



Evaluation Of Analgesic And Anti-inflammatory Effect Of Embelia Ribs By using Different Preclinical Model

¹Miss. Ashmalatahoor Ansari, ²Mr. Dr Vinod Rajaram patil, ³Mr. Huzaifa Ansari, ⁴Dr. Tarique Deshmukh, ⁵Dr Rashid Akhtar, ⁶Miss. Prof. Dr.Shadiyatahseen Sajjad.

¹Lecturer in shri sai college of pharmacy Vaijapur District Aurangabad

²Assistant professor SPH college of pharmacy malegaon, District Nashik.

³Assistant professor Royal college of pharmacy malegaon District Nashik.

⁴HOD of Pharmacology in Royal college of pharmacy malegaon, District Nashik.

⁵Principal of royal College of pharmacy malegaon District Nashik

⁶HOD of Amraze Niswa wo quabalat Younus Fazlani unani college kunjkheda dost.Aurangabad.

Corresponding Author: Miss. Ashamalatahoor Ansari

Designation: Lecturer in shri sai college of pharmacy Vaijapur, District Aurangabad

Background:

Study of Pain defines pain as an unpleasant sensory and emotional experience associated with, actual or potential tissue damage. Pain and inflammation are the major medical condition commonly addressed with traditional remedies. Embelia ribs is a traditional herb widely used in Ethiopian folk medicine for pain management. pharmacotherapy of pain relies on the use of a variety of medications, such as Non-steroidal anti-inflammatory drugs (NSAIDs) and opioid analgesics. However, these drugs are associated with many side effects. Using NSAIDs for example results in gastric ulcer, gastric irritation, effects on blood pressure, alterations in renal function and hepatic injury, and platelet inhibition.

: The current study aims at evaluating the in vivo analgesic and anti-inflammatory effects of 80% methanolic stem bark extract of Embelia ribs in rodent models.

Methods: After successful extractions of the stem of Embelia ribs with 80% methanol, the pain relieving effects of Emb.Extract at 25, 50 and 100 mg/kg dose were evaluated using different Pain inducing models like Chemical pain model(acetic acid writhing test), Haffner's Tail clip method, Pin prick test, tail flick methods, thermal and cold allodynia and the anti-inflammatory profile was determined by carrageenan induced paw edema model. Result was evaluated at different dose level on different time interval by comparing Control or standard treated groups or before and after treatment. Values were Expressed as mean \pm ANOVA followed by dunnet 't' test.

Result: In this study it was observed that Analgesic effect of Embelia ribs extract at 25, 50 & 100mg/kg bw showed good result in different parameters such as mechanical allodynia, cold allodynia and thermal hyperalgesia in comparison with normal control group or before treatment response. Basically 50 & 100 mg/kg Emb. Extract shows significant analgesic effect. This effect of Embelia ribs may be due to the presence of alkaloid and flavonoid (embelin) as phytochemical compound

Conclusion:

Thus, from this Analgesic and Anti-inflammatory Behavioural study we conclude that Extract of embelia ribs fruit can treat the acute Pain & Inflammation through less side effect or safe way, Emb. Extract treatment 50mg/kg, 100mg/kg (p.o) show significant analgesic effect in different pre-clinical models. How ever more detailed studies with different animal models may be beneficial. This point of view makes the use of Emb.extract safe and best to use pain management.

Keywords: embelia ribs, Analgesic, Anti-inflammatory, thermal.

Introduction:

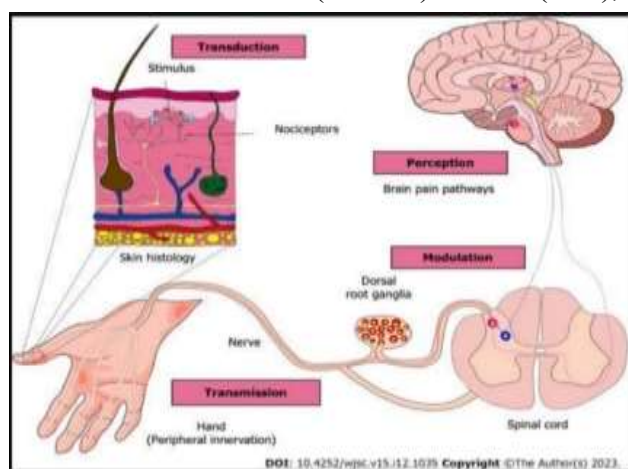
Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.' It is mediated by specific nerve fibres to the brain where it's conscious appreciation may be modified by various factors. (IJLSR -2015, Hanumanthappa S, Hanumanthappa). pain can be known as protector as well as predictor (IJLSR -2015, Malviya KG, Shivhare UD, Srivastava P). The word "pain" for the patient means disease and suffering, for the doctor it is a symptom, and for the physiologist it is a kind of feeling that has its own anatomical and physiological system which begins with the receptors and ends up in the brain cortex. The intensity of pain is Difficult to measure and an individual's perception of pain depends on the individual's emotional state, Circumstances under which the pain was acquired, and whether it is perceived as a threatening signal (Podstawy).

Etiology of Pain: Pain can also be generated without receptors, from the peripheral and central nervous systems. This is Always a pathological pain which arises due to damage to the nervous system, and has a different nature from Physiological pain and clinical presentation. It is important to distinguish receptor pain – nociceptive, Physiological (Acute Pain) pain from non-receptor pain – pathological (Chronic Pain), central and peripheral.

