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COMPARATIVE ANALGESIC ACTIVITY OF SELECTED MEDICINAL PLANTS FROM INDIAN ORIGIN

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ABSTRACT: Synthetic analgesic drugs have major side effects like gastritis, gastric ulcer, kidney disorders and cardiac arrhythmias. So, use of natural or herbal analgesics is an important and growing part of the pain-control and new discoveries are made practically every year. Many of these drugs commit the side effects like Morphine is responsible do work against heavy sedation and may elevate mood in distressed patients as do the antidepressants. Caffeine, release the histamine in more amounts, also have stimulation. And the use of cannabis like a medicine remains a debated issue. Analgesic herbs are the therapeutic herbs with analgesic effect that are commonly known as pain relief herbs or simply the pain herbs. Analgesic herbs are natural pain reliever that reduce or eliminate pain. These pain relief herbs are available in the market in analgesic topical forms like essential oil and analgesic cream- that can be directly applied at the pain sites- as well as in form of capsules, tea and tinctures for pain relief. So, Author proposed the comparative analgesic activity of some other new medicinal plant from Indian origin which can be very useful for medical sciences.

INTRODUCTION: The term analgesic is known any member of the group of drugs which is used to relieve from pain means achieve analgesia. The word analgesic derives from Greek and means “without" and algos means "pain". These drugs act in various ways on the nervous and central peripheral systems. These drugs include many categories like NSAIDs (non-steroidal anti-inflammatory drugs) such as the Acetic Acid derivatives, Salicylic Acid derivatives and opioid analgesics drugs such as morphine and opium. They can be distinct from anaesthetics in the manner of reversibly eliminate sensation [1-4].

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Due their wide range of pharmacological, industrial and synthetic applications, the synthesis of 1, 5-benzodiazepines are the have received considerable attention.

The choice of drug analgesic is also determined by the type of pain means for neuropathic pain and traditional analgesics are less effective and there is often benefit from classes of drugs that are not normally considered analgesics category, such as antidepressants and antiepileptic.

Pain is defined as neuralgia, an unpleasant sensory experience associated with tissue damage. The nerves in our body send a response to the brain which allows the body to feel pain. Pain can chronic or acute and can come and go in repeated manner. All of us have suffered from pain in once or many times whether it can be from injury or not.

Sometimes we can ignore pain but many times we may need something to help us along [5]. There are many herbs in the world that are very useful and effective for relief of pain. Many of them are safe and effective for everyone but some should be avoided during pregnancy or while nursing. Herbal medicines definitely have outstanding analgesic properties, in addition anti-inflammatory and anti-spasmodic functions also found. However, even though herbs and pharmaceutical drugs have many overlapping functions, they are not directly interchangeable or analogues of each other. The therapeutic effectiveness of herbal formulas is dependent on accurate diagnosis and careful prescription. When analgesic herbs used properly, it can be powerful alternatives to drug of choice for pain management [6].

The use of herbal medicine in the world has increased dramatically in recent years. These products are not regulated by the Food and Drug Administration with the same scrutiny as conventional drugs. Patients who use herbal supplements often do so in conjunction with conventional drugs [7].

Being a natural pain relief herb, any type of analgesic herb has the advantage of not producing any side effects as is the case with other chemically produced pain relief medicine. There are many analgesic herbs that are typically known as joint herbs for their analgesic properties of giving relief from joint pains like those felt in arthritis, neck and back pain, or tendonitis. In fact, these therapeutic herbs are anti-inflammatory herbs and treat the pain conditions that result from inflammation of joints [8].

MATERIALS AND METHODS:

Hot plate and Tail Flick tests: The rats (100-120 g) of either sex were used for the study. 12 groups of rats (*n* = 6/group) were treated with test drugs i.e. methanolic extract (250 mg/kg) and aqueous extract (250 mg/kg). Indomethacin 5mg/kg body weights were taken as reference. The reaction times of these rats were measured 1 h prior to the treatment, 1 and 3 h after the treatment using hot plate and tail flick techniques. In the hot plate test, the rat was placed in a hot plate analgesia meter (Model MK 35 A, Muromachi Kikai Co. Ltd., Tokyo, Japan) at 50°C and the time taken to lick the hind paw or to jump was recorded. In the tail flick test, the tail of the rat 4-5 cm from its tip was immersed in a water bath at 55°C and the time taken to flick the tail was recorded. Rats showing a pre-treatment reaction time greater than 15 s in the hot plate test and 5 s in the tail flick test were not used in the experiment. A cut off time of 25 s was set to avoid tissue damage [9-10].

