

FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP OF GINGER AND CLOVE USING JAGGERY BASE

Nikita Dnyaneshwar Ghorpade

Students, Bachelor of Pharmacy,
Shri Sai Institute of Pharmacy & Research
Chhatrapati Sambhajanagar,
Maharashtra, India.
nikitaghorpade800@Gamil.com

Shaik Zainudden

Assistant Professor,
Department of Pharmacy
Assistant Professor, Shri Sai Institute of Pharmacy & Research
Chhatrapati Sambhajanagar,
Maharashtra, India.

Dr. Kavita Kulkarni

Principal
Department of Pharmacy
Principal, Shri Sai Institute of Pharmacy & Research
Chhatrapati Sambhajanagar,
Maharashtra, India.

Abstract

The present study focuses on the formulation and evaluation of a herbal cough syrup using ginger and clove with jaggery as a base. Herbal ingredients such as tulsi, peppermint, fennel, cardamom, black pepper, and liquorice were incorporated for their therapeutic properties, including anti-inflammatory, antitussive, expectorant, and immune-enhancing effects. The syrup was prepared using the decoction method, and jaggery was used as a natural sweetener and preservative to improve palatability and shelf life. Three formulations (F1, F2, F3) were developed, and the optimized formulation (F3) was selected based on its viscosity and physicochemical properties. The prepared syrup was evaluated for organoleptic characteristics, pH, density, viscosity, and stability. Results indicated that the herbal cough syrup was brownish in color, sweet with an aromatic odor, and had a pH of 5.33 and viscosity of 1.202, demonstrating satisfactory physical and chemical properties. This study confirms that the developed herbal cough syrup is safe, effective, non-alcoholic, and potentially beneficial for relieving dry and wet cough, promoting easy breathing, and enhancing immunity without adverse effects associated with synthetic formulations.

1. INTRODUCTION :-

Herbal plants and formulations are used for the many types of diseases like cough syrup and many more other diseases. In cough syrup many types of herbal plants are used, for example ginger, tulsi, honey, clove. In

that whole plants are used for making herbal medicine since a many years. Herbal formulations are most commonly used in development as well as developing countries as health care aid

Herbal cough syrup was prepared by adding decoction of herbal drugs with jaggery as a base. The herbal cough syrup is formulated by using decoction method. Mix decoction of herbal drugs with base of jggery helpful to the formulation for thicken and preserve the formulation. That was helpful to increase the shelf life of formulation. The added jaggery sweetener can also helpful to increase the palatability of some herbal drugs. Unpleasant taste and odour. Examine solubility of drug

A cough is a sudden and often repetitively occurring process which helps to clear the large breathing passage from secretion, irritants, foreign particle and microorganisms. When there is a blockage orirritation in the throat or upper air passage

Some of the symptoms of a cough are itchy throat, chest pain and congestion. The repetition of coughing produces inflammation and discomfort, which in turn result in more coughing. Natural product itself or compounds derived from natural

products play a major role as drugs or lead molecules for the development of synthetic drugs. Many antibiotic materials are unstable when maintained in solution for appreciable length of time, and therefore, from a stability standpoint, insoluble forms of the drug substances in aq.suspension or as dry powder for reconstitution are attractive to manufactures.

In adults with a chronic cough,i.e a cough longer than 8 weeks, more than 90 percent of cases are due to post nasal drip, asthma, eosinophilic bronchitis and gastroesophageal reflux disease. There are many types of drugs that are used to suppress cough and are often prescribed in combination. Before dealing with the particular type of drug used, it is important to consider briefly the nature of cough production, its role in disease and desirability of suppressing it. The most preferred treatment for cough is herbal treatment. Herbal formulations are playing major role in improvement of health care sector. The Herbal treatments are used for mild to severe health disorders including, asthma, tuberculosis, cough, pneumonia, kidney diseases, cancer, diabetes, allergies, lung cancer and viral infections . As stated, to estimate of WHO, there are 80% population even uses herbal medicines for primary health care requirements. Medicinal herbs have always been used as traditional primary healthcare agents and especially in Asian countries . Major use of herbal medicines is for health promotion and therapy for chronic, as opposed to condition which are life threatening. Most of the synthetic drug treatment used causes many side effects like vomiting, nausea, sedation, allergies, respiratory tract infections, appetite change, irritability, drowsiness, addiction and excess use can damage organs

or parts of organs. In recent years, researchers are mainly focusing on herbal drugs and herbal treatments which have less or have no side effects during and after treatment herbal cough syrup is typically used as an alternative to conventional cough syrup.

