FORMULATION AND EVALUATION OF GINGER OFFICINALE GEL FOR ANALGESIC ACTIVITY

Bhadane Jayshree S.[1], Kulkarni Aditya M.[2], Mahale Divya M.[3], Mahale Rahul S.[4], More Komal P.[5], Patil Prathmesh S.[6]

[1]*Asst. Prof., Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*
[2]*Student, Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*
[3]*Student, Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*
[4]*Student, Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*
[5]*Student, Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*
[6]*Student, Department of Pharmaceutics, Loknete Dr.J.D. Pawar College of Pharmacy, Maharashtra, India*

ABSTRACT

Migraine is a common neurological disorder that may be accompanied by vascular disturbances, Migraine is one of the most causes of disability worldwide. Zingiber officinale is a medicinal herb that has an analgesic effect on many disorders such as headaches, migraine, muscle tension, stomach spasm, and dysmenorrhea. Also, ginger has many pharmacological actions used to treat and prevent various common symptoms and diseases. This review aims to evaluate the potential of ginger to treat or prevent migraine episodes. Especially nowadays, Patients prefer herbal and complementary medicine to avoid the hard side effects of chemical drugs. It is suggested that the bioactive compounds in ginger have the potential to treat and prevent acute migraine episodes effectively and safely. The author recommends encouraging the manufacturing of different pharmaceutical dosage forms of ginger extract to be used worldwide in a safe way and to render a higher absorption rate, and pharmacological response.

Keywords: - *Ginger Gel, Carbopol, Analgesic Activity, Gel Formulations.*

1. INTRODUCTION

Migraine:

What is Migraine:

Migraine is a type of headache characterized by recurrent attacks of moderate to severe throbbing and pulsating pain on one side of the head. The pain is caused by theactivation of nerve fibers within the wall of brain blood vessels traveling inside the meninges (three layers of membranes protecting the brain and spinal cord).

Types of Migraine-

- Migraine with aura
- Migraine without aura.

- Chronic migraine.
- Hemiplegic migraine.
- Menstrual migraine
- Abdominal migraine

Symptoms of Migraine-

- Throbbing, Drilling, Pounding Headache
- Sensitivity to light and sound
- Inability to focus or concentrate
- Stomach pain
- Vomiting
- Diarrhoea
- Nausea
- Neck and shoulder pain
- Severe Headache.[17]

2. PHASES OF MIGRAINE:

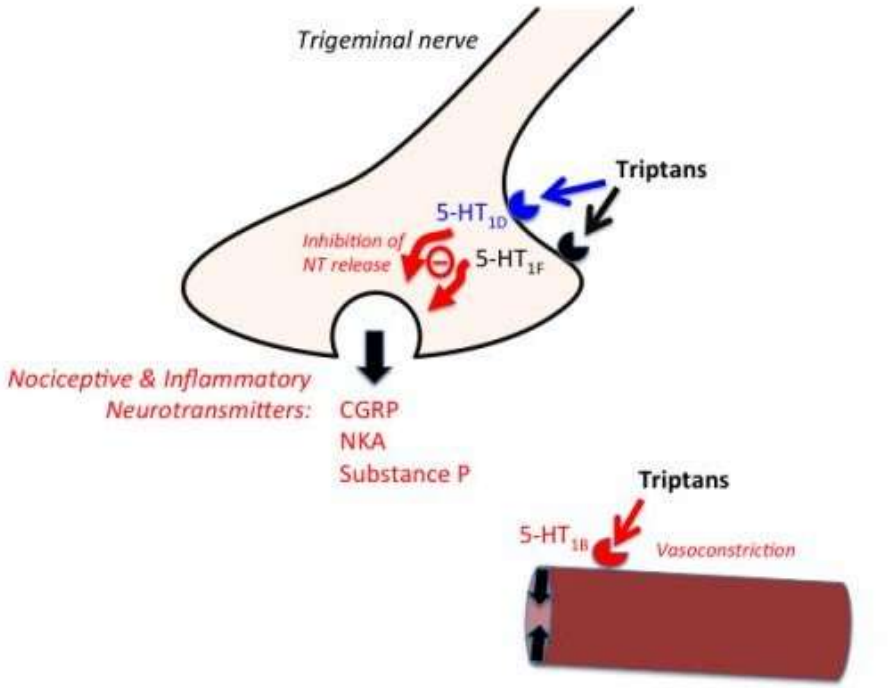
Migraine is divided into four phases, all of which may be present during the attack:

1. Premonitory symptoms occur up to 24 hours prior to developing a migraine. These include food cravings, unexplained mood changes (depression or euphoria), uncontrollable yawning, fluid retention, or increased urination.
2. Aura- Some people will see flashing or bright lights or what looks like heat waves immediately prior to or during the migraine, while others may experience muscle weakness or the sensation of being touched or grabbed.
3. Headache- A migraine usually starts gradually and builds in intensity. It is possible to have migraine without a headache.
4. Postdrome- Individuals are often exhausted or confused following a migraine. The postdrome period may last up to a day before people feel healthy again.

3. DRUGS USED FOR TREATMENT OF MIGRAINE:

1. Triptan drugs increase levels of the neurotransmitter serotonin in the brain. Serotonin causes blood vessels to constrict and lowers the pain threshold.
2. Ergot derivative drugs bind to serotonin receptors on nerve cells and decrease the transmission of pain messages along nerve fibers. They are most effective during the early stages of migraine.
3. Non-prescription analgesics or over-the-counter drugs such as ibuprofen, aspirin, or acetaminophen can ease the pain of less severe migraine headache.
4. Combination analgesics involve a mix of drugs such as acetaminophen plus caffeine and/or a narcotic for migraine that may be resistant to simple analgesics.
5. Nonsteroidal anti-inflammatory drugs (NSAIDs) can reduce inflammation andalleviate pain.
6. Nausea relief drugs can ease queasiness brought on by various types of headache.
7. Narcotics are prescribed briefly to relieve pain. These drugs should not be used to treat chronic headaches.[16]

4. MECHANISM OF ACTION OF ANTI- MIGRAINE DRUGS- TRIPTANS



5. MATERIALS AND METHODS:

Formulation:

Sr. No.	Ingredients	Quantity Taken
1.	Ginger Extract	2 ml
2.	Carbopol	1 grams
3.	Polyethylene glycol	5 ml
4.	Triethanolamine	q.s
5.	Sodium benzoate	q.s
6.	Distilled water	Up to 50 ml

6. INGREDIENTS:

Ginger: Synonyms: Zingiber, Sunthi.

Biological Source: Ginger consists of whole or cut, dried scarpped and unscarpped rhizomes of *Zingiber Officinale Roscoe*

Family: *Zingiberaceae*

Geographical source: It is said to be native or South East Asia but is cultivated in Carribbean Islands, Africa, Australia, India.

Chemical Constituent: Ginger consists of Volatile Oil(1-4%), Starch(40-60%), Fat(10%), Fibre(5%), Inorganic Materials (6%), Residual Moisture(10%), Acrid Resinous matter(5-8%). Ginger oil is constituted of Monoterpenes hydrocarbons, Sesquiterpene hydrocarbon, Oxygenated mono and Sesquiterpene and Phenylpropanoids.