Acetic acid induced writhing response: The rats (180-200 g) of either sex were used for the study. 12 groups of rats (*n* = 6/group) were treated with test drugs i.e. methanolic extract (250 mg/kg) and aqueous extract (250 mg/kg). Standard drug Aspirin 100 mg/kg body weights were taken as reference.

The acetic acid-induced writhing test was carried out using the reported technique. The rats (180–200 g) were pre-treated with test drugs and positive drug for 8 days, half hour after final administration 0.6% acetic acid (0.1 ml/10 g) was intraperitoneally injected.

Each rat was placed in a transparent observation box and the number of writhes was counted for 20 min after the acetic acid administration. The number of writhes in each treated group was compared with control group in which only received the saline.

The inhibition rate of writhes;

[(control mean - test mean)/control mean]×100 were calculated [11-12].

RESULT AND DISCUSSION:

Hot plate and Tail Flick tests: Table 1 shows the effect of the both extracts on the hot plate and tail flick method, In the hot plate and tail flick test the extracts exhibited a dose-dependent increase in the tail flick latency in rats. The results were significant ($p < 0.001$) for 250 mg/kg at 3 hr as compared to control. The similar results were obtained and the analgesic activity was found to be in the order as obtained in acetic acid-induced writhing. Standard drug Indomethacin (5 mg/kg) elicited a significant ($p < 0.001$) increase in the tail flick latency at 3 hr. post treatment time point.

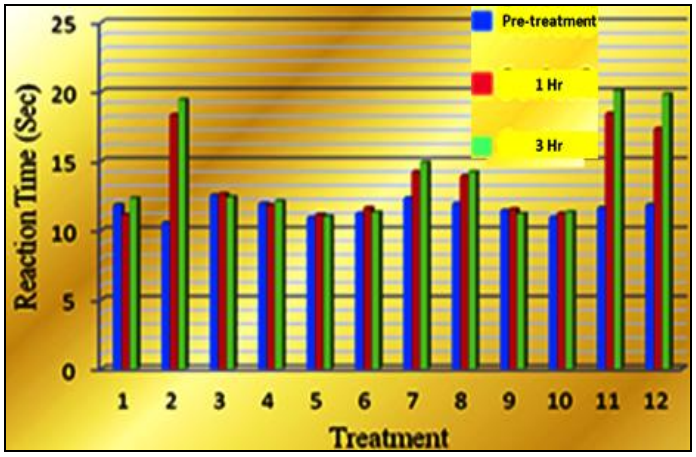
The significant results are shown in **graph 1 and graph 2** by Hot plate and tail flick test respectively.