Pathology of Pain: Representative diagram of anatomical levels involved in the steps of pain from detection of stimulus up to its Interpretation and modulation. Starting from the left to the right sides of the figure. The initiation of pain Processing starts with the sensing of a noxious stimulus on the skin. This stimulus is detected by nociceptors and then relayed to the spinal cord before ultimately reaching the brain. In the brain, the stimulus is interpreted and converted into the sensation of pain subsequently.

Inflammation:

Inflammation is the protective mechanism by the body against foreign particles; Characteristics signature of Inflammation is rubor (redness). Calor (heat), tumour (swelling), dolor (pain) and functionless. Normal inflammatory response is an acute process that Resolve After removal of the inciting stimulus.



Receptor Pain	Non-Receptor Pain
From irritation the receptors of integuments, muscle, joints and internal organs.	Nerve or central nervous system damage
No changes in nervous system	Damage nervous system
Skin, osteo-articular, muscular and organ pain	Neuropathic pain-from the nerves, central pain, from the spinal cord

Inflammatory response include:

1. Tissue injury
2. Phagocytosis/Macrophages activation
3. Release inflammatory mediators TNF alpha and Chemo attractant.
4. Dilation of Blood vessels.
5. Temporary swelling and Redness.

Pharmacotherapy of Pain and inflammation:

Pharmaceutical management of Pain and inflammation used by variety of non-steroidal anti-inflammatory drugs and Opium analgesic However these drugs are associated with many side effects. SAID Cause gastric ulcer, gastric irritation and also effected on Blood pressure. On other hand sedation and dependency and constipation are common with the Opioids. Research into the analgesic and anti-inflammatory properties of herbal drugs is actively expanding, driven by the need for safe and effective alternatives to conventional medications like NSAIDs and opioids, which often carry significant side effects. Numerous studies, including in vitro, in vivo, and some clinical trials, have investigated a wide range of plants and their bioactive compounds for these properties.

EMBELIA RIBS:

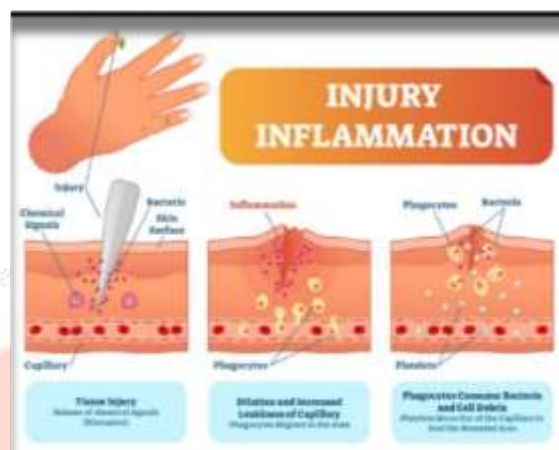
Embeliaribes Burm. (*E. ribes*) is a woody shrub from the family Myrsinaceae, commonly known as Vidanga, and it has been used in traditional medicine due to several observed effects, including analgesic, Anthelmintic, antioxidant, antibacterial, antidiabetic, anticancer, antihyperlipidemic, wound healing, and Anti-spermatogenic activity, etc. fruits, seeds, leaves, etc., of this species comprise active principle compounds such as embelin, embeliaribyl ester, embelinol, and embeliol(Haq et al., 2005)..Rigorous phytochemical and pharmacological Studies have been carried out on the fruits of this species(Khan et al., 2010).

Material Method:

Embelia Ribs Fruit Extraction: Dried fruit powder of Embelia ribs 150gb subjected to maceration extraction with 500ml 80%methanol for 24 hr. After that residue transfer in petri dish, keep in sunlight to solvent evaporation and to obtain dry powder of extract, powder store in air tight container as per requirement dissolve in water and fed orally to the animals.

Experimental Animals: Animal Study Approved by the Institutional Animal Ethics Committee Established by Royal College of Pharmaceutical Education and Research Abdul Muttalib Campus Dhule Road Sayene Khurd Malegaon Dist.Nashik423203.Select the Male Mice 20-35gm were used for the study and total five number of groups each group contained SIX (6) mice.

Selection of Dose: The Dose of plant Extract was selected based on the previous reports and literature survey Wherein the embelia fruit Extract was used as Modulator of Metabolic Endotoxemia and Associated Obesity in high fat diet fed mice, The dose are 50 mg/kg, p.o. and 100mg/kg, p.o. (H.E.T-2021 Sagepub.com). In article "SYNTHESIS AND AND ANTI PROLIFRATIVE ACTIVITIES OF NEW DERIVATIVES OF EMBELIN" revealed that Embelin is safe to use and Doses of 10 mg to 3g/kg given orally to rat and mice did not show any toxic effect. (Bioorganic and Medicinal Chemistry Letters 24-2014).



STUDY OF BEHAVIORAL PARAMETERS:**CHEMICAL ALLODYNIA:**❖ *Acetic Acid induce writhing test:*

Mice were given intraperitoneal injection of Aqueous. Acetic acid (0.7%) at 10ml/kg dose, Test compound was administered 40 min. prior to administration of acetic acid, Whereas Morphine sulphate was given 15 min. prior. Writhing was observed for a period of 20 mint. After 5min. of injection of acetic acid. % inhibition of pain was calculated by compared with mean value of control. **% inhibition = Control Mean – Treated Mean / Control Mean X 100.**

MECHANICAL ALLODYNIA:❖ *Haffner Tail Clip Method:*

An Artery clip is placed at the root of the tail of the mice to induce pain, A quick response of the animal was seen as biting of the clip. The time between the application of the clip and response was noted by stop watch. Then the same procedure is recorded after 15, 30, 60 min. after administration of the test and standard drug.

