ANIMALS."

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ABSTRACT:

Colocasia esculenta Linn. Schott commonly called as Taro is cultivated in tropical and subtropical regions belongs to the family *Araceae.* The present study aimed to explore the analgesic activity of ethanolic leaves extract of *Colocasia esculenta Linn. Schott* using Hot plate, tail immersion, and acetic acid induced writhing model in mice. Intensive investigation on phytochemical constituents was done and found the presence of alkaloid, tannin and high amount of flavonoids. In this study, ethanolic leaves extract of *Colocasia esculenta Linn. Schott* at the dose of 100, 200 and 400 mg/kg was used and found significant (*p<0.05, **p<0.01 and ***p<0.001) analgesic activity which is highest at the dose of 400 mg/kg at reaction time 120 minutes in both hot plate and tail immersion model. The maximum inhibitory effect observed at the dose of 400 mg/kg in acetic acid induced writhing model. The present study concludes that this herbal medicine can be used as a painkiller.

KEYWORDS: *Colocasia esculenta Linn. Schott*, Analgesic, Acetic acid induced writhing, phytochemical constituents.

1. INTRODUCTION:

Plants have been used as a potential source of medicine, due to an enormous diversity of bioactive compounds. Many of the plants used in the traditional medicine to alleviate the common ailments and to promote a healthy life [1,2]. It was observed that it has antitumoral, antimutagenic, Immunomodulatory, anti-inflammatory, antioxidant, anti-hyperlipidemic, anti-hyperglycemic, antifungal, Antidiabetic, hepatoprotective, anthelmintic activity [3,4]. World Health Organization (WHO) mentioned that 80% of the world populations are dependent on the traditional medicine. India possesses well knowledge of the traditional medicine and practices it since ancient times [5]. In recent years, increased attention towards the use of herbal drugs has been observed throughout the world [6]. Studies have shown that opiates cause physical dependency, tolerance, and addiction while NSAIDs usually cause gastrointestinal disorders. Herbal therapy could be an interesting option for treatment of opioids dependence and withdrawal. There is enormous development in pain therapies; the medicinal community still needs safe, effective and potent analgesic drugs for the treatment of different painful conditions [7]. The aim of the present study was to evaluate scientifically the analgesic activity of *Colocasia esculenta Linn. Schott.*

1.1. Analgesic: [8,9]

Agents which selectively relieve pain by acting in the central nervous system or peripheral pain mechanisms without significantly altering consciousness.

Analgesics relieve pain as a symptom, without affecting its cause. They are used when noxious stimuli cannot be removed.

Analgesia is an ill-defined, unpleasant sensation, usually evoked by an external or internal noxious stimulus.

1.2. Plant Profile:

Colocasia esculenta (Linn.) Schott is a tropical plant grown primarily for its edible corms, a root vegetable most commonly known as Taro [10]. It is major root crop belongs to the family *Araceae*, sub family *Aroideae.*

It is wetland herbaceous perennial plant found in tropical and sub tropical regions most extensively cultivated in Southeast Asia by several common names like arbi, arvi and eddode. [11]

The plant has rhizomes of different shapes and sizes. Leaves are upto 40cm x 24.8cm dark green above and light green beneath. They are triangular – ovate, sub-rounded and mucronate at the apex, with the tip of the basal lobes rounded or sub-rounded. The lamina is narrowly lanceolate, convolute, acuminate and curved slightly backward in flower. Spadix is shorter than the petiole and much shorter than the spathe and appendix is much shorter than the inflorescence. [12]

Female inflorescence is short but the male inflorescence is long, cylindrical, and usually interposed neuters between the two. Male flower has 3-6 androus, female flowers have 3-4 gynous ; ovary ovoid or oblong. The stem is slightly swollen at the base of the leaf sheath.

Moreover, the leaves, leaf stalks and petioles are also used as vegetable. It is often referred to as "elephant ears" they can reach upto 1-2 m height during the growth period. [13]

Figure no. 2: *Colocasia esculenta Linn. Schott*

Geographical Distribution: [17]

It is wild plant and cultivated throughout the hotter parts of India and Ceylon. It is cultivated in all hot countries.