which often contain synthetic ingredient that can have unwanted side effect. Herbal cough syrup is generally considered to be safe and effective for most people, although it is important to consult with a healthcare professional before using any new herbal remedy. Herbal medicine are naturally occurring plant- derived substance that are used to treat illness within local or regional healing practices. Syrups are a popular anti-tussive drugs because they feel more soothing to swallow a tablet or capsule, and the medication is more quickly absorbed. Due to various adverse effects of available synthetic cough syrup preparations, the present study was performed to comparatively evaluate the herbal cough syrup containing natural ingredients having no side effects.

2. LITERATURE REVIEW :-

2.1. Miss Telange Patil (2022) :-

Medicine presently used to treat cough are among the most extensively used over the counter medicines in the world, despite a recent analysis suggesting that there is a little evidence to similar medicines produce any meaningful efficiency. Syrup is generally useful and popular dosage form which is used for the treatment of cough and cold. We prepared the herbal cough syrup by adding decoction of herbal drugs such as Ginger, Tulsi, Liquorice, black pepper, funnel, peppermint, clove and excipients like peppermint oil, methyl paraben with jaggery as a base. The herbal cough syrup is

formulated by using decoction method. Adding the decoction of herbal drugs with base of jaggery is helpful to the formulation for thick and preserve the formulation. That was helpful to increase the shelf life of formulation of herbal syrup. The added jaggery sweetener can also help to increase the palatability of some herbal drugs. The finally develop the herbal cough syrup with the base of jaggery.

2.2. Mr. Ankush Ganpat patil (2002) :-

Cough is one of the most common problem faced by all people. There are mainly two types of cough one is dry cough and another one is wet cough. dry cough there is no mucous and secretion while in wet cough there is cough with mucous or secretion. Syrup is commonly used and popular dosage form which is used to cure cough and cold, because it having ease of patients compliance. Syrup contain Ginger macerated honey base and also Tulsi, liquorice, cardamom, fennel, adulsa, clove as an antitussive and expectorant. Quality of final herbal syrup was evaluated for pre formulation a post formulation parameter. Here by using honey base three batches were formulated having various concentration such as 35%, 40%, 45% w/v.

2.3. Vanshri Turke (2023) :-

Syrup is commonly useful and famous dosage form which is used for the remedy of cough and bloodless. We organized the herbal cough syrup by means of including Jaggery base and decoction of natural capsules together with Pudina, Tulsi, Cinnamon, Jaggery and other natural excipients. The natural cough syrup is formulated by using decoction method. Including the decoction of natural capsules with base of Jaggery is beneficial to the formulation for thick and preserves the

system. That turned into beneficial to increase the shelf lifestyles of components of natural syrup. The brought Jaggery sweetener also can help to growth the palatability of some natural drugs. The ultimately increase the herbal cough syrup with the bottom of Jaggery. The purpose of this examine is to develop a herbal cough syrup and examine the parameters consisting of, coloration odour, taste have been as compared with the changes in multiplied balance checking out. Excellent of very last natural cough syrup changed into evaluated with the parameters such as physical appearance like shade, odour, taste, pH. Syrup acts as an expectorant for treating respiration issues, inclusive of colds bronchitis, cough, asthma and upper respiration conditions.

2.4. Mr. Rohit Rajendra Ubale (2024) :-

The cough it is a most common problem are face by the all people. There are two types of cough one is the Dry cough and second is wet cough. The dry cough is a no mucous and secretion while in wet cough there is cough mucous or secretion. The syrup is most commonly used and popular dosage form there is used in cure the cough and cold because it having ease of patients compliance. The herbal cough syrup was formulated using crude drugs as Pudina & Tulsi or Cinnamon as a main ingredient along with JAGGARY. Today syrup is used for treatment of May ailments and to overcome symptoms of disease. The antioxidant syrup is used to treatment the cancer because of many stress condition and other oxidative reaction in body the free radical are generated by using theses, syrup the condition is overcome. Formulation at laboratory scale was done and evaluate for number of parameters such as PH, viscosity, Density, stability testing during evaluation formulation found to be stable and ready to

