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EVALUATION OF ANTINOCICEPTIVE ACTIVITY OF HYDROALCOHOLIC EXTRACT OF WHITE JUTE SEEDS

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ABSTRACT

Background: Analgesics are drugs that relieve pain. These drugs treat the symptoms of pain without treating its underlying cause. They usually function by either altering how the brain interprets pain or by decreasing inflammation at the location of the pain. The utilization of medicinal plants are the main components of herbal medicine. It is the oldest method of treatment, and in recent decades, research on medicinal plants and their traditional uses across the world has drawn more attention. *Corchorus capsularis* is one of the important medicinal herbs having wide range of pharmacological activity like antioxidant, anti-inflammatory, analgesic antipyretic, antimicrobial and numerous additional effects of pharmacological nature. Traditionally, the *Corchorus capsularis* has been used to treat a variety of physiological problems, including pain. **Aim:** The analgesic effect of Seeds of *Corchorus capsularis* (Jute) was estimated in this study to evaluate its traditional use. **Method:** The seeds of *Corchorus capsularis* were collected, dried and extracted with 70% hydroalcoholic extract by soxhlation method, the extract was evaporated by using Soxhlet apparatus. Using the tail flick method, the sample's ability to reduce pain was

evaluated at two distinct dosages, 250 mg/kg (CCLD) 500 mg/kg (CCHD), where paracetamol was taken as a standard drug. **Conclusion:** In both experimental doses *Corchorus capsularis* has shown significant analgesic property, though the CCHD has shown the similar action like paracetamol.

Keywords: *Corchorus capsularis*, Hydroalcoholic extract, Paracetamol, Tail flick method

INTRODUCTION

A somatic feeling of extreme discomfort, a sign of a physical injury or illness, or even emotional suffering can all be categorised as pain **[1]**. Pain is a crucial aspect of the body's defense mechanisms and to reduce physical harm, it is a component of the quick warning relay that instructs the central nervous system's motor neurons **[2, 3]**. Pain can be classified into two types:

a. Acute pain: Acute pain serves as the body's alert to existing tissue harm or illness. It typically manifests as a quick and intense sensation, often accompanied by a dull ache afterward. This type of pain is temporary or has clear and identifiable reasons **[4]**.
b. Chronic Pain: Pain that last significantly longer than it would with a specific injury is referred to as chronic pain. Chronic pain can be constant or intermittent and is generally harder to treat than acute pain. Pain can also be grouped by its source and related pain detecting neurons such as cutaneous pain, somatic pain, visceral pain and neuropathic pain **[5]**.

The stimulation of pain receptors, which are free nerve ends, results in pain. Nociceptor pain receptors are found in the dorsal root ganglion, an area outside the spinal column. When they reach their sensory endpoints is how they earn their names. These sensory terminals resemble little shrub branches. The perception of pain is caused by sensory neurones in the spinal cord that send a signal to the central nervous system when these receptors are activated **[6, 7]**.

The absence of pain without unconsciousness is known as analgesia. The analgesia system is mediated by 3 major components: The periaqueductal grey matter (in the midbrain), the nucleus raphe magnus (in the medulla) and Pain-transmitting neurones in the dorsal horns of the spine are inhibited by the pain-inhibitory neurones in the spinal cord's dorsal horns **[8, 9]**.

Sources of Analgesic Drugs: There are various sources of analgesic drugs; they are classified into following two types: a) Synthetic Drugs b) Natural sources.

a. Synthetic Drugs: There are numerous synthetic medications with analgesic effects on the market like Paracetamol, Ibuprofen, COX-2 inhibitors, NSAIDs, diclofenac etc. **[10]**
b. Natural Sources: Numerous medicinal plants with analgesic properties can be found in nature, as follow Opoid Analgesics: Opioids are drugs derived from Opium. Opium is derivative of the juice of the opium poppy, Papaver somniferous. Any drug that binds to opioid receptors in the central nervous system is considered as an opioid & used as analgesic activity. Opioids are used in medicine as strong analgesics, for relief of severe or chronic pain. These are classified into following types: Endogenous opioid peptides (produced in the body: endorphins, dynorphins, enkephalins) **[11]**.

