

# “EXPLORING THE POTENTIAL OF PAPAYA, GINGER AND PINEAPPLE: MANAGEMENT OF MENSTRUATION REGULARITY THROUGH NATURAL MEANS”

**Author :** Vaishnavi V. Bankar, Vaishnavi V. Pund, Ajit B. Tuwar, Dr. Megha T. Salve

## ABSTRACT

Menstruation is regular uterine bleeding that occurs at more or less regular monthly periods during a woman's active reproductive life. The menstrual cycle and the accompanying physical and mental symptoms can often have a negative impact on daily life and activities. Papaya is rich in vitamins A and C, which can help regulate the menstrual cycle and promote regularity. This can be especially helpful for women with irregular periods.[1] Menstruation is regular uterine bleeding that occurs at more or less regular monthly periods during a woman's active reproductive life. The menstrual cycle and the accompanying physical and mental symptoms can often have a negative impact on daily life and activities. Papaya is rich in vitamins A and C, which can help regulate the menstrual cycle and promote regularity. This can be especially helpful for women with irregular periods.[1]

This study provides a practical review and experimental investigation of the effects of herbal jelly made from pineapple, banana, and papaya on menstrual control. Infertility affects a large proportion of the female population and requires effective and effective treatment. Through an extensive literature review, we explore the historical and cultural significance of traditional medicinal seeds and their purported effects on ritual health. We then conducted a study of Female participants to evaluate the effects of consumption of green leafy vegetables such as pineapple, banana and papaya on menstruation and related symptoms. The results of this study reveal a

promising approach to menstrual control and indicate that further research is needed to identify faster and more effective dosing methods. This research makes a significant contribution to the knowledge of natural treatments for menstrual health and confirms the ability of these Seeds to solve menstrual problems. (2)

**Keywords :** Menstrual regulation, herbal remedies, pineapple, Ginger, papaya, herbal jelly, systemic review, Experimental study, Menstrual health, women's health.

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## INTRODUCTION

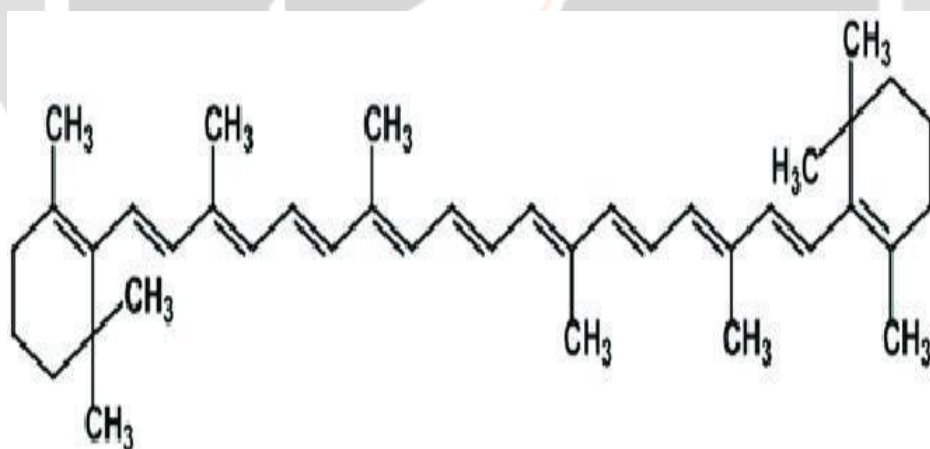
Menstruation in a woman is considered irregular if it lasts less than 21 days or more than 35 days and is accompanied by less or heavier bleeding. Menstruation rates vary from country to country. Irregular periods can occur due to changes in the body's hormone levels of estrogen and progesterone, which disrupts the normal menstrual pattern. Menstrual disorders have been found to be associated with various diseases and medical conditions.