THERMAL HYPERALGESIA:❖ *Eddy's Hot Plate Test:*

Mice were orally administered with test and control drugs. 1hr. after the injection of drug animal were placed on the hot plate. Response such as jumping, withdraw of the paw and paw licking were observed. The time period when animal was placed and until responses occur was noted as latency period by stopwatch. Latency period recorded after 0, 60, 90 and 120min. The cut-off time 15 sec was maintained. Manually record the time in seconds for Paw licking/ jumping. Repeat the procedure until all mice are tested.

❖ *Hot Water Tail Immersion Test*

In hot water tail immersion test, distal 1cm of the tail was immersed in a warm water container by Maintaining a constant temperature 52O C. The duration of time taken for withdrawal of the tail from hot water was noted. A cut-off time of 15 sec. was maintained to prevent tissue injury. The procedure was repeated three times for each animal and then mean values are taken as consideration. The decrease in tail contact time was pointing towards Nociception prolong contact time noted as anti-allodynic effect.

**COLD ALLODYNIA:**❖ *Cold Water Tail Immersion Test:*

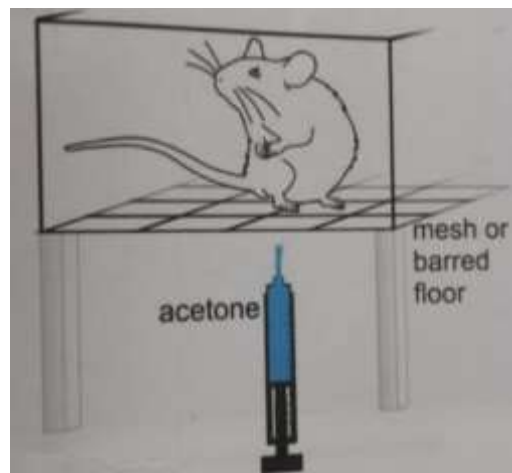
In the cold-water Tail immersion test, distal 5cm of the tail was immersed in a cold-water Container by maintaining a constant temperature 10OC. The Duration of time taken for withdrawal of the tail from cold water was noted. A cut-off Time of 20 Sec. was maintained to prevent tissue injury. The procedure was repeated three time for each animal and mean values are taken into Consideration.



The decrease in tail contact time with cold water was pointing towards nociception, whereas Prolong contact time was noted as an anti-allodynic effect.

❖ *Acetone Drop Test:*

Mice were placed in a metal mesh cage and allowed to habituate for approximately 20mint. To acclimatize them to the new environment Freshly dispensed acetone drop (50µL) was applied gently onto the mid plantar surface of the hind paw. It generates a cold chemical sensitivity reaction, i.e.; paw licking, Shaking or Rubbing the hind Paw with brisk foot withdrawal after application 2-5 sec of acetone was considered a nociceptive Response and absence or delay these responses was considered as anti-nociceptive effect.



Carrageenan Induce Paw Oedema Model:



The animals are divided into 5 groups of 6 Animals (plant Extract was dissolve and administered per Oral at different dose level) Group first was treated with 0.1N 1% carrageenan solution. After 30 min. of Carrageenan solution. Group 2: was administered Diclofenac Sodium (10mg/kg) Group 3,4,5: was treated with 25 50 &100mg/kg bw. (p.o) Emb.Extract.paw edema measured by water displacement method and the displaced water was collected in the micro-burette. Volume of paw edema compared with carrageenan treated group and Calculate percentage of inhibition by given formula.

% inhibition = normal control paw volume – traded group paw volume ÷ Normal grp Paw volume X 100

RESULT:

Plant Profile:

Properties	Plant
Common Name	Vidanga/ False Black Papper
Scientific Name	Embelia Ribs
Family	Myrcinacea
Plant Part	Different economic mode of cultivation reported, like Seed germination, Vegetative Stem cutting germination, it was found That seed germination for rising plant material is accessible way of propagation. It is Indo malayan species distributed in India, Sri-lanka, Singapoer, Malaysia
Chemical Constituents	Embelin (alkaloid), christembine Quinine derivatives,Tannins, Volatie oil, Embelinol, embel-ester, Embeliol, cinnamic acid, fixed oil
Pharmacological Action	Anti-viral, Anti-Fungal, Anti;Psychotic, Cardioprotective, wound healing, Neuroprotective.

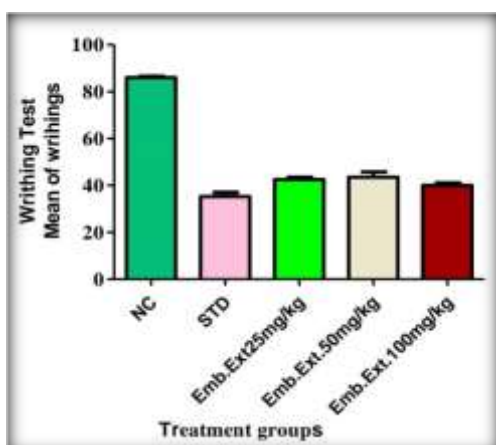
<p>Photograph of plant</p>	
<p>Method of Extraction</p>	<p>Methenolic extraction by Maceration</p> 
	<p>Extract of Embelia ribs contain Alkaloid that can produce Analgesic Effect by different Mechanisms. Primarily interact with Nervous system. Actually, on Opid Receptor and reduce pain perception, affect ion channels and receptor involve in pain.</p> <p>Embelin is primary active compound of Embelia ribs (benzoquinone) quinone moiety of Embelia ribs and presence of phenolic OH group on C-5 position responsible to suppress prostaglandin production and their pain producing function.</p>

Behavioural study on different Animal models

Chemical allodynia:

❖ *Acetic acid induces writhing test:*

Groups	Dose mg/kg	No.of withing per 20mint.	% Inhibition
Normal Control	-	86 ± 0.86	
Morphine Sulphate	1mg/kg	35.33 ± 0.33	55.43%
Emb. Extract	25mg/kg	42.5 ± 0.50	50.58%
Emb. Extract	50mg/kg	43.5 ± 0.5	49.35%
Emb. Extract	100mg/kg	39.33 ± 0.33	54.27%



Values Are Expressed as mean ± SEM. ANOVA Followed by Dunnet 't test. Values are Consider as significant when P< 0.001 Compared with Normal Control group.

