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Formulation and Evaluation of Analgesic Herbal Gel from ethanolic Extract of Ehretia Laevis Leaves

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Abstract: ***The main aim of the project is to formulate and evaluate herbal analgesic gel for pain relief. In India many Folklore plant are used traditionally for medicinal purpose. Herbal medicines consist of plant or its part to treat injuries, disease or illness and are used to prevent and treat disease and ailments or to promote health and healing. In ayurveda these plant mention as a charma vruksha and useful for prameha (diabetics) and anti venom. This plant commonly used in joint pain, wound healing, minor fractures by local people. It has very good pain relief activity.***
Keywords: herbal analgesic, Ayurveda, Joint pain.

I. INTRODUCTION

Analgesic, also known as painkiller, are a class of drugs used to relieve pain. Unlike anesthetic, which block all sensation, analgesics specifically target pain without significantly affecting consciousness. They are widely used in both acute and chronic medical conditions. Pain, is a complex and factual experience that is a vital part of the human condition. It serves as a warning system that alerts the body to potential damage or impair, but it can also become a chronic condition that considerably affects quality of life. There are various types of pain, mechanisms, and ways it can be handled or treated.

A. Mechanisms of Pain

Pain involves a complex process that starts with a stimulus (like wound or inflammation) and ends in the brain where the pain is recognized. The pathway can be broken down into various stages:

1) Transduction: When anyone experience an injury, pain receptors (nociceptors) in the affected tissue are turn on. This converts the painful and throbbing stimulus (like pressure) into electrical signals.
2) Transmission: The electrical signals move beside nerve fibers to the spinal cord and then to the brain. This occurs through specialized and specific nerve fibers: A-delta fibers (which transfer sharp, acute pain) and C fibers (which transmit dull, aching pain).
3) Perception: The brain has these signals and interprets them as pain. The experience of pain becomes factual, as it's convinced by emotional and psychological aspects.
4) Modulation: The brain can convert the pain signals through descending pathways, either intensifying or diminishing the pain. This explains why pain can sometimes feel more deep when you're stressed or distracted, or why it might diminish with certain coping mechanisms (like relaxation techniques or pain treatment).

B. Common Causes of Chronic Pain

Arthritis: Inflammation of the joints that can cause enduring pain.
Back Pain: It can result from muscle strain, disc difficulty.
Migraines: Severe headaches that can cause acute throbbing or severe pain, often accompanied by nausea, vomiting or visual disturbances.
Fibromyalgia: A state characterized by widespread musculoskeletal pain and tenderness.
Nerve Damage: Condition like shingles or sciatica can cause long-lasting nerve pain.

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II. DRUG PROFILE

A. Ehretia laevis roxb. Leaves

Botanical Classification:

1) Kingdom: Plantae
2) Order: Boraginales
3) Family: Boraginaceae
4) Genus: Ehretia
5) Species: Ehretia laevis Roxb.



Fig 1. Ehretia laevis leaves

III. MATERIAL AND METHOD

Sr. no.	Drug	F1	F2	Properties
1.	Extract of Ehretia Laevis leaves	1 gm	1 gm	Analgesic and anti-inflammatory
2.	Carbopol	1.5 gm	2 gm	Gelling agent
3.	Propylene glycol	5 ml	5 ml	Stabilizer
4.	Methyl paraben	0.5 ml	0.5 ml	Preservative
5.	Propyl paraben	0.5 ml	0.5 ml	Preservative
6.	Triethanolamine	1.5 ml	1.5 ml	Neutralizer
7.	Water	Q.S	Q.S	-

Table 1: Material and method

Collection and authentication of plant material

Part of Plant Used: Leaves of Ehretia laevis Roxb.

Procedure:

- Collect fresh leaves of Ehretia Laevis.
- Wash it gently to remove dirt.
- Dry in shade (not direct sunlight) for some days.
- Transform it into fine powder using a grinder.
- Store it in airtight container.