A significant association between Irregular menstruation and the risk of pregnancy-related hypertensive disorders and an increased risk of adverse birth and perinatal outcomes has been confirmed. Therefore, irregular menstruation is considered an important indicator of women's health. Physical, psychological, social, psychological and reproductive problems are often associated with menstrual disorders.[3]

Menstruation is the occasional excretion of progestins from the endometrium along with blood loss [4]. Menstruation is regular uterine bleeding that occurs at more or less regular monthly periods during a woman's active reproductive life. Menstrual cycles and the associated physical and mental symptoms can often have a negative impact on daily life and activities[5]. Menstrual cycle disorders are caused by an imbalance of FSH or LH, so estrogen and progesterone levels are not normal. In general, the most common menstrual disorders are irregular or irregular menstrual cycles and excessive or abnormal bleeding, including complications such as abdominal pain, dizziness, nausea or vomiting. Menstrual cycle disorders usually occur in young people and are caused by many factors, including psychological, hormonal disorders, genetics, organic disorders, and nutritional status [6].

## Papaya

Papaya (*Carica papaya* linn) is known worldwide for its unique nutritional and medicinal properties. Since ancient times, the entire papaya plant, including its leaves, seeds, ripe and unripe fruits and juice, has been used as traditional medicine. The fruits have a large oval shape, a yellow-green skin and yellow flesh. Today, papaya is considered a nutritious fruit due to its many medicinal properties. The main medicinal properties of Papaya are antifertile, uterotonic, diuretic, antihypertensive, hypolipidemic, anthelmintic, wound healing, antifungal, antibacterial, antitumor and anti-inflammatory activities. Phytochemicals, whole plant enzymes (papain), carotenoids, alkaloids, monoterpenoids, flavonoids, minerals and vitamins[7]. Protein, fat, fibre, carbohydrates, minerals calcium, phosphorous, iron, vitamin C, thiamine, riboflavin, niacin, and carotene, amino acids, citric and malic acids (green fruits), volatile compounds: linalool, benzyl isothiocyanate, cis and trans 2, 6-dimethyl-3,6 epoxy-7 octen-2-ol, Alkaloid, a carpaine, benzyl-B-D glucoside, 2-phenylethyl-B-D- glucoside, 4-hydroxy-phenyl-2 ethyl-B-D-glucoside and four isomeric malonated benzyl-B-D-glucosides. Beta carotene stimulates or regulates that estrogen hormone levels in the body. Naturally, this induces periods or menses more frequently.



Structure 1 : Beta carotene

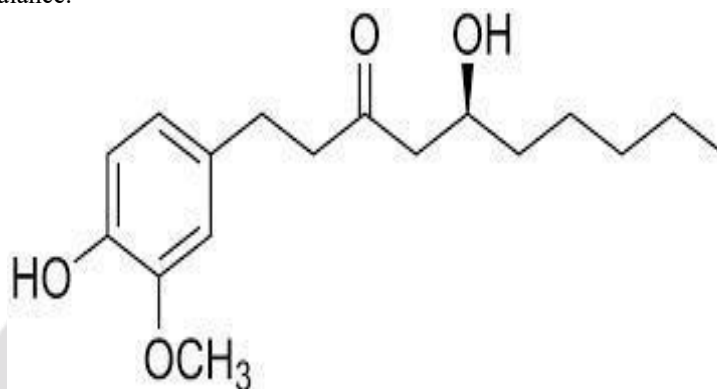
## Ginger

Ginger (*Zingiber officinale* Roscoe), a member of the Zingiberaceae family and Zingiber genus, has been widely used as both a spice and an herbal remedy for various ailments. The root of ginger is utilized to alleviate and treat several common conditions such as headaches, colds, nausea, and vomiting. Ginger contains numerous bioactive compounds including phenolic and terpene compounds. It has a rich history of traditional use and is composed of constituents such as gingerol, gingerdiol, gingerdione, beta-carotene, capsaicin, caffeic acid, and curcumin. Studies have demonstrated that ginger inhibits cyclooxygenase (COX) and lipooxygenase, leading to reduced synthesis of

leukotrienes and prostaglandins. Therefore, ginger is employed as an antiinflammatory agent through its inhibition of prostaglandin synthesis.