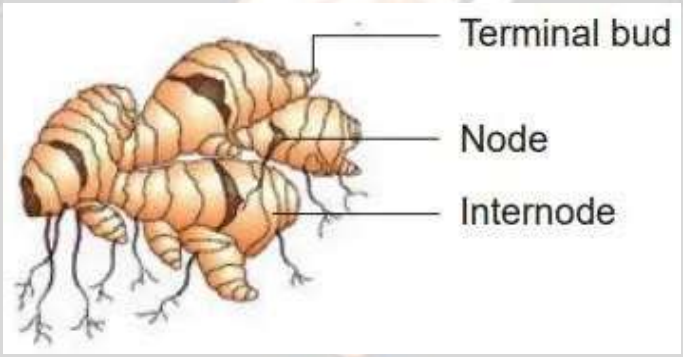


Fig. Ginger Rhizome

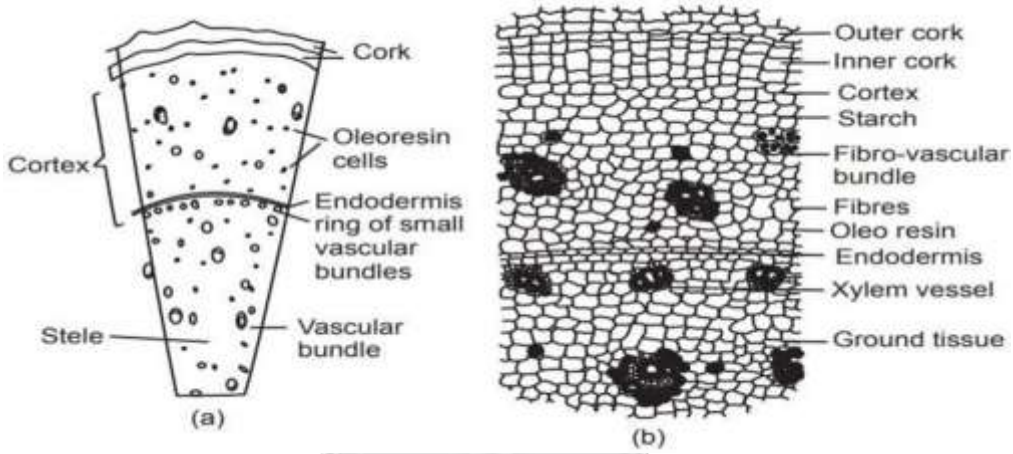
Microscopic Characters:

Colour- externally, it is buff colouredOdour-
agreeable and aromatic
Taste- agreeable and pungent

Size- Rhizomes of ginger are about 5-15 × 1.5-6.5 cm

Shape- compressed, bearing short flat, ovate and oblique branches on theupper
size with bud at the apex.

Fracture- short and fibrous



Uses:

- Better Digestion
- Improves Immunity
- Relieves Nausea and Upset Stomach
- May Help with Cancer
- Reduces Pain
- Healthier Skin
- Weight Loss Aid [8,10,11]

Preparation of extract:

Take 5 grams of ginger powder

↓

Then add 50 ml of ethanol in a conical flask and Covered with aluminum foil

↓

This mixture was periodically shaken as it macerated for four to five days.

↓

After maceration, Filter out the mixture

↓

Then filtrate was collect in porcelain dish

Fig. Preparation of extract

Method of Preparation:

Take required quantity of Carbopol.

↓

Then sprinkling in a beaker with 3 ml of water

↓

The beaker was kept aside for 15 minutes for the Carbopol to swell

↓

Then, weighed amount of polyethylene glycol and ginger extract was added to thebeaker

↓

Add Ginger extract in polyethylene glycol and then add into the Carbopol mixture beaker with continuously stiring.

↓

Add triethanolamine to adjust the pH to 7

↓

Then sodium benzoate was added to it

↓

sufficient quantity of distilled water was added to get the ginger gel

(Fig. Prepared Ginger Gel)

7. PHYSIOCHEMICAL SCREENING:

Physiochemical screening of the methanol extract of ginger was performed using stdprocedures

Test for tannin:

0.5 g of plant extract was mixed with 2mL of water and heated in a water bath. The mixture was filtered, and 1mL of 10% FeCl3 solution was added to the filtrate. A blue-black solution indicates the presence of tannin.

Result and Discussion:

Standard: blue-black solution.
Observed: Brown Colour

Inference: Absent

Test for steroids (Salkowski test):

0.2 g of plant extract and 2 mL of chloroform were added, and 2 mL of concentrated sulphuric acid was added to form a layer. The formation of a violet/blue/green/reddish-brown ring at the interface indicates the presence of a steroidal ring.

Result and Discussion:

Standard: violet/blue/green/reddish-brown ring
Observed: reddish- brick brown colour

Inference: Present

Test for reducing sugar:

2 mL of distilled water and 0.2 g of plant extract were mixed and thoroughly shakenin a test tube. 1 mL each of Fehling solution A and B were added to the mixture. A brick-red precipitate at the bottom of the test tube confirms the presence of reducing sugar.

Standard: brick-red precipitate at the bottom

Observed: brick red Precipitate
Inference: Present

Test for volatile oil:

0.2g of plant extract and 2 mL of ethanol were mixed, and a few drops of ferric chloride solution was added. A green coloration indicates volatile oil.

Standard: green coloration indicates volatile oil

Obserevd: Green Colour
Inference: Present

Test for saponin:

About 0.2 g of plant extract was shaken with 4 mL of distilled water and then heated to boil in a water bath. The creamy miss of tiny bubbles (Frothing) shows thepresence of saponin.