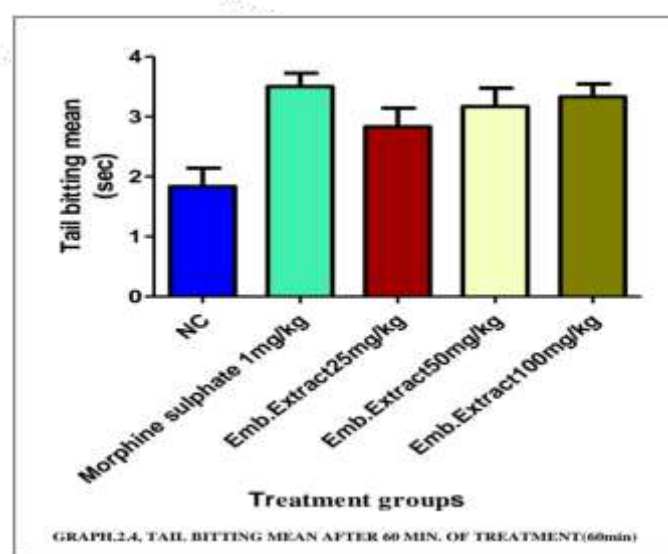
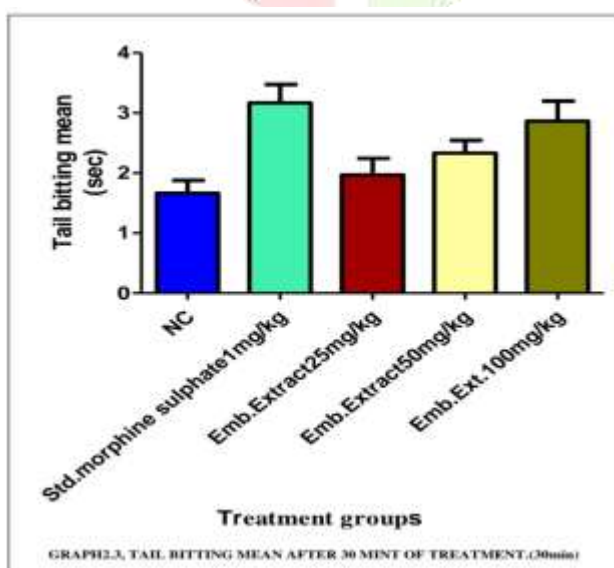
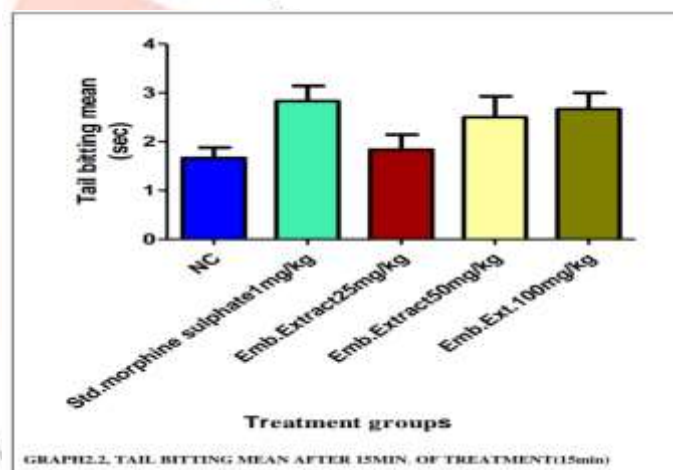
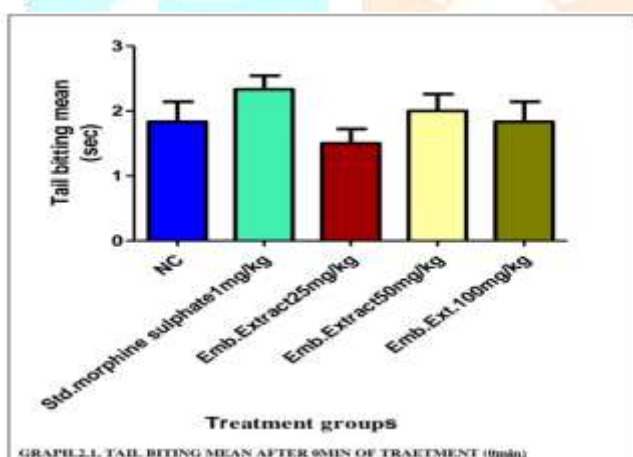
Physical Method

❖ Haffner's Tail clip method:

Observation Haffner's Tail clip method

Groups	Dose mg/kg	Reaction Time (sec)			
		0min	15min	30min	60min
Normal control	-	1833 ± 0.83	3.16 ± 0.16	3.62 ± 0.62	3.80 ± 0.8
Morphine sulphate	1mg/kg	2.33 ± 0.33	3.83 ± 0.83	4.50 ± 0.50	5.83 ± 0.5
Emb. Extract.	25mg/kg	1.50 ± 0.50	2.81 ± 0.81	3.16 ± 0.16	3.53 ± 0.53
Emb. Extract	50mg/kg	2.0 ± 0.00	2.50 ± 0.50	3.40 ± 0.4	4.16 ± 0.16
Emb. Extract	100mg/kg	1.83 ± 0.83	2.66 ±	4.26 ±	5.12 ± 0.12

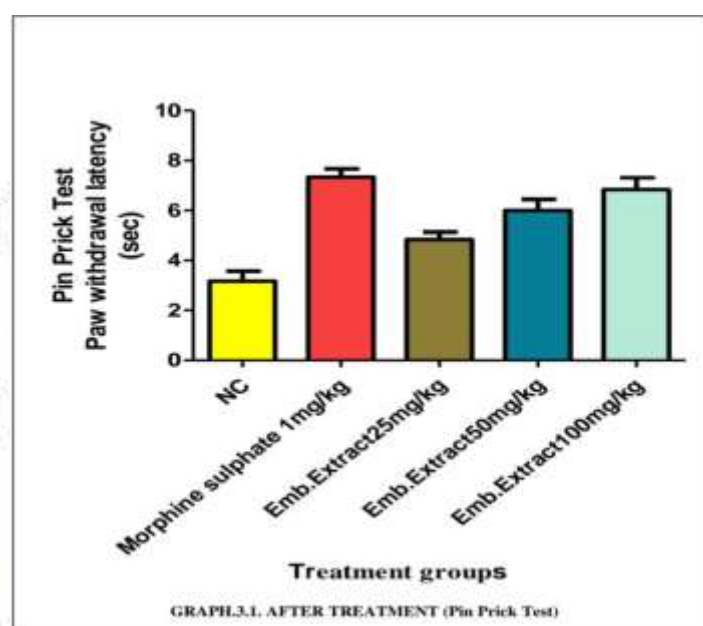
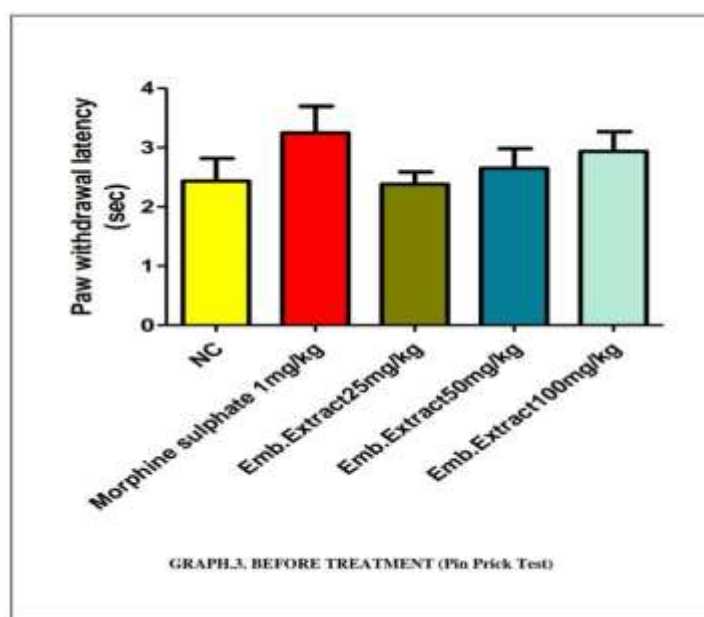
Values Are Expressed as mean ± SEM. ANOVA Followed By Dunnet 't test. Values are Consider as significant when P< 0.0001 Compared with Normal Control group.



❖ Pin Prick Test:

Groups	Dose mg/kg	Reaction Time	
		Before Treatment	After Treatment
Normal Control	-	4.13 ± 0.13	5.33 ± 0.33
Morphine Sulphate	1mg/kg	5.93 ± 0.93	6.83 ± 0.83
Emb.Extract	25mg/kg	4.38 ± 0.38	5.81 ± 0.81
Emb.Extract	50mg/kg	5.16 ± 0.16	7.35 ± 0.35
Emb.Extract	100mg/kg	5.44 ± 0.44	7.81 ± 0.71