In recent decades, an increasing number of people are interested in studying medicinal plantsand their historic uses across various cultures. Plants generally produce many secondary metabolites which were constituted an important source of many pharmaceutical drugs. The plant has a variety of pharmacological effects, including cardiac, antioxidant, anti-inflammatory, analgesic, antipyretic, antibacterial, and insecticidal ones, according to the pharmacological study **[12-14]**.

As *Corchorus capsularis* has been used as an analgesic drug in folk medicine from the ancient time, but no scientific data is available. Here is an attempt to establish the analgesics action of *Corchorus capsularis* scientifically **[15, 16]**.

MATERIALS AND METHODS

Collection and preparation of leaves extract: [17, 18]

The seeds of *Corchorous capsularies* were collected from the local area at Chakdaha and dried under sunlight, were grinded by hand grinder and 50 gms of powdered seeds were packed in the soxhlet apparatus with 400 ml of 70% hydro-ethanolic mixture and subjected for extraction for continuous 48 hrs. The extract was collected and evaporated to dryness by using water bath. The dried extract was used for further studies.

Experimental Animals:

Albino Wister rat weighing 150 to 200g were purchased from authorized animal breeder one week prior to the study to acclimatize in the environment of NSCBIP prior to the study. NSCBIP animal house was well maintained under standard hygienic condition at a temperature (22 ± 2°C), 65% relative humidity, 12 hr light and dark cycle. They were provided with commercial food and tap

water. Cleaning and sanitation work was done on alternate days. Paddy husk was provided as bedding material, which was changed every day. The cages were maintained clean and all experiments were conducted between 10am to 6pm.

Drugs and chemicals:

All the chemicals and drugs used were of analytical grade or laboratory grade supplied by standard manufacturers. Ethanol (Dr. S.C. Deb's Dilution), Distilled water, Paracetamol tablet (Pacimol 500mg by IPCA Laboratories Ltd.).

Preliminary phytochemical investigation of the extract: [19, 20]

The *Corchorous capsularies* seeds hydroalcoholic extract was subjected to phytochemical analysis of various phytoconstituents such as Alkaloids, Carbohydrates, Flavonoids, Glycosides, Saponins, Steroids, Phenolic acids and Proteins.

Tail Flick Model: [21, 22]

Male albino wistar rats weighing 200-250 grams were taken. The animals were grouped into 4 groups, 6 animals each:

Group I: Untreated control group: animals of this group were not received any treatment.

Group II: Standard group: animals of this group were received Paracetamol 500mg (Pacimol 500mg by IPCA Laboratories Ltd.).

Group III: Test group: animals of this group were received extract 250mg/kg *Corchorous capsularis* low dose (CCLD).

Group IV: Test group: animals of this group were received extract 500 mg/kg *Corchorous capsularis* high dose (CCHD).

Basal reaction time was taken to radiant heat by placing the tip (last 1-2 cm) of the tail in the radiant heat source (Hot water at 55±2ºC). The tail-withdrawal from the heat (flicking response) was taken as the end point. Normally a mouse has withdrawn its tail within 3-5 sec. A cut off period of 10-12 sec was observed to prevent damage to the tail. Any animal unable to remove its tail in 3-5 sec was rejected from the trial. After administering a dose of paracetamol to mice, record their basal reaction times for each mouse at a 5-minute interval to ensure that the animals are behaving normally. Reaction times of the animals were recorded at 15, 30, 60, 90, and 120 minutes following the injection. The animal was determined to be in maximum analgesia when its reaction time reached 10 seconds, and in order to protect the tissue, its tail was taken off the heat source.

Statistical Analysis

The results are presented as mean ± S.E.M. The differences between experimental groups were evaluated using one-way ANOVA (control vs. treatment), followed by Dunnett's

test, and were accepted statistically significant when P<0.001.

RESULTS & DISCUSSION

Preliminary phytochemical investigation:

The seeds of *Corchorous capsularis* were subjected to extraction (Soxhlation) by using 70% ethanol for consecutive 48 hours and 12% yield were obtained. The extract was generated fromthe seeds of *Corchorous capsularis* and subjected for preliminary photochemical investigation and followed observation are found **(Table 1)**.

