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EVALUATION OF ANALGESIC EFFECT OF BACLOFEN IN ALBINO RATS IN COMPARISON WITH DICLOFENAC

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ABSTRACT

Aim And Objective: To evaluate the analgesic effect of baclofen in albino rats in comparison with diclofenac.

Materials And Methods: Eighteen inbred male albino rats weighing about 150-200 gms were selected from central animal house. They were divided into three groups, with six rats in each. Group I served as control received normal feed and water. Group II served as standard received T. Diclofenac – 10 mg/kg (oral). Group III served as test group received T. Baclofen -- 8mg/kg (oral). The analgesic effect of baclofen was evaluated using Eddy's hot plate method and tail-flick method and compared with diclofenac. The values obtained are expressed as mean ± SEM. Statistical analysis of differences between groups was carried out using one-way analysis of variance (ANOVA). Probability (P) value of <0.05 was taken as the level of statistical significance.

Results: Baclofen showed statistically significant analgesic activity in comparison with control group and standard group ($P < 0.05$).

Conclusion: Baclofen a GABA- B agonist has significant analgesic activity comparable to that of diclofenac ($P < 0.05$)

KEYWORDS : Baclofen, Diclofenac, Analgesic activity, Eddy's hotplate, Tail flick.

INTRODUCTION:

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Over the course of human history, pain has been treated by psychological technique, physical method (surgical intervention, electrical stimulant, pressure, cold, heat, counter irritant, acupuncture) and by drugs. NSAIDs and opoids are used for management of acute pain. Severe pain due to cancer metastasis warants the use of strong analgesics like opioid drugs but addiction liability of opioids is a major drawback. Diclofenac, a NSAID, acts by blocking the enzyme cycloxygenase which catalyse the biosynthesis of prostaglandins and thromboxanes from arachidonic acid[3] Baclofen, a GABA-B agonist which is commonly used as skeletal muscle relaxant, has got antinociceptive effect also. There is evidence indicating that it potentiates the action of other analgesics like opioids[4] It can be used as an adjuvant analgesic[5]. In spite of vast number of drugs available, search for new analgesics having better efficacy and minimal adverse effect are continuing throughout the world. Hence this study was undertaken to evaluate the analgesic effect of baclofen in albino rats.

MATERIALS AND METHODS:

The study was carried out in the Institute of Pharmacology, after getting clearance from the Institutional Ethical Committee. (Ref no: 5953/E1/5/2015 dated 22/6/2015)

Study Design:

18 adult albino male rats weighing 150-250gm were procured from central animal house. The animals had free access to food and water ad libitum and allowed to acclimatise in the laboratory conditions for a period of a week. The animals were divided into three groups of 6 animals in each. Group I served as control, Group II served as standard and Group III served as test groups.

GROUP	STUDY	TREATMENT
I	Control	Normal feed and water
II	Standard	Normal feed, water and T. Diclofenac – 10 mg/kg (oral)
III	Test	Normal feed, water and T. Baclofen -8mg/kg (oral)

EVALUATION OF ANALGESIC EFFECT

Eddy's hot plate method Tail flick method

THERMAL STIMULUS BY EDDY'S HOT PLATE METHOD:

In this method, the rats were placed on a hot plate which was maintained at a constant temperature of 55 ^{0}C throughout the test. The time taken by the animals to lick the hind paw or jump was taken as the reaction time and it was measured. A cut-off period of 15 sec was considered as maximal latency to avoid injury to the paws. Control group (Group I) received normal feed and water. Standard group (Group II) received T. Diclofenac sodium 10mg/kg orally and the test group (Group III) received T. Baclofen 8 mg/kg orally. The reaction time of the rats was recorded at 30 mins, 1, 2, 3 hour after drug administration. The mean of the observed values was considered for statistical analysis.

TAIL FLICK METHOD USING RADIANT HEAT FROM ELECTRIC SOURCES:

Tail flick latency (reaction time) of the animals was assessed by the analgesiometer. The strength of the current passing through the naked nichrome wire was kept constant at 5 amps. The distance between the heat source & tail skin was 1.5 cm. Last 2- 3 cm of the tip of the tail was placed on the radiant heat source. The time taken by the animal to withdraw its tail from the hot wire (flicking response) was taken as the 'reaction time'. This tail flicking was considered as the end point of this test and time taken was noted. The cut-off time of 10 sec was considered to avoid any tissue damage.Control group (Group I) received normal feed and water. Standard group (Group II) received T. Diclofenac sodium 10mg/kg orally and the test group (Group III) received T. Baclofen 8 mg/kg orally. The reaction time of the rats was recorded at 30mins, 1, 2, 3 hours, after drug administration. The mean of the observed values was considered for statistical analysis.