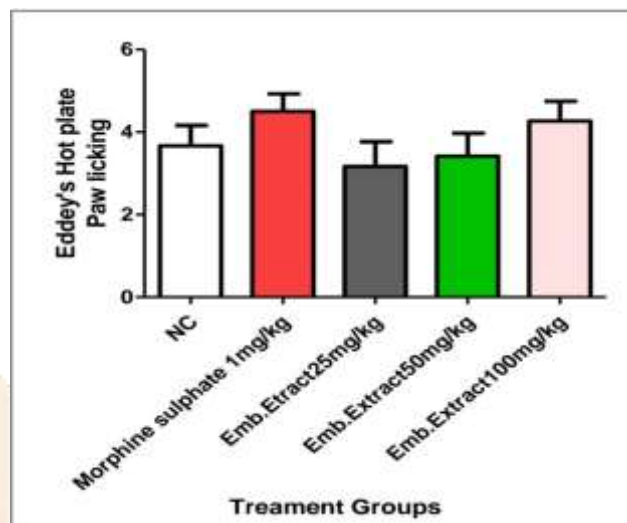
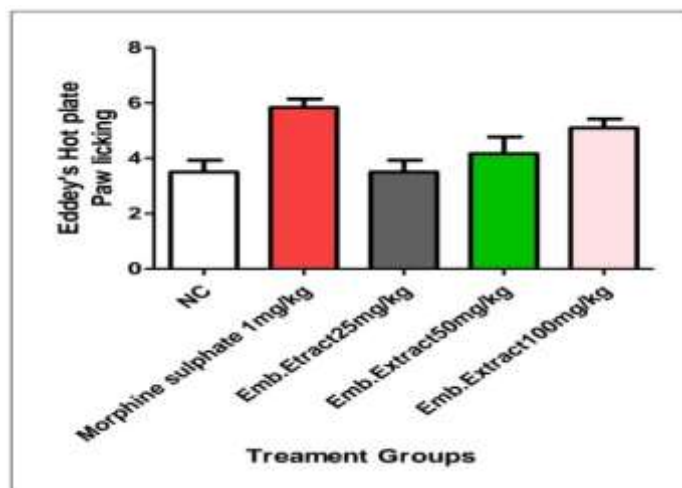
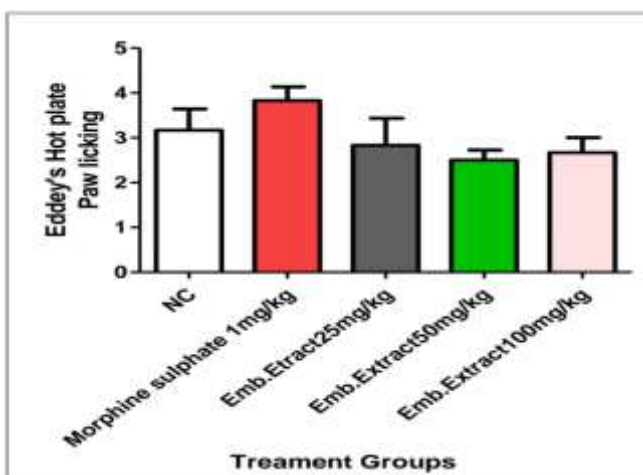
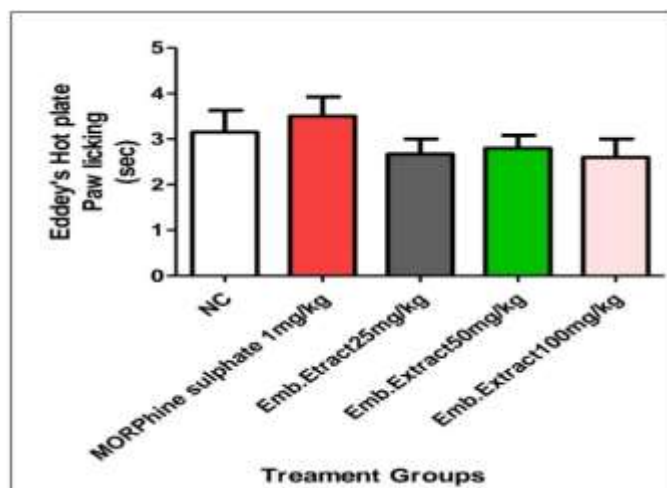
Values Are Expressed as mean ± SEM. ANOVA Followed By Dunnet 't test. Values are Consider as significant when $P < 0.0001$ Compared with Normal Control group.



Thermal Hyperalgesia:

❖ Eddy's Hot Plate Test:

Groups	Treatment	Reaction Time mean (sec) Paw licking			
		0min	60min	90min	120min
Normal Control	-	3.15 ± 0.15	3.16 ± 0.16	3.62 ± 0.62	3.50 ± 0.50
Morphine Sulphate	1mg/kg	3.50 ± 0.5	3.83 ± 0.83	4.50 ± 0.5	5.83 ± 0.83
Emb. Extract	25mg/kg	2.66 ± 0.66	2.81 ± 0.81	3.16 ± 0.16	3.53 ± 0.53
Emb.Extract	50mg/kg	2.80 ± 0.89	2.50 ± 0.50	3.41 ± 0.41	4.16 ± 0.16
Emb.Extract	100mg/kg	2.63 ± 0.63	2.66 ± 0.66	4.26 ± 0.26	5.12 ± 0.12