Tail Flick Test:

The effect shown by the rats to the test as per Control as group I, Standard as group II, CCLD as group III, CCHD as Group IV. The test results, which were obtained at various intervals (15, 30, 60, 90, and 120 minutes), are listed below: **(Table 2)**, **(Figure 1-5)**.

70% hydroalcoholic extract of white jute seed exerted significant reduction in nociceptive responses compared to controls in experimental models of pain induction. Dose-dependent inhibition of pain was observed, with higher doses showing greater efficacy.

The results suggest thatwhite jute seed extract possesses analgesic properties, potentially mediated through mechanisms such as interaction with pain receptors or anti-inflammatory effects. More investigation is necessary to clarify its precise mode of action and examine its therapeutic potential for pain management.

Table 1: Results of Preliminary phytochemical investigation

Phytochemicals Test	Observation
Alkaloids	Negative
Glycosides	Positive
Terpenoids	Positive
Quinones	Negative
Saponins	Positive
Flavonoids	Positive
Triterpenoids	Negative
Steroids	Negative
Tannins	Positive
Phenols	Positive

Table 2*:* Effect of antinociceptive activity of white jute seeds as compare to standard or control

Treatment	15 min	30 min	60 min	90 min	120 min
Control	1.2 ± 0.23	1.2 ± 0.18	1 ± 045	1 ± 0.3	1.1 ± 0.28
Standard	1.9 ± 0.35***	2.7 ± 0.44***	3.2 ± 0.36***	3.8 ± 0.19***	2.8 ± 0.21***
CCLD	1.4 ± 0.44***	1.8 ± 0.63***	2.6 ± 0.81***	2.8 ± 0.53***	2.1 ± 0.47***
CCHD	1.7 ±0.51***	2.2 ± 0.48***	2.8 ± 0.16***	3.1 ± 0.42***	2.8 ± 0.39***