use in a cough treatment. It is found that Antitussive

2.5. Mr. Tanvir S. Rohokale (2023) :-

The main objective of this study was to eliminate harmful synthetic ingredient from herbal cough syrup. Formulation and substitute them with safe natural ingredient. Asthmatic patients are increasing day by day in India due to various environmental reasons. It is beneficial for people suffering from chest congestion. The study aim to formulate a pure herbal syrup and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal syrup. There are wide range of synthetic cough syrup available in the market with different functions, But there synthetic cough syrup show harmful effect on the body. Such as confusions, hallucinations, trouble urinating. Due to there reasons cough syrup has evolved as an alternative to synthetic cough syrup because of the safe and traditionally used ingredients. The natural herbal syrup was formulated by adding the extracts of Adhatoda vasica nees. Syzygium aromaticum, Vasicine, Vasicol, and Vasinone, Sugar, Alcohol, Orange peel Constituents. It may also act as a bronchodilators nad as an expectorant. Adhatoda Vasica Nees, Leaves extract is a traditional medicine and reported to use in the management of cough. The vasaca plant may have properties such as antimicrobial, antibacterial, anti inflammatory, antiasthmatic, anticancer, antituberculars, antioxidants. Vasaka leaves have the potential to provide compounds. with strong antitussive efficacy and little side effects Allowing for treatment of expectorants, particularly dose and monitoring of unwanted effects. Hence, the results of the present study indicted the Cooperative effect of vasaca leaves in the management of cough aversions.

2.6. Snehal Jadhav :-

The objective of the study was to develop analogous herbal syrup using ginger, basil and stevia (GBS Syrup) as the main ingredients and evaluate for its antimicrobial, antioxidant activity and storage study of the syrup. The focus was on Ginger, Basil and Stevia to formulate a healthy option to synthetic syrups. For this purpose, extract of ginger and basil were withdrawn and tried at different level, to match the sweetness level of traditional syrup (650Brix), Different concentration of Stevia was used in order to match the viscosity. Different levels of stabilizer were also explored. The developed. syrup was analyzed for its storage study using various physico-chemical and microbial parameter and evaluated for anti-oxidant and antimicrobial activity against Basillus subtilis, Staphylococcus aureus, Salmonella typhi, Echerichia coli, Aspergillus niger and Saccharomyces cerevisiaea. Product acceptability of this syrup to consumer was evaluated and it shows satisfactory results.

Objective of study :-

- Relieves dry and wet cough.
- Enhances immunity.
- Cures cold, sore throat and bronchitis.
- Promotes easy breathing.
- Very effective against allergic cough and smoker cough
- It is a non-alcoholic formulation.
- It is effective in dissolution and removing congealed cough and phlegm.
- It is non habit forming.
- Expels sputum accumulated in the chest and prevent forming new sputum.

3. DRUG & EXCIPIENTS PROFILE :-

| SR.NO | INGREDIEN TS | USES |
|-------|--------------|-------------------|
| 1 | Ginger | Anti-Inflammatory |
| 2 | Clove | Expectorant |
| 3 | Tulsi | Anti-tussive |
| 4 | Cardamom | Aromatic |
| 5 | Black Pepper | Preservative |
| 6 | Fennel | Flavoring Agent |
| 7 | Peppermint | Cooling Agent |
| 8 | Liquorice | Anti-Inflammatory |
| 9 | Jaggery | Base |

3.1. GINGER:-

- **Synonyms** :-Rhizoma zingiberis, Zingibere.
- **Biological Source** :-Zingiber officinale
- **Family** :- zingiberaceae
- **Chemical constituents** :- Gingerol, Shogaol, Zingiberena
- **Use** :- Anti-inflammatory



3.2. CLOVE :-

- **Synonyms** :- Lavang
- **Biological Source** :- Eugenia caryophyllus
- **Family** :- Myrtaceae
- **chemical Constituents** :- Eugenol
- Uses** :- Stimulant aromatic species, dental analgesic



3.3. TULSI :-

- **Synonyms** :- Gauri
- **Biological Source** :- Ocimum sanctum
- **Family** :- Labiatae
- **Chemical Constituents** :-Eugenol, Vitamin C
- **Uses** :- Immunomodulator, Antibacterial