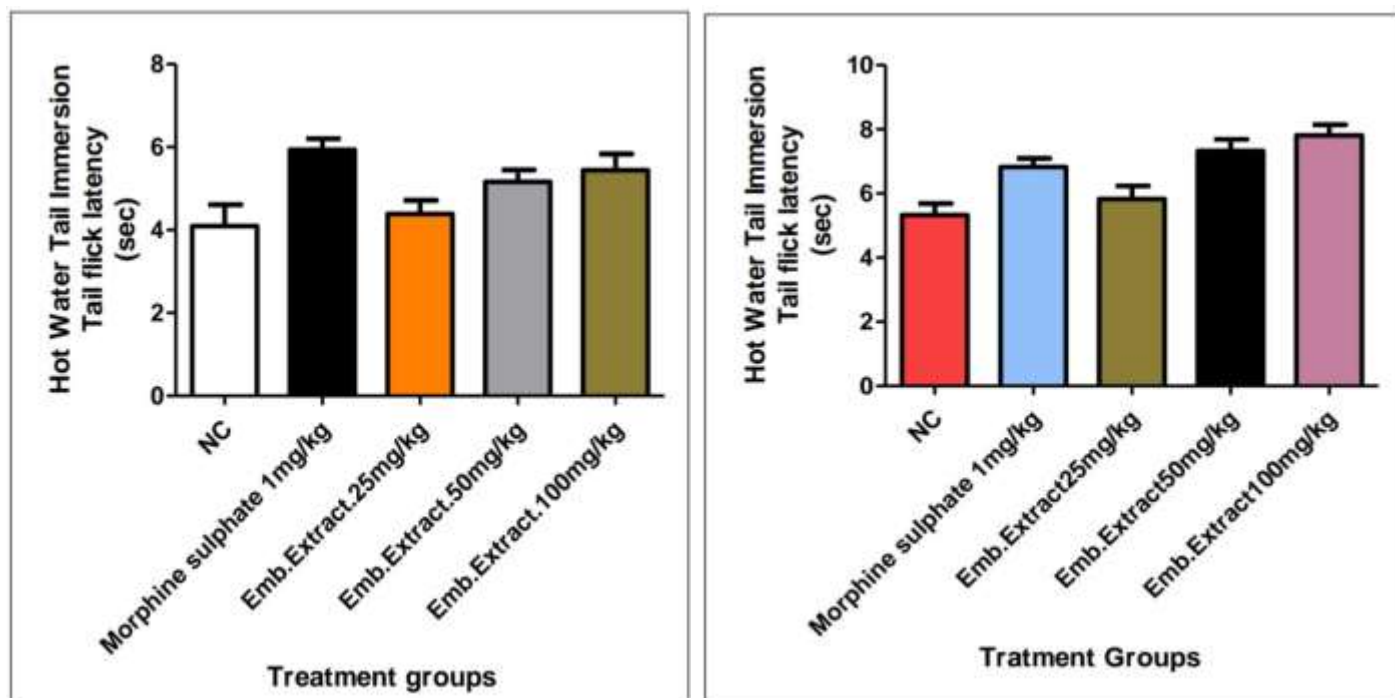


Values Are Expressed as mean \pm SEM. ANOVA Followed By Dunnet 't test. Values are consider as significant when $P < 0.001$ Compared with Standard drug treatment group at different time intervals.

❖ Hot Water Tail Immersion Test:

Observation Table Hot water Tail Immersion Test

Groups	Dosemg/kg	Reaction Time (sec)	
		Before Treatment	After Treatment
Normal Control	-	4.13 \pm 0.13	5.33 \pm 0.33
Morphine sulphate	1mg/kg	5.93 \pm 0.93	6.83 \pm 0.83
Emb.Extract	25mg/kg	4.38 \pm 0.38	5.81 \pm 0.81
Emb.Extract	50mg/kg	5.16 \pm 0.16	7.35 \pm 0.35
Emb.Extract	100mg/kh	5.44 \pm 0.44	7.81 \pm 0.81



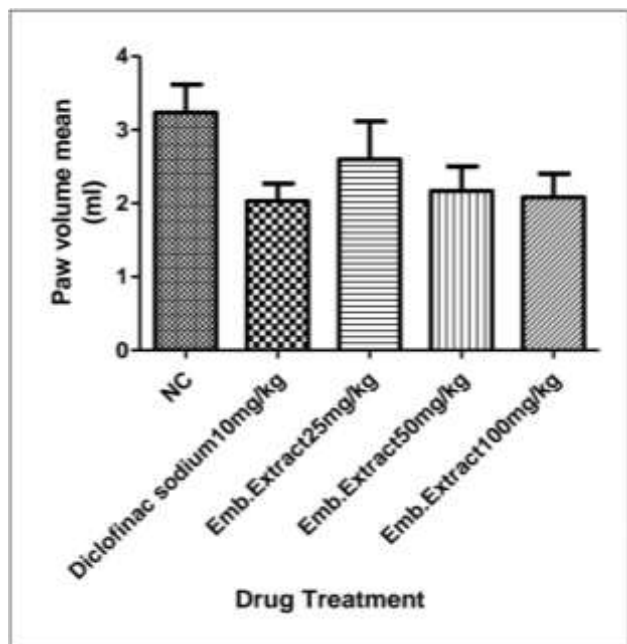
Values Are Expressed as mean \pm SEM. ANOVA Followed By Dunnet 't test. Values are Consider as significant when $P < 0.001$ Compared with Before and after treatment of drug.

Carrageenan Induced Paw Edema Model:

Table. Observation Carrageenan Induce Paw Edema

Groups	Dose mg/kg	Mean of paw volume (ml)	%inhibition
Normal Control	--	3.23	
Diclofenac sodium	10mg/kg	2.03	37.15%
Emb.Extract	25mg/kg	2.6	19.50%
Emb.Extract	50mg/kg	2.16	33.12%
Emb.Extract	100mg/kg	2.08	35.60%

$$\% \text{inhibition} = \frac{V_c - V_t}{V_c} \times 100$$



Values are Expressed as mean SEM P<0.5 significant compare to carrageenan treated group.

Discussion :

After successful extractions of the stem of Embelia ribs with 80% methanol, the pain relieving effects of 25, 50 and 100 mg/kg extract were evaluated using acetic acid-induced writhing test and hot plate method whereas the anti-inflammatory profile was determined by carrageenan induced paw-edema model. Extract of embelia ribs contain alkaloids that can produce Analgesic effect by various mechanism. Primarily interact with Nervous system, Act on Opioid Receptors and reduce Pain perception, Affect Ion Channels or Receptors Involved in Pain.

Conclusion:

from this Analgesic and Anti inflammatory Behavioral study we conclude that Extract of embelia ribs fruit can treat the

acute Pain & Inflammation through less side effect or safe way, Emb. Extrat treatment 50mg/kg, 100mg/kg (p.o) show significant analgesic effect in different pre-clinical models. how ever more detailed studies with different animal models may be beneficial. This point of view make the use of Emb. extract safe and best to use pain management.