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A. Extraction of Phytoconstituents by Maceration

Material required for maceration:

Powder of dried leaves Ehretia laevis plant, Solvent (methanol), Beaker or glass container, Stirrer, Filter paper, sieve, Evaporating dish, Measuring cylinder, Balance, Label for it.

Procedure:

Step 1: Preparation of Plant Material

- Collect and clean by washing fresh leaves.
- Dry them in shade to preserve phytoconstituent (avoid sunlight).
- Crush the leaves into fine powder.
- Weigh the required amount of powder.

Step 2: Selection and Preparation of Solvent

- Choose an suitable solvent: Methanol or ethanol .
- Use a suitable solvent volume mainly 10 times the weight of the plant material (1:10 w/v).

Step 3: Maceration

- Place the powdered leaves into a clean glass container.
- Add the solvent such as ethanol.
- Pack the container tightly with cap.
- Allow the mixture to stand for 48–72 hours at room temperature.
- Shake and stir the mixture 2–3 times a day to enhance extraction efficiency.

Step 4: Filtration

- After completion of maceration period, filter the extract using filter paper.
- Extract out any remaining liquid from the plant residue.

Step 5: Storage

- Store the extract in an amber-colored, airtight container.

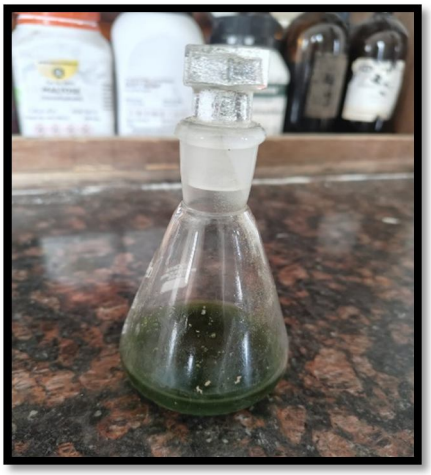


Fig 2. Maceration of Ehretia laevis leaves

B. Preparation of gel base

Ingredients used:

- Carbopol 940
- Propylene glycol
- Triethanolamine (TEA): q.s. (to adjust pH to 6.5–7)
- Distilled water: q.s.
- Preservatives: Methylparaben

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Procedure:

1. Disperse Carbopol 940 in distilled water and allow it to hydrate (usually 6–12 hours).
2. Add propylene glycol gently with continuous stirring to avoid lumps.
3. Incorporate the plant extract (typically 1–5% depending on efficacy and preliminary tests).
4. Stir slowly to ensure uniform mixing.
5. Adjust the pH to 6.5–7 using Triethanolamine to attain gel consistency.
6. Add preservatives.
7. Transfer to sterile containers.

C. Chemical Test

Sr. no.	Test	Test for	Result	Observation
1.	Alkaline reagent test	Flavonoids	Positive	Pink or red colour
2.	Dragondroff's test	Alkaloids	Positive	Formation of Precipitate
3.	Fehling test	Carbohydrates	Positive	Violet colour
4.	Benedicts test	Reducing Sugar	Negative	Red colour
5.	Keller killiani test	Glycoside	Postive	Brown colour
6.	Foam test	Saponins	Positive	Froth formation
7.	Biuret test	Proteins	Negative	Purple, violet colour
8.	FeCl3 test	Phenolic compound	Positive	Blue green colour
9.	Salkowaski test	Triterpenoids, Sterols	Positive	Reddish-brown colour