TABLE 1: ANALGESIC EFFECT OF AQUEOUS AND METHANOLIC EXTRACT OF PLANTS USING HOT PLATE AND TAIL FLICK METHODS

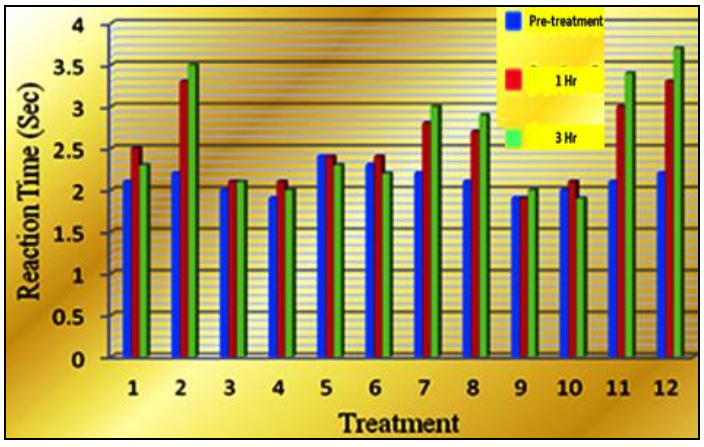
Group	Reaction time (Sec)					
	Hot Plate			Tail Flick		
	Pre treatment	1 hr	3 hr	Pre treatment	1 hr	3 hr
Control	11.8 ± 0.8	11.1 ± 0.7	12.3 ± 0.9	2.1 ± 0.2	2.5 ± 0.2	2.3 ± 0.1
Standard 5mg/kg Indomethacin	10.5 ± 1.2	18.3 ± 1.7***	19.4 ± 1.4***	2.2 ± 0.1	3.3 ± 0.1***	3.5 ± 0.1***
AMAE 250 mg	12.5 ± 0.3	12.6 ± 0.7	12.4 ± 0.5	2.0 ± 0.3	2.1 ± 0.1	2.1 ± 0.5
AMME 250 mg	11.9 ± 0.7	11.8 ± 0.5	12.1 ± 0.2	1.9 ± 0.4	2.1 ± 0.5	2.0 ± 0.2
CAAE 250 mg	10.9 ± 1.1	11.1 ± 0.9	11.0 ± 0.5	2.4 ± 0.2	2.4 ± 0.6	2.3 ± 0.3
CAME 250 mg	11.2 ± 0.2	11.6 ± 0.4	11.3 ± 0.8	2.3 ± 0.3	2.4 ± 0.5	2.2 ± 0.2
CBAE 250 mg	12.3 ± 1.2	14.2 ± 0.7**	14.9 ± 0.5*	2.2 ± 0.1	2.8 ± 0.4**	3.0 ± 0.4**
CBME 250 mg	11.9 ± 1.1	13.9 ± 0.2**	14.2 ± 0.6*	2.1 ± 0.4	2.7 ± 0.2**	2.9 ± 0.1**
SPAE 250 mg	11.4 ± 0.2	11.5 ± 0.8	11.2 ± 0.6	1.9 ± 0.6	1.9 ± 0.7	2.0 ± 0.2
SPME 250 mg	10.9 ± 1.2	11.2 ± 0.6	11.3 ± 0.9	2.0 ± 0.1	2.1 ± 0.6	1.9 ± 0.6
SOAE 250 mg	11.6 ± 0.6	18.4 ± 1.2***	20.09 ± 1.2***	2.1 ± 0.5	3.0 ± 0.5***	3.4 ± 0.4***
SOME 250 mg	11.8 ± 1.8	17.3 ± 1.8***	19.8 ± 1.0***	2.2 ± 0.1	3.3 ± 0.3***	3.7 ± 0.1***

All values are expressed as mean ± S.E.M (n=6), ***P<0.001 as compared control (5 ml/kg of water), **P<0.01 as compared control (5 ml/kg of water), One-way ANOVA followed by Bonferroni multiple comparison test.

Abbr.: Standard= Indomethacin, AMAE= *A. muticum* aq. Extract, AMME= *A. muticum* meth. extract, CAAE= *C. argentia* aq. extract, CAME= *C. argentia* meth. extract, CBAE= *C. burhia* aq. extract, CBME= *C. burhia* meth. extract, SPAE= *S. persica* aq. extract, SPME= *S. persica* meth. extract, SOAE= *S. oleoides* aq. extract, SOME= *S. oleoides* meth. Extract