All values are mean ±SEM, n=6, *** p <0.001 vs control

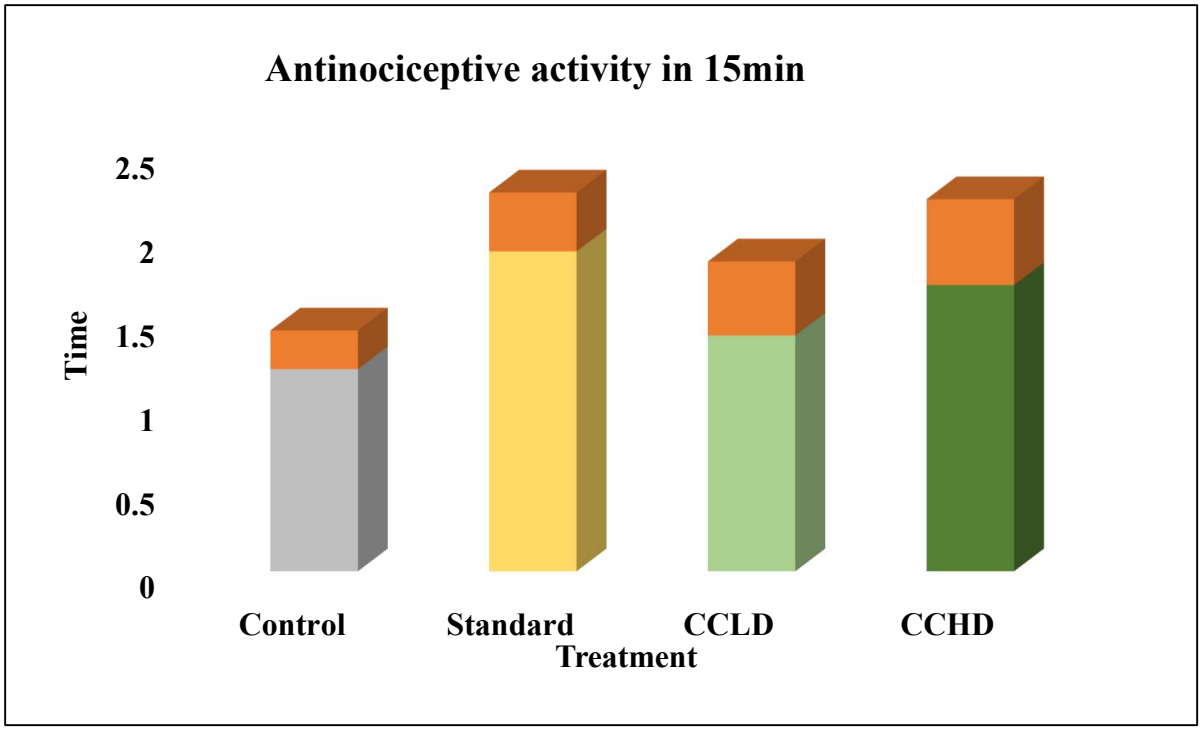

Figure 1: Effect of antinociceptive activity of white jute seeds in 15min
All values are mean ±SEM, n=6, *** p <0.001 vs control

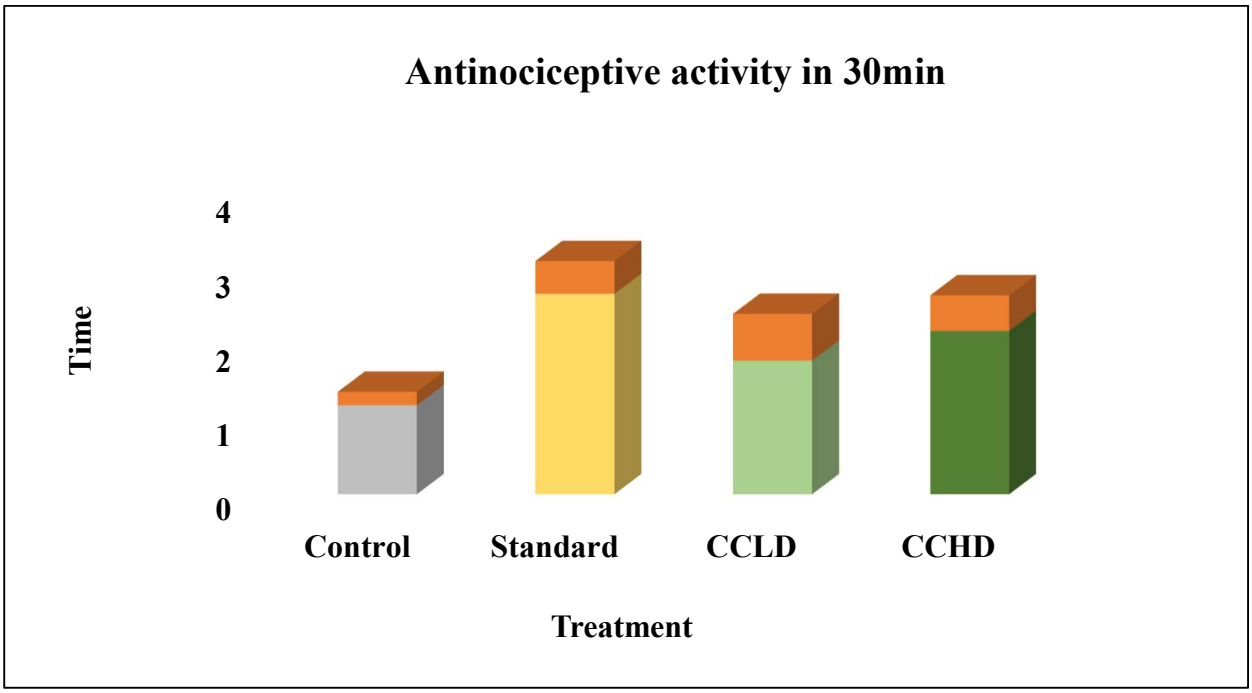

Figure 2: Effect of antinociceptive activity of white jute seeds in 30min
All values are mean ±SEM, n=6, *** p <0.001 vs control