Table 2: Chemical test

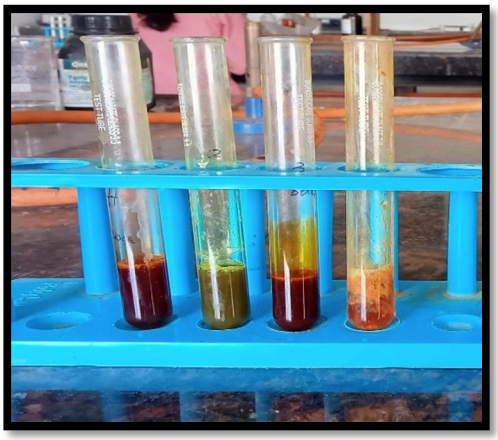


Fig 3: phytochemical test

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Fig 4: phytochemical test

IV. EVALUATION OF GEL

A. Physical Appearance

The physical appearance of the formulation was checked visually.
Colour: The color of the formulations was checked out against white & black backgrounds.
Odour: The odour of the gels was checked by mixing a little amount of gel in water and by taking smell.
Consistency: The consistency was checked by applying the gel on to the skin.
Greasiness: The greasiness was assessed by the application on to the skin.

B. Determination of pH

The pH values of 1% aqueous solutions of the optimized gel was measured by pH meter.

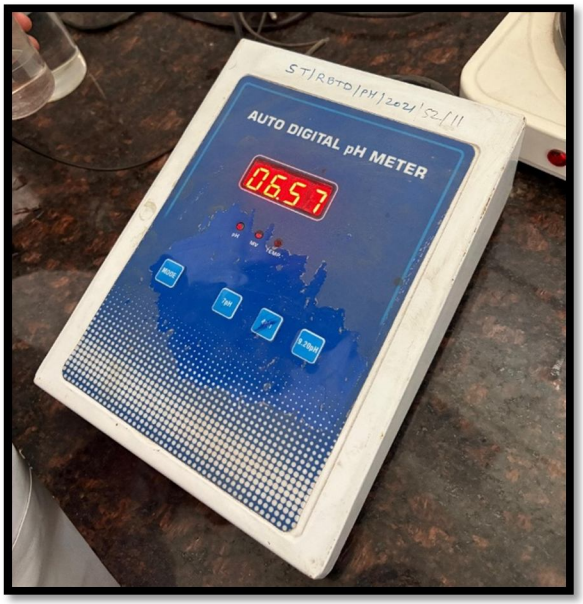


Fig 5. pH of gel

C. Spreadability

The spreadability of the gel formulations was determined by measuring the spreading diameter of 1 g of gel between two horizontal plates (20 cm x 20 cm) after one min.

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D. Irritancy Test

Mark an area (1sq.cm) on the hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, oedema, was checked if any for regular intervals up to 24 hrs and reported.



Fig 6. Irritancy test

Type of smear:

After application of gel, the type of film or smear formed on the skin were checked.

Washability:

The washability of Gel is examined by washing the applied part with tap water.

Phase separation:

Visual observation: Turbidity or cloudiness in the gel solution can be a sign of phase separation checked at room temperature.



Fig 7: Analgesic Gel

V. RESULT AND DISCUSSION

The analgesic gel was formulated and tested. The qualitative results are expressed as the presence and absence of phytochemicals.