Standard: creamy miss of tiny bubbles (Frothing) shows the presence of saponin.

Observed: Creamy miss tiny bubbles
Inference: Present

Observation Table for Test:

Sr.no.	Chemical Test	Standard	Observed	Inference
1.	Test for Tanin	Blue-black solution.	Brown Colour	Absent
2.	Test for Steroids	Violet/blue/green/reddish-brown ring	Reddish-brick brown colour	Present

3.	Test for Reducing Sugar	Brick-red precipitate atthe bottom	Brick red Precipitate	Present
4.	Test for VolatileOil	Green coloration indicates volatile oil	Green colour	Present
5.	Test for Saponin	Creamy miss of tiny bubbles (Frothing) showsthe presence of saponin.	Creamy miss tiny bubbles	Present

8. EVALUATION PARAMETERS:

Physical appearance:

The physical appearance of the formulation was checked visually which comprised. Color - The color of the formulations was checked out against white background.
Consistency-The consistency was checked by applying on skin.

Feel on the skin - No Irritation

pH:

pH of the formulated gel was determined by using pH meter. In this method, gel was dispersed in purified water. The electrode was washed with double distilled water, dried by tissue paper and calibrated before use with standard buffer solution at 4.0,7.0, 9.0 . The pH measurements were done in triplicate and average values were calculated 10.

Stability studies:

The Gel formulation was stored in well closed glass container and then stored at $5^{o}C$ and at $30^{o}C$. Physical appearance, content uniformity and drug permeation study data was determined at regular time intervals.

Result- The Physical appearance and content uniformity of optimized formulation was found to be unchanged after 2 months and Drug permeation study was done by applying on skin.

Chemical stability studies:

Analyze pH, active ingredients concentration, and any chemical changes.

Physical stability studies:

Changes in texture and appearance was analyze

Spreadability:

The spreadability studies were carried out using 1gm of the gel on the butter paper. This was then placed between two parallel tiles with an upper plate bearing a weightof 1 kg. The spreading diameter of the gel was recorded as spreadability. The average diameter of the circle after the spreading of the gel was determined.

9. CONCLUSION:

To sum up, the creation and assessment of ginger gel's analgesic properties offer a potentially effective approach to pain relief. Due to its analgesic and anti- inflammatory qualities, ginger is a useful natural substance for topical treatments. Careful formulation and optimization are necessary to create a stable gel, taking into account variables such as concentration, excipients, and rheological characteristics.

Rigorous research, including both in vitro and in vivo evaluations, are part of the evaluation process to find out how well the gel works to reduce inflammation, ease pain, and create safety profiles. Subsequent developments could concentrate on improving bioavailability, investigating innovative delivery methods, and carrying out thorough clinical trials to confirm its efficacy in a range of pain disorders.

Overall, the development and testing of ginger gel demonstrate promise for a possible substitute or addition to conventional analgesics.

10. REFERENCES:

1. Trease and Evans, Pharmacognosy, Sixteenth Edition, Saunders Elsevier, Pageno.289-292.
2. Indian Pharmacopoeia 2022, Volume III, Ninth Edition, Published by Indian Pharmacopoeia Commission Ghaziabad, Page no. 4304-4305.
3. Kokate c.k., A book of Pharmacognosy, Nirali Prakshan, 58th Edition, Page no. 14.142-14.143.
4. Joshi Saroja, Practical Pharmacognosy, published by Frank Bros and co. , 1st Edition 2009, Page no. 146-147.
5. V.Rajpal, D.P.S. Kohli, Herbal drugs industry, Published by Business Horizons, 2nd edition 2009, Page no.238-239.
6. Safitri FI, Nawangsari D, Febrina D. Overview: Application of carbopol 940 in gel. InInternational Conference on Health and Medical Sciences (AHMS 2020) 2021 Jan 27 (pp. 80-84). Atlantis Press.
7. Lachman/Lieberman's , The Theory and Practice of Industrial Pharmacy, CBS publishers & Distributors, 4th Edition, Page no.501.
8. The role of Triethanolamine Echemi.com https://www.echemi.com/cms/85497.html
9. Rang & Dale's Pharmacology, Elsevier Churchill livingstone, Eighth Edition, Page no. 203-205.
10. Tripathi KD., Essentials of Medical Pharmacology, 8th Edition, page no. 192-193.