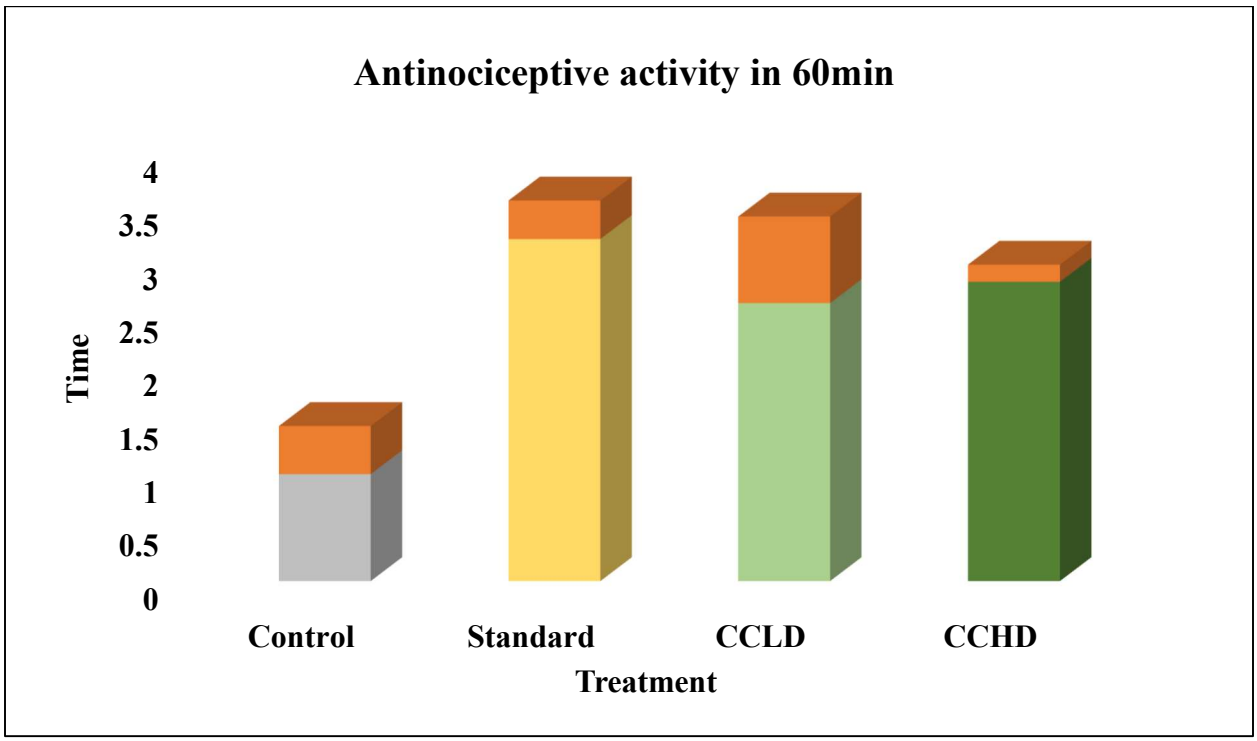

Figure 3: Effect of antinociceptive activity of white jute seeds in 60min
All values are mean ±SEM, n=6, *** p <0.001 vs control