3.4. CARDAMOM :-

- **Synonyms** :- Seasonings
- **Biological Source** :- Elettaria cardamimum
- **Family** :- Zingiberaceae.
- **Chemical Constituents** :- alpha-pinene, beta-pinene
- **Uses** :- Aromatic, carminative, stimulate



3.5. BLACK PEPPER :-

- **Synonyms**:- Golmirch
- **Biological Source**:- Piper nigrum
- **Family**:- Piperaceae

- **Chemical Constituents** :- alpha-pinene, beta-pinene, piperine
- **Uses** :- Flavouring agent, condiment, antibacterial



3.6. FUNNEL:-

- **Synonyms** :-Bhang
- **Biological Source** :-Foeniculum vulgare
- **Family** :-Umbeliferae
- **Chemical Constituents**:- Anethole, Fenchone PharmEasy
- **Uses** :- Flavoring agent



3.7. PEPPERMINT :-

- **Synonyms** :- Brandy mint
- **Biological Source** :- Mintha peperita
- **Family** :-Labiatae
- **Chemical** :- Menthol, menthone cineole



- **Uses** :- stomachic, carminative

3.8. LIQUORICE :-

- **Synonyms** :-Mulethi
- **Biological Source** :- Glycyrrhiza glabra
- **Family** :- Leguminosae
- **Chemical Constituents** :- Glycyrrhizin, Glycyrrhetic acid.
- **Uses** :-Demulcent, Expectorant



3.9. JUGGERY :-

- **Synonyms** :- Gur
- **Biological Source** :- Sugarcane and toddy palm tree
- **Chemical Constituents** :- 70% sucrose
- **Uses** :- sweetener, self-preservative



4. Material & Method :-

4.1. List of drug & Excipients :-

| Sr.No | Herbal Drug |
|-------|--------------|
| 1 | Ginger |
| 2 | Liquorice |
| 3 | Tulsi |
| 4 | Peppermint |
| 5 | Fennel |
| 6 | Cardamom |
| 7 | Black pepper |
| 8 | Jaggry |
| 9 | Clove |

Table 6.1:- List of herbal drug

4.2. Equipments and Glassware used:-

| Sr No. | Glassware |
|--------|--------------------|
| 1 | Beaker |
| 2 | Measuring Cylinder |
| 3 | Spatula |
| 4 | Funnel |

Table 6.2:- Equipments and Glassware used

4.3. Instruments used:-

| Sr No. | Name | Model | Manufacture |
|--------|----------------|----------------|-----------------|
| 1 | Digital alance | AA-2200 | LABLINE, Mumbai |
| 2 | Heating hentle | Heating hentle | LABLINE, Mumbai |

Table 6.3:- Instruments used

5. Experimental Works:-

5.1. Material/Instruments used:-

The material/instruments used for this work were heating mantle, measuring cylinder, funnel, spatula and beaker.

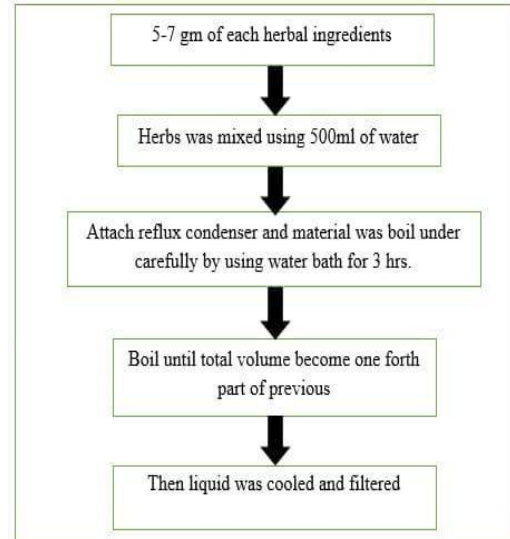
5.2. Sample/Herbal drug collection:-

All the herbal crude drugs were collected from the local market.

5.3. Processing of herbal drugs:-

All the herbal crude drugs were dried and powdered by using electric grinder.