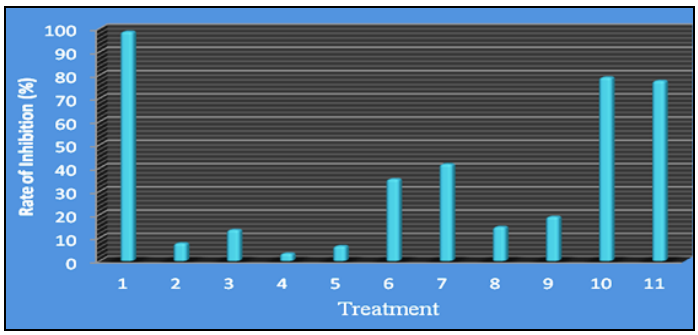


GRAPH 1: ANALGESIC EFFECT OF AQUEOUS AND METHANOLIC EXTRACT OF PLANTS USING HOT PLATE METHOD



GRAPH 2: ANALGESIC EFFECT OF AQUEOUS AND METHANOLIC EXTRACT OF PLANTS TAIL FLICK METHOD

Acetic acid induced Writhing response: Table 2 shows the effect of the both extracts on the acetic acid-induced writhing. The aqueous and methanolic extracts at dose of 250 mg/kg caused a dose-dependent and significant ($p < 0.001$) inhibition of the writhes. The percentage inhibitions were in the range of 7.60 to 78.96 for different extracts. The SOAE has maximum percentage inhibition followed by SOME i.e., 78.96 and 77.47 respectively as compared to standard drug aspirin which having percentage inhibition of 98.62. While some of the extract showed very low percentage inhibition viz., CAME, AMAE i.e., 6.42 and 7.60 respectively. This effect was significant ($p < 0.001$) compared to the control. Standard drug Aspirin 100 mg/kg produced a significant ($p < 0.001$) increase in the latency response compared to the control. The significant results are shown in **graph 3**.



GRAPH 3: PERCENTAGE INHIBITION OF AQUEOUS AND METHANOLIC EXTRACT ON ACETIC ACID-INDUCED WRITHING RESPONSES

TABLE: 2 EFFECT OF AQUEOUS AND METHANOLIC EXTRACT ON ACETIC ACID-INDUCED WRITHING RESPONSES

Group	Acetic acid induced writhing response	
	Numbers of writhing response	Rate of inhibition (%)
Control	28.95 ± 5.98	-
Standard 100 mg/kg Aspirin	0.4 ± 0.33***	98.62
AMAE 250 mg	26.75 ± 3.76	7.60
AMME 250 mg	25.08 ± 2.98	13.36
CAAE 250 mg	28.02 ± 5.21	3.21
CAME 250 mg	27.09 ± 4.29	6.42
CBAE 250 mg	18.76 ± 1.23**	35.20
CBME 250 mg	16.89 ± 1.67**	41.65
SPAE 250 mg	24.71 ± 2.01	14.65
SPME 250 mg	23.45 ± 1.09	19.0
SOAE 250 mg	6.09 ± 0.976***	78.96
SOME 250 mg	6.52 ± 0.75***	77.47

All values are expressed as mean ± S.E.M (n=6), ***P<0.001 as compared control (normal saline), **P<0.01 as compared control (normal saline), One-way ANOVA followed by Bonferroni multiple comparison test.
Abbr.: Standard= Aspirin, AMAE= *A. muticum* aq. Extract, AMME= *A. muticum* meth. extract, CAAE= *C. argentia* aq. extract, CAME= *C. argentia* meth. extract, CBAE= *C. burhia* aq. extract, CBME= *C. burhia* meth. extract, SPAE= *S. persica* aq. extract, SPME= *S. persica* meth. extract, SOAE= *S. oleoides* aq. extract, SOME= *S. oleoides* meth. Extract

CONCLUSION: The many herbs were reported to have analgesic activity by reduced availability of prostaglandins. The study showed that the methanolic extract and aqueous extracts produced significant analgesia both centrally and peripherally. Centrally acting analgesics not only raise the threshold for pain, but also alter the physiological response to pain and suppress the patient's anxiety and apprehension while peripherally acting analgesics act by blocking the generation of impulses at chemoreceptor site of pain. As the analgesic action is decreased partially some other non-opioid mechanisms may also be involved. Standard drugs like aspirin indomethacin offer relief from inflammatory pain by suppressing the formation of pain substances in the peripheral tissues13.

In the comparative analgesic activity of selected medicinal plants from Indian origin, the aqueous and methanolic extracts at dose of 250 mg/kg caused a dose-dependent and significant of the writhes. The percentage inhibitions were in the range of 7.60 to 78.96 for different extracts. The SOAE has maximum percentage inhibition followed by SOME

In the hot plate and tail flick test the extracts exhibited a dose-dependent increase in the tail flick latency in rats. The results were significant for 250 mg/kg at 3 hr as compared to control. The similar results were obtained and the analgesic activity was found to be in the order as obtained in acetic acid-induced writhing.

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