Statistical Methods:

The values obtained were expressed as mean ± SD. Statistical analysis of differences between groups was carried out using one-way analysis of variance (ANOVA). Probability (P) value of <0.05 was taken as the level of statistical significance.

RESULTS:

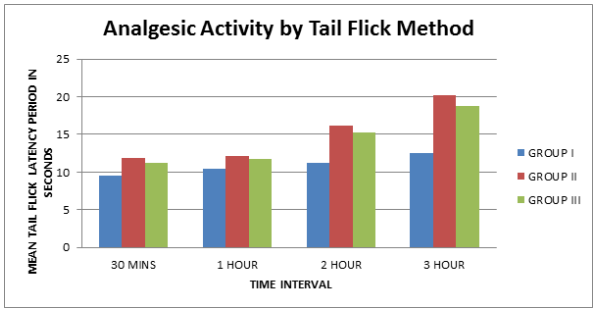
Tail flick latency of the rats, recorded at 30 mins, 1, 2, 3 hours, after drug administration obtained were expressed as mean ± SD.Baclofen showed statistically significant elevation in pain threshold ($P < 0.05$) in comparison to control, as shown in Table 1. The results also demonstrated that analgesic activity produced by baclofen was comparable to that of standard group that received diclofenac .

Table 1 Mean Tail Flick Latency Period (seconds) At 30min., 1, 2, 3 Hour

Group	30min	1hr	2hr	3hr
GroupI	9..5±0.42	10.5±0.25	11.2±0.48	12.5±0.42
GroupII	11.9±0.40*	12.2±0.35*	16.2±0.87*	20.2±0.70*

GroupIII	11.2±0.65	11.8±0.33	15.3±0.66*	18.8±0.54*

* P < 0.05

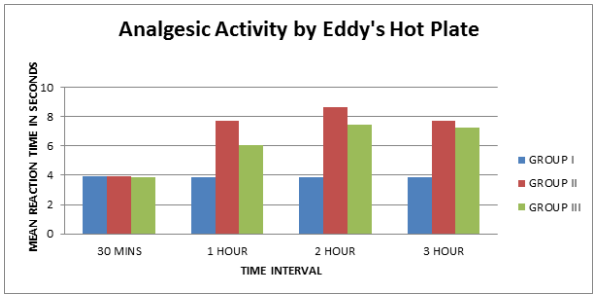


In hot-plate test, baclofen showed statistically significant ($P < 0.05$) elevation in pain threshold in comparison to control, as represented in Table 2. The results demonstrated that analgesic activity produced by baclofen was comparable to that of standard drug diclofenac.

Table 2 Mean Reaction Time (seconds) by Eddy's Hot Plate at 30min., 1, 2, 3 hour

Groups	30min	1hr	2hr	3hr
Group I	3.91±0.03	3.89±0.02	3.85±0.04	3.86±0.02
Group II	3.94 ± 0.05	7.74±0.20	8.66±0.19 *	7.70±0.32
Group III	3.84±0.05	6.04±0.36	7.42±0.16 *	7.25±0.08 *

* P < 0.05



DISCUSSION:

In this present study analgesic effect of baclofen, a GABA-B agonist was evaluated using albino rats by tail flick method and Eddy's hot plate method and it was found to have statistically significant analgesic activity. Baclofen depresses both monosynaptic and polysynaptic transmission in spinal cord possibly through a decrease in neurotransmitter release. Its centrally acting muscle relaxant property is used in the treatment of neurological disorders like multiple sclerosis, spinal injuries and flexor spasms[7]. The main nociceptive mechanism of baclofen may be due the glutamate release inhibition from A delta and C primary afferent terminals in substantia gelatinosa. It acts at spinal and supraspinal levels by interacting with substance P[8]. Alteration in catecholamine function at supraspinal sites may also be involved in antinociceptive effect of baclofen[9] .

CONCLUSION:

In the present study, Baclofen showed promising results when compared to the control group. Baclofen can be used as adjuvant analgesic. It may be a lead compound for identifying new analgesic drugs. Further studies are needed to support these findings in humans as the animal data cannot be directly extrapolated on humans.

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