5.4. Decoction of herbal Drugs :-



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No. 7.1:- Method of decoction



Fig No . 7.2 :- Decoction of Herbal Drug



Fig 7.3 :- Decoction of herbal drug

5.5. Formulation Table :-

| Sr. No | Ingr edien ts | Quantity | | | Use |
|--------|----------------|----------|------|------|--------------------|
| | | F1 | F2 | F3 | |
| 1 | Ginger | 4 gm | 2 gm | 6 gm | Anti-Inflammat ory |
| 2 | Liqu orice | 1 gm | 1 gm | 1 gm | Anti-Inflammat ory |
| 3 | Tuls | 2 gm | 2 gm | 2 gm | Antitussi ve, |
| 4 | Pepp ermir t | 1 gm | 1 gm | 1gm | Cooling Agent |
| 5 | Fenr el | 2 gm | 2 gm | 2 gm | Flavoring Agent |
| 6 | Card amo m | 2 gm | 2 gm | 2 gm | Aromatic |
| 7 | Blac k pepp er | 1 gm | 1 gm | 1 gm | Preservat ive |
| 8 | Jagg ry | 40 % | 40 % | 40 % | Base |
| 9 | Clov e | 2 gm | 1gm | 3 gm | Expector ant |

Table 7.1 :- List of Herbal ingredients with quantity & use

5.6. Formulation Procedure:-

- The F3 batch formula is taken as final formula has having the best viscosity.
- In the final preparation of the herbal cough syrup All the herbal decoction are taken 10 ml each and mixed together except jeggary which is taken about 45%.
- Preparation is continuously stirred

until the jeggary and decoction completely mixed together.

- The herbal cough syrup finally prepared.

5.7. Evaluation of herbal cough syrup:-

Physiochemical parameter likes specific gravity, density, pH, refractive index, alcohol contain, acid value were analysed as per the standard procedure mentioned in Indian pharmacopoeia. The colour, odour, test were also recorded syrup.

1. Colour examination :-

shows the results obtained for colour of formulated batches of syrup. The colour of formulation was found to be yellowish brown for the optimized batch. The colour of the formulation ranges from yellowish brown to dark brown for F1 ,F2 & F3 batches respectively.

2. Odour examination:-

shows the results obtained from odour of formulated batches of syrup. The odour of formulation was aromatic for F1 ,F2 & F3 batches respectively.

3. Taste examination :-

A pinch of final syrup was taken and examined the taste of yrup.

4. pH examination:-

- 1) Washed the glass electrode with distilled water and cleaned.
- 2) Placed the electrode in pH 7 buffer solutionand set the value of 5.54 on the pH meter turnin the Calibrate knob on the meter.
- 3) Removed the electrode and washed withdistilled water and cleaned.
- 4) Placed electrode in the pH 4 buffer solution. Adjust the value.
- 5) Then electrode was placed in the final syrup.



Fig 7.4 :- pH Examination

5. Density examination :-

- 1) Cleaned the specific gravity bottle.
- 2) The bottle was washed at least two times with distilled water.
- 3) Measured the weight of empty dry bottle with stopper (w1).
- 4) The bottle was filled with final syrup and placed the stopper, wipe out excess syrup from outside the tube.

5). Measure the weight bottle with syrup (w2).

6) Calculate weight in grams of syrup (w3).

Formula for density:-

Density of liquid under test (syrup) = weight of syrup under test /volume of final syrup under test =W3/v.

6. Viscosity examination; -

1) Cleaned the Ostwald viscometer with warm chromic acid and if necessary used an organic solvent such as acetone. E 0.00

2) Placed the viscometer in vertical position on a suitable stand.

3) Filled water in dry viscometer up to mark G.

4) The time was counted in second for water to flow from mark A to mark B.

5) This step was repeated at least 3 time to obtained accurate reading.

6) Then washes the viscometer with

sample liquid and then fill it up to mark A, then observed out the time required for liquid to flow to mark B

Formula for viscosity:-

Density of test liquid x Time required to flow test liquid Viscosity = x Viscosity of water

Density of water x Time required to flow water.



Fig 7.5 :- Viscosity Examination

7. Stability testing:-

1) Stability testing of the prepared herbal syrup was performed on keeping the samples a accelerated temperature conditions.

2) The final syrup was taken in culture tubes.