Taxonomy Classification: [14]

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Super division: Spermatophytes
- Division: Magnoliophyta
- Class: Liliopsida
- Subclass: Arecidae
- Order: Arales
- Family: Araceae
- Genus: Colocasia Schott
- Species: Colocasia esculenta

Binomial name: *Colocasia esculenta (L.) Schott*

Vernacular Names[14]

- English : Taro
- Hindi : Arvi, Kachalu
- Sanskrit : Alupam, Alukam
- Marathi : Alluu
- Gujarati : Aalavi, Patarveliya
- Bengali : Alti Kachu, Kachu
- Kannada : Kesavedantu
- Malayalam : Chempu, Madantha, Chempakizhnna
- Tamil : Sempu

Cultivation and Collection: [15]

Taro can be grown in paddy fields where water is abundant or in upland situations where water is supplied by rainfall or supplemental irrigation. Taro is one of the few crops (along with rice and lotus) that can be grown under flooded conditions. This is due to air spaces in the petioles, which permit underwater gaseous exchange with the atmosphere. Warm, stagnant water caused basal rooting. For maximum yields, the water level should be controlled so that the base of the plant is always under water.

Flooded cultivation has some advantages over dry land cultivation: higher yields, out-of-season production and weed control. On the other hand, in flooded production systems taro requires a longer maturation period, investment, infrastructure and higher operational costs.

The crops do well in deep, moist or even swampy soils where the annual rainfall exceeds 2,500mm. It attains maturity within 6-12 months and 12-15 months after planting in dry land cultivation and wet land cultivation respectively.

Collection:

The crop is harvested when the plant height decreases and the leaves turn yellow. These signals are usually less distinct in flooded taro cultivation. Harvesting is usually done by hand tools, even in mechanized production system. First, the soil around the corm is loosened and then the corm is pulled up by grabbing the base of the petioles.

The global average yield is 6.2 tons per hectare but varies according to the region. In Asia, average yields reach 12.6 t/ha.

Phytochemistry: [16]

Mainly leaves contain calcium oxalate, fibers, minerals (calcium phosphorous, etc.), starch, vitamin A, B, C etc. Phytochemically, these also contain flavones, apigenin, luteolin and anthocyanins. The isolated flavonoids contain vicenin-2, iso-vitexin, iso-vitexin 3'-O-glucoside, vitexin X''-O-glucoside, iso-orientin, orientin,

orientin 7-O-glucoside, luteolin 7-O-glucoside. It also contains tarin, alkaloid, saponin, tannin, polyphenols, polysaccharide (arabinogalactan).

Colocasia esculenta Linn. Schott tubers contain globulins accounting for 80% of the total tuber proteins.

Taro corms have been reported to have 70-80% starch with small granules.

The high level of carbohydrate content observed in raw taro, taro powder and total amino acids recorded in the tubers are in the range of 1380-2397 mg/100g.