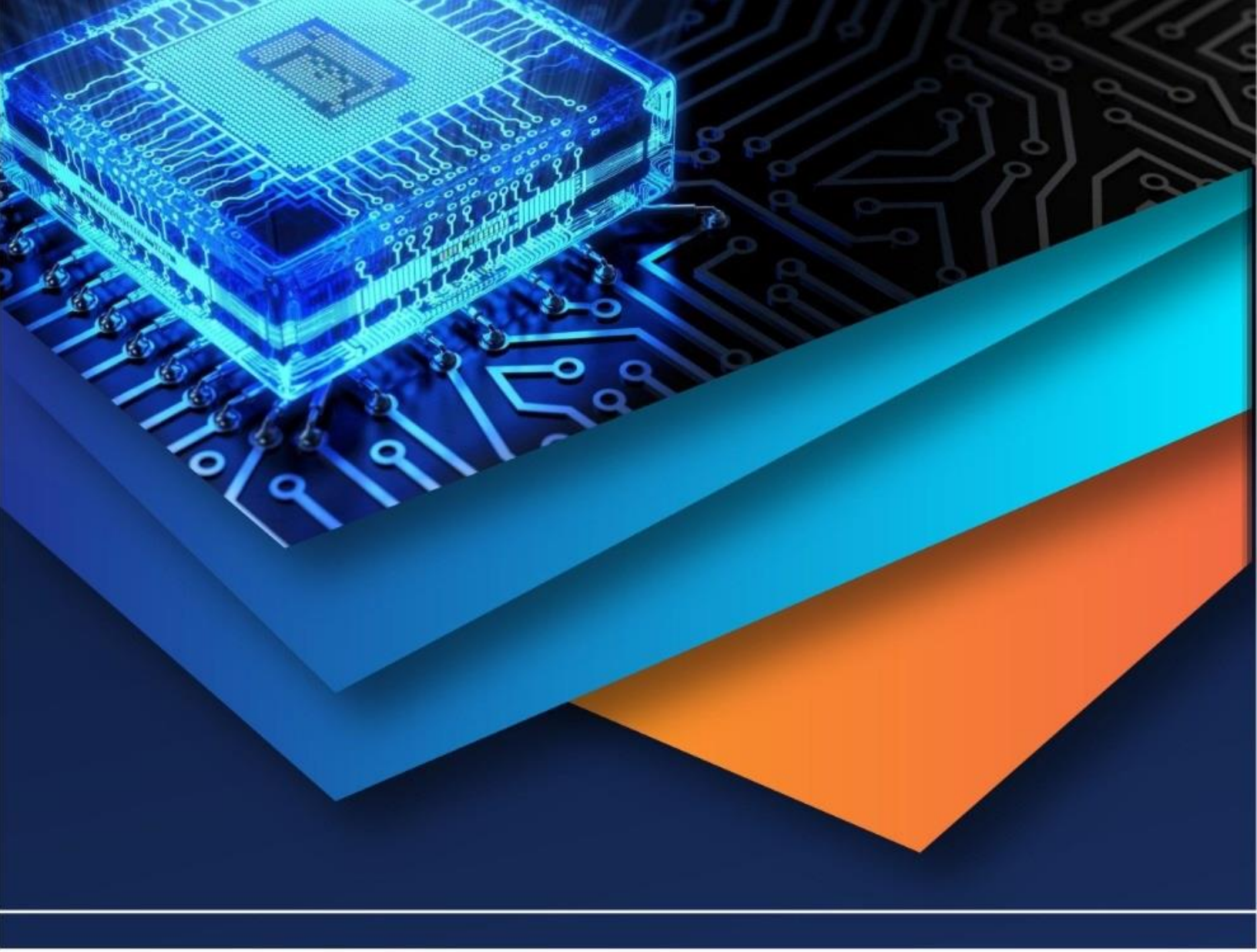
VI. CONCLUSION

In conclusion, the herbal gel formulated from Ehretia laevis leaves is a favaourable and eco-friendly approach for the topical treatment of pain and inflammation, combining traditional knowledge with modern formulation techniques.

REFERENCES

[1] Rang, H.P., Dale, M.M., Ritter, J.M., Flower, R.J., & Henderson, G. (2012). Rang and Dale's Pharmacology (7th ed.). Elsevier Health Sciences.
[2] Tripathi, K.D. (2013). Essentials of Medical Pharmacology (7th ed.). Jaypee Brothers Medical Publishers.
[3] International Association for the Study of Pain (IASP). (2020). IASP Terminology. Retrieved from https://www.iasp-pain.org/terminology/.