References:

- MANAGEMENT OF PAIN AND FEVER IN DIFFERENT MEDICINAL SYSTEM- A REVIEW, IJLSR, (2015), Vol. 1, Issue 5; accepted, 27 April, 2015; published 30 May, 2015,...Dey Y, Gosh A: Evaluation of analgesic activity of methanolic extract of Amorphophallus paniifolius tuber. International Journal of Pharma and Biosciences 2010. 1:229-24
- Clinical Pharmacology Bennet & Brown, P.N. Bennett MD FRCP, M.J. Brown MA MScMD FRCP, Ninth, Edition, Published by Elsevier a division of Reed Elsevier India, Private Limited, 17-A/1, Main Ring Road, Lajpat Nagar – IV, New Delhi – 110 024, INDIA.
- Assessment of pain: types, mechanism and treatment December 2013 Annals of agricultural and Environmental medicine: AAEM 0(1)(Special Issue):2-7... Domżał T. Kli niczne podst awy badani a I Oceny bólu wprowadz enie do tematu. Pol Przegl Neurol. 2007; 3 (4), 211–Kraków, 2007. P. 63–97 (in Polish).
- Rang & Dale's PHARMACOLOGY, eighth edition, 2016, imprint of ELSEVIER limited. ISBN: Main Edition ISBN- 13978-0-7020-5362-7, International edition.
- Assessment of pain: types, mechanism and treatment December 2013 Annals of agricultural and Environmental medicine: AAEM 0(1)(Special Issue):2-7
- Major Pain Theories and Factors Behind Chronic Pain. <https://aneskey.com/major-pain-theories-and-factors-behind-chronic-pain>
- Submit a Manuscript: <https://www.f6publishing.com> DOI: 10.4252/wjsc.v15.112.1035 World Journal of Stem Cells World J Stem Cells 2023 December 26; 15(12): 1035-1062 ISSN 1948-0210 (online), Stem cells and pain.
- International Journal of Neurologic Physical Therapy 2016; 2(6): 44 50 <http://www.sciencepublishinggroup.com/j/ijnpt>. A Detailed Review on Nociceptive Models for the Screening of Analgesic Activity in Experimental Animals.
- Deepraj Paul et al. Int. Res. J. Pharm. 2013, 4 (5) INTERNATIONAL RESEARCH JOURNAL OF PHARMACY Research Article EVALUATION OF HYDROALCOHOLIC EXTRACT OF AERIAL

PARTS OF ABUTILON INDICUM FOR ITS ANALGESIC AND SEDATIVE PROPERTY
www.iriponline.com.

- Wolters Kluwer, PRINCIPLES OF PHARMACOLOGY. The Pathophysiologic Basic of Drug Therapy. Fourth edition. (South Asian Edition).
- Bennet & Brown Clinical Pharmacology. Ninth Edition. (ELSEVIER). Published by Elsevir India Private Limited.
- Goodman's & Gillman's The Phamacological Basis of Therapeutics, Tenth Edition, Edited by "Joel G Hardman, Ph.D Professor of pharmacology and Lee E. Limbird, Ph.D.
- Vasu S. Botanical Pharmacognosy of the Fruit of Embelia ribes Burm. F. Pharmacogn. Nat. Prod. 2015;1:2015. doi: 10.4172/jpnp.1000103.
- ANCE OF EMBELIA RIBES: AN UPDATE. IJPSR (2013), Vol. 4, Issue 10 Received on 23 May, 2013; Received in revised form, 17 July, 2013; accepted, 13 September, 2013; published 01 October, 2013. EISSN: 0975-8232; P-ISSN: 2320-5148... Jarald E: Textbook of Pharmacognosy and Phytochemistry, CBS Publishers and distributors, New Delhi, 2006:41-45.
- Ethnopharmacological Uses of Embelia ribes Burm. F. Dr. Somesh, Dr. Om Prakash Sharma and Dr. Jagdish Mohan Onka. Review Article ISSN 2455-3301 Wjpmr. Article accepted on 25 July 2021. Guhabakshi DN, Sensarma P, Pal DC (2001). A lexicon Medicinal Plants of India. Calcutta, India, Naya Prakashan, Calcutta pp.135-136.
- Syed Asadulla, Ramandang, Rajasekharan. Pharmacognosy of Embelia ribes Burm.f. International Journal of Research in Pharmacy and Chemistry. 2011. 1 (4):1236-1251.
- Distribution, conservation and folk uses of Vaibidang (Embelia ribes Burm. F.) International Journal of Biodiversity and Conservation Vol. 4(13), pp. 525-529, October 2012 Available online at <http://www.academicjournals.org/IJBC> DOI: 10.5897/IJBC12.046 ISSN 2141-243X ©2012 Academic Journals.
- International Journal of Modern Agriculture, Volume 10, No.2, 2021 ISSN: 2305 -7246 4588 Embelia Ribes Burm F. (Vai Vidanga)- An Overview- Sudani R J, Akbari B V and Vidyasagar G.(2011). Pharmacogenetic and preliminary phytochemical investigation of Embelia ribes Burm f. International Journal of Pharmaceutical & Biological Archives 2011; 2: 648-651.
- Biological Forum – An International Journal 15(6): 450-460(2023) ISSN No. (Print): 0975-1130 ISSN No. (Online): 2249-3239 Phytochemistry, Pharmacological Activities, Nanoparticles Synthesis, Commercial Exploration and Valorization of Endangered Medicinal Plant Embelia ribes Burm.: A Review---Asadulla, S. & Rajasekharan, R. (2013). Botanical Standardization of the Embeli ribes Burmf & Possibilities of Species Substitute. Global Journal of Medical Research, 13, 31–34.