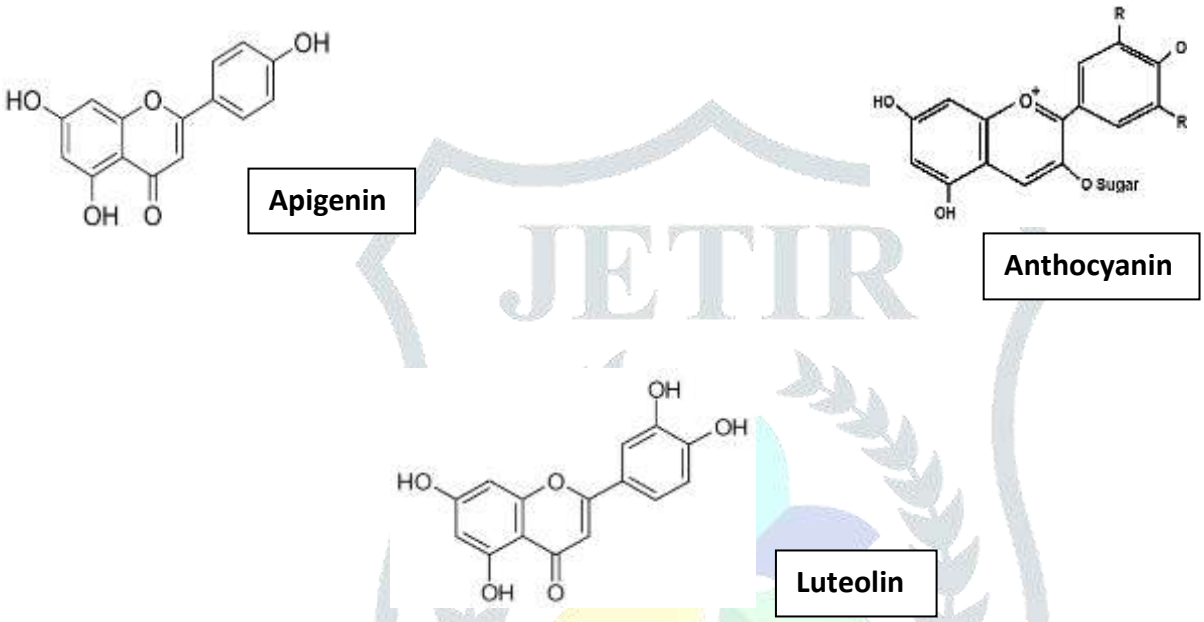

Figure no.3: Structure of chemical constituents of *Colocasia esculenta Linn. Schott*

PHARMACOLOGICAL STUDIES:

- **Hot plate method:**

In this method heat is used as a source of pain. Animals are individually placed on hot plate maintained at constant temperature (55° C) and the reaction of animals, such as paw licking or jump response is taken as the end point. Analgesics increase the reaction time.

The analgesic activity of ethanolic leaves extract of *Colocasia esculenta Linn. Schott* was assessed at 100, 200 and 400 mg/kg. Analgesic activity was compared with standard drug pentazocine. Among all three doses 400 mg/kg showed maximum analgesic activity at reaction time 120 min (9.3 ± 0.05) which is slightly lower than the standard drug pentazocine (9.7 ± 0.15), it prolonged the reaction time of animals with relatively extended duration of stimulation, confirming centrally active drug. In the present study, all ethanolic extracts showed significant (*p<0.05, **p<0.01 and ***p<0.001) analgesic activity.

- **Tail immersion method:**

The use of immersion of the tail is apparently a variant of the tail flick model. The most obvious difference is that the area of stimulation is far greater. Immersion of an animal's tail in hot water provokes an abrupt movement of the tail and sometimes the recoiling of the whole body. Again, here it is the reaction time that is measured.

There was a significant (*p<0.05, **p<0.01 and ***p<0.001) reduction of pain full sensation due to tail immersion in warm water. Among all three doses, maximum analgesic activity observed at the dose of 400 mg/kg at 120 min (4.3±0.03) which is slightly lower than the standard drug pentazocine (5.9 ± 0.05)

- **Acetic acid induced writhing:**

Painful reactions in animals may be produced by chemical also. Intraperitoneal injection of phenylquinone, bradykinin or acetic acid produces pain reaction which is characterized as a writhing response. Abdominal constriction, turning of trunk (twist) and extension of hind legs (stretching) responses by the animal are taken as reaction to chemically induced pain. Analgesics, both narcotic and non-narcotic type, inhibit writhing response.

The ethanolic leaves extract of *Colocasia esculenta Linn. Schott* showed reduction in writhing at the dose of 100, 200 and 400 mg/kg as (4.6 ±0.51, 4.4±0.37 and 4.1±0.40) respectively. Injection of acetic acid into control mice produced 5.8± 0.51 writhes. Among all three doses maximum inhibitory effect was observed at 400 mg/kg (29.31%) which is slightly lower than the standard drug Diclofenac sodium (31.03%).

CONCLUSION:

The present thesis entitled "Study of analgesic activity of Colocasia *esculenta (Linn.) Schott* in experimental animal" deals with the exploration of phytochemical and pharmacological screening of the selected Indian medicinal plant *Colocasia esculenta (Linn.) Schott* belongs to the family *Araceae.* This review focused on botanical description, Phytochemistry, ethno medical use and pharmacological activity of *Colocasia esculenta Linn. Schott*. It contains alkaloid, tannin and high amount of flavonoids. It was reported that the flavonoids frequently found in plants possess analgesic activity. Ethanolic leaves extract of *Colocasia esculenta Linn. Schott* possess several pharmaceutical and pharmacological properties. Further study will enable us to evaluate the safety and efficacy to develop safe dosage form from this plant.

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