[4] Vane, J.R., & Botting, R.M. (1998). “Mechanism of action of nonsteroidal anti-inflammatory drugs.” American Journal of Medicine, 104(3A), 2S–8S.
[5] Treede, R.-D., Rief, W., Barke, A., Aziz, Q., Bennett, M.I., Benoliel, R., et al. (2015). “A classification of chronic pain for ICD-11.” Pain, 156(6), 1003–1007.
[6] International Association for the Study of Pain (IASP). (2020). IASP Terminology.
[7] Jensen, T.S., et al. (2011). “A new definition of neuropathic pain.” Pain, 152(10), 2204–2205.
[8] Clauw, D.J. (2014). “Fibromyalgia: A clinical review.” JAMA, 311(15), 1547–1555.
[9] Guyton, A.C., & Hall, J.E. (2016). Textbook of Medical Physiology (13th ed.). Elsevier.
[10] Kumar, V., Abbas, A.K., & Aster, J.C. (2014). Robbins and Cotran Pathologic Basis of Disease (9th ed.). Elsevier.
[11] Purves, D., Augustine, G.J., Fitzpatrick, D., et al. (2018). Neuroscience (6th ed.). Oxford University Press.
[12] World Health Organization (WHO). (2021). WHO guidelines for the management of chronic pain in adults. Geneva: WHO.
[13] Merskey, H., & Bogduk, N. (1994). Classification of Chronic Pain: Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms (2nd ed.). IASP Press.
[14] Ballantyne, J.C., & Mao, J. (2003). “Opioid therapy for chronic pain.” The New England Journal of Medicine, 349(21), 1943–1953.
[15] McQuay, H.J. (2017). Analgesic Therapy. In Oxford Textbook of Palliative Care. Oxford University Press.
[16] Derry, S., Moore, R.A., & McQuay, H.J. (2009). “Topical analgesics for acute pain: A systematic review.” Cochrane Database of Systematic Reviews, (4).
[17] Bali, S., Garg, A., & Mahi, G. (2014). “Formulation and evaluation of topical gel containing diclofenac sodium for the management of pain.” International Journal of Pharmaceutical Sciences and Research, 5(12), 4829–4835.
[18] Aung, T., & Khine, H. (2017). “Formulation and characterization of lidocaine gel for topical pain relief.” Journal of Pharmaceutical Sciences, 106(10), 3113–3120.
[19] Rosenberg, L. (2018). Practical Pain Management: Topical Analgesics. Elsevier.
[20] Sharma, R.K., & Dash, B. (2000). Charaka Samhita (Agni Sthana – on treatments). Chowkhamba Sanskrit Series Office, Varanasi.
[21] Prakash, A., & Gupta, V. (2011). “Therapeutic uses of Vitex negundo Linn in Ayurvedic medicine: A review.” International Journal of Pharmaceutical & Biological Archives, 2(6), 1527–1530.
[22] Sharma, A., Bhatia, S., Kharya, M.D., & Gajbhiye, V. (2013). “Formulation and evaluation of polyherbal topical gel.” International Journal of Pharmaceutical Sciences and Research, 4(4), 1428–1432.
[23] Rathod, A., Shah, R., & Mehta, D. (2017). “Formulation and evaluation of herbal gel containing Boswellia serrata extract.” Journal of Pharmacognosy and Phytochemistry, 6(5), 658–661.
[24] Nariya, A., Shukla, V.J., & Acharya, R.N. (2013). “Evaluation of herbal gel formulation containing Zingiber officinale and Curcuma longa extracts for anti-inflammatory activity.” Ayu, 34(3), 330–334.
[25] Mishra, A., et al. (2011). “Formulation and evaluation of herbal anti-inflammatory gel containing Curcuma longa and Aloe vera.” International Journal of Drug Development and Research, 3(4), 109–117.
[26] Singh, V., & Pandey, R. P. (2014). Ethnobotany of India: Volume 1: Eastern Ghats and Deccan. CRC Press.
[27] Journal of Indian System of Medicine, 2017. https://journals.lww.com/jism/abstract/2017/05020/pharmacognostic_and_phytochemical studies.
[28] Formulation and evaluation of anti aging herbal creams, MS. Dhotre Bhagyashree Gopalrao, International journal of advance in engineering and management, vol.2 111-114.



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