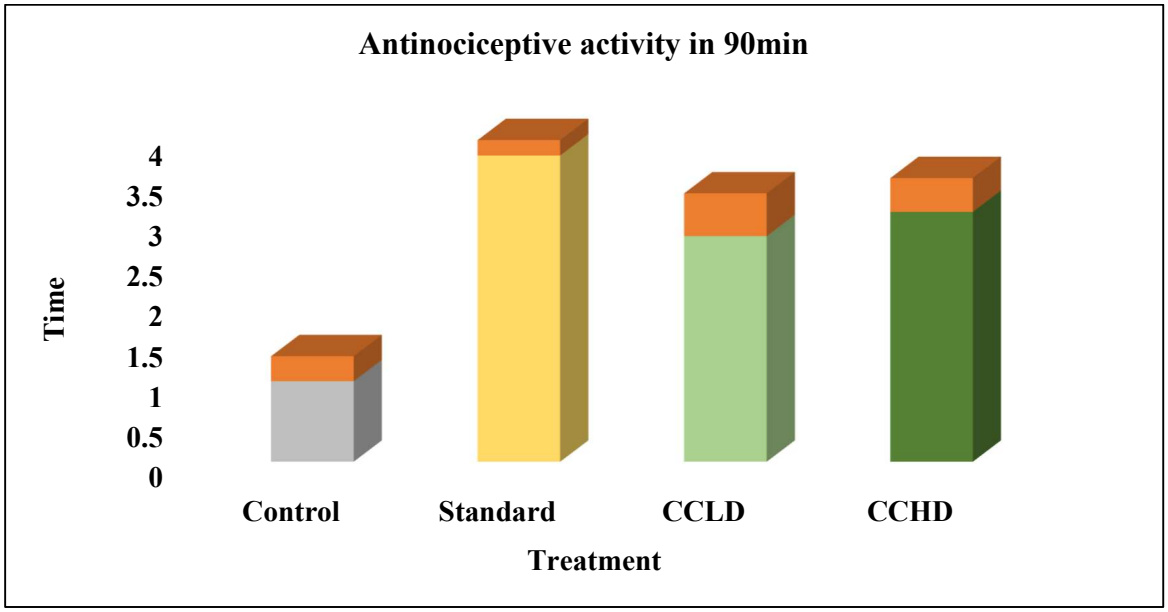

Figure 4: Effect of antinociceptive activity of white jute seeds in 90min
All values are mean ±SEM, n=6, *** p <0.001 vs control

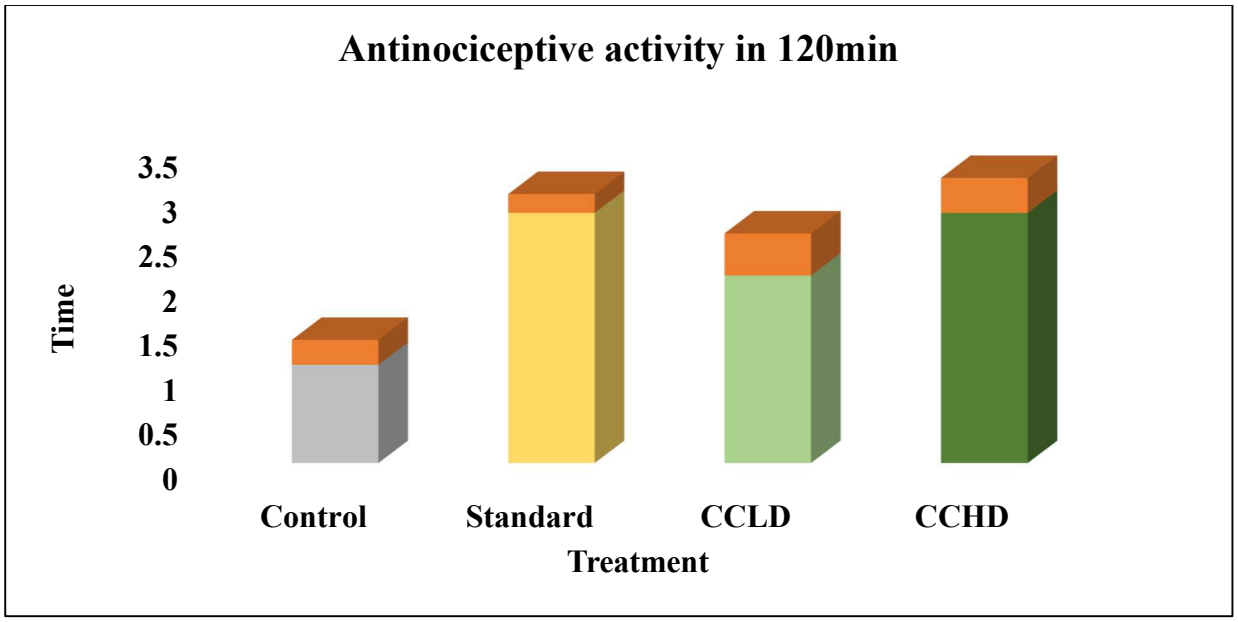

Figure 5: Effect of antinociceptive activity of white jute seeds in 120min
All values are mean ±SEM, n=6, *** p <0.001 vs control

CONCLUSION

In this project hydroalcoholic extract of white jute seeds has been evaluated for antinociceptive activity. The paracetamol is incorporated in the project as a standard. *Corchorous capsularis* has shown nociceptive activity, comparable with the effect of paracetamol while compared with untreated control. The existence of flavonoids (0.77 to 5.5 mg/gm), tannins (3.17 to 22.73 mg/gm) may be the responsible phytochemicals behind the outstanding antinociceptive property of white jute seeds. The potential of this drug may bring a beam of hope in the antinociceptive activity.

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