3) Then kept at accelerated temperature at 4°C, Room temperature and 47°C respectively.

4) The samples were tested for all the physicochemical parameters (colour, odour, taste) turbidity and at the interval of 24 hr, 48 hr, and 72 hr to observe any change.

5.8. Identification & authentication :-

Current development in the identification and authentication of plant species and products in the herbal marketplace is moving toward the use of combination methods. Ten previous studies were found to use combination methods for the authentication

of herbal products. In general, these studies support the notion that combination methods are more preferred for application in herbal authentication compared to single methods

6. Result and Discussion:-

6.1. Pre formulation Studied:-

Parameter were identifying those organoleptic properties shown in table:

| Sr No. | Herbal Drug | Organoleptic properties | | | |
|--------|--------------|-------------------------|-------------|-----------------|------------------|
| | | colour | odour | Morphology size | shape |
| 1 | peppermint | Mint Green | Sharp odour | 2.6-4.6cm | Lance shaped |
| 2 | Tulsi | green | musky | 1.5-6cm | elliptical |
| 3 | Liquorices | brown | aromatic | 2-6 cm | Long Cylindrical |
| 4 | Ginger | Light brown | aromatic | 2-10 cm | Thick branched |
| 5 | Clove | Dark brown | Spicy sweet | 13-19 mm | Nail like |
| 6 | Fennel | Light green | aromatic | 4-10 mm | Distinct shape |
| 7 | Black pepper | Dark brown/black | spicy | 50-150mm | round |
| 8 | Cardamom | Light green | aromatic | 6-8 mm | Spindle shaped |
| 9 | Jaggery | yellow | Sweet | - | - |

Table no.8.1 preformulation studied

6.2. Evaluation of herbal cough syrup:

6.2.1. organoleptic

characterization:-Appearance of all formulations were observed visually which was found to be brwnish. The observations

are shown in table.

| Sr. no. | formulation | colour | odour | taste |
|---------|-------------|----------|----------------|-------|
| 01 | F1 | brownish | Sweet aromatic | sweet |
| 02 | F2 | brownish | Sweet aromatic | sweet |
| 03 | F3 | brownish | Sweet aromatic | sweet |

Table.8.2 :- organoleptic characterization

6.2.2. pH Determination:-

The pH of all prepared batches of herbal cough syrup were determined by using digital pH meter and observed ph is given in table.

| Sr. no. | Formulation code | pH |
|-----------|------------------|-------------|
| 01 | F1 | 5.77 |
| 02 | F2 | 5.58 |
| 03 | F3 | 5.33 |

table.8.3:- pH determination of herbal cough syrup

8.2.2. Viscosity Determination:-

The pH of all prepared batches of herbal cough syrup were determined by using ostwalds viscometer.

| Sr. no. | Formulation code | viscosity |
|-----------|------------------|--------------|
| 01 | F1 | 1.150 |
| 02 | F2 | 1.304 |
| 03 | F3 | 1.202 |

table no.8.4 viscosity determination of herbal cough syrup

Our overall study is determination of general physical and chemical parameters that are essential for the identification of crude drugs on the basis of available standard data. The physicochemical property of

herbal cough syrup finished product were: **pH (5.33), Viscosity (1.202), The Colour (brownish), Odour (aromatic), and taste (sweet)** of herbal cough syrup was Satisfactory in physical appearance.

7. SUMMARY & CONCLUSION :-

7.1. summary :-

the Preformulation studies of all three formulations were within specifications. Also the physiochemical properties of prepared syrup like colour, odour, pH, taste were satisfactory but among the all three formulation is was within the all specification, it has proper concentration of jaggery as per IP and also a good preservative. The present study help to develop affective and safe herbal cough syrup with 40% W/V jaggery as a base of cough syrup.

7.2. CONCLUSION: –

Our overall study is determination of general physical and chemical parameters that are essential for the identification of crude drugs on the basis of available standard data. The physicochemical property of herbal cough syrup finished product were: **pH (5.33), Viscosity (1.202), The Colour (brownish), Odour (aromatic), and taste (sweet)** of herbal cough syrup was Satisfactory in physical appearance. The herbal product is in high demand because of the least possibilities of side effect. The present studies help to develop a herbal cough syrup with 40% w/v Jaggery base Syrup, which is effective and safe.

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