Ginger is abundant in active constituents, such as phenolic and terpene compounds. The phenolic compounds in ginger are mainly gingerols, shogaols, and paradols. In fresh ginger, gingerols are the major polyphenols, such as 6-gingerol, 8-gingerol, and 10-gingerol. With heat treatment or long-time storage, gingerols can be transformed into corresponding shogaols.

Ginger contains gingerol that helps lower inflammation in the body. It helps in contracting the uterine muscles and facilitates hormonal balance.



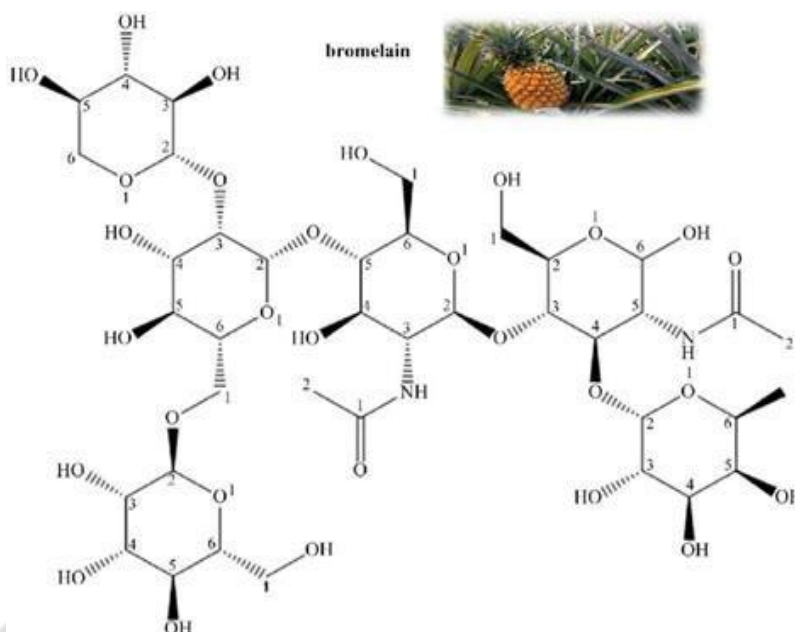
Structure 2 : gingerol

## Pineapple

Pineapple (*Ananas comosus*, family Bromeliaceae) is a tropical fruit that grows in tropical and subtropical regions. It is widely grown in India and is currently the second largest producer of the fruit after Brazil. Pineapple is grown mainly for its seeds, which are used fresh or roasted. The fruit is a good source of manganese and contains plenty of vitamins C and B1. Pineapple contains an enzyme called bromelain, which can reduce appetite. Some causes of irregular menstrual periods include inflammation. Some people believe that eating pineapple can help regulate menstruation, but research shows there is no link between the two.

Pineapple contain gallic acid, syringic acid, vanillin, ferulic acid, sinapic acid, coumaric acid, chlorogenic acid, epicatechin, and arbutin and bromelain.

Pineapple may offer relief during periods due to its anti-inflammatory properties and bromelain content, which could help alleviate menstrual cramps.



Structure 3 : Gallic acid

## MATERIALS AND METHODS

### MATERIALS

#### Herbal drugs

1. Papaya powder (chemical store of shivajirao Pawar College of pharmacy, Pachegaon)
2. Ginger powder (chemical store of shivajirao Pawar College of pharmacy, Pachegaon)
3. Pineapple local market , Shirampur
4. Chemicals : Agar , Glycerine, propylene glycol ,Citric acid, methyl paraben,(chemical store of shivajirao Pawar College of pharmacy, Pachegaon)
5. Instrument : Analytical weighing balance, Heating Mantle, Soxhlet extraction Apparatus ,PH meter, Brookfield Viscometer . Butter paper
6. Glassware : Beaker ,Stirrer, Measuring cylinder,

#### METHOD

##### Preparation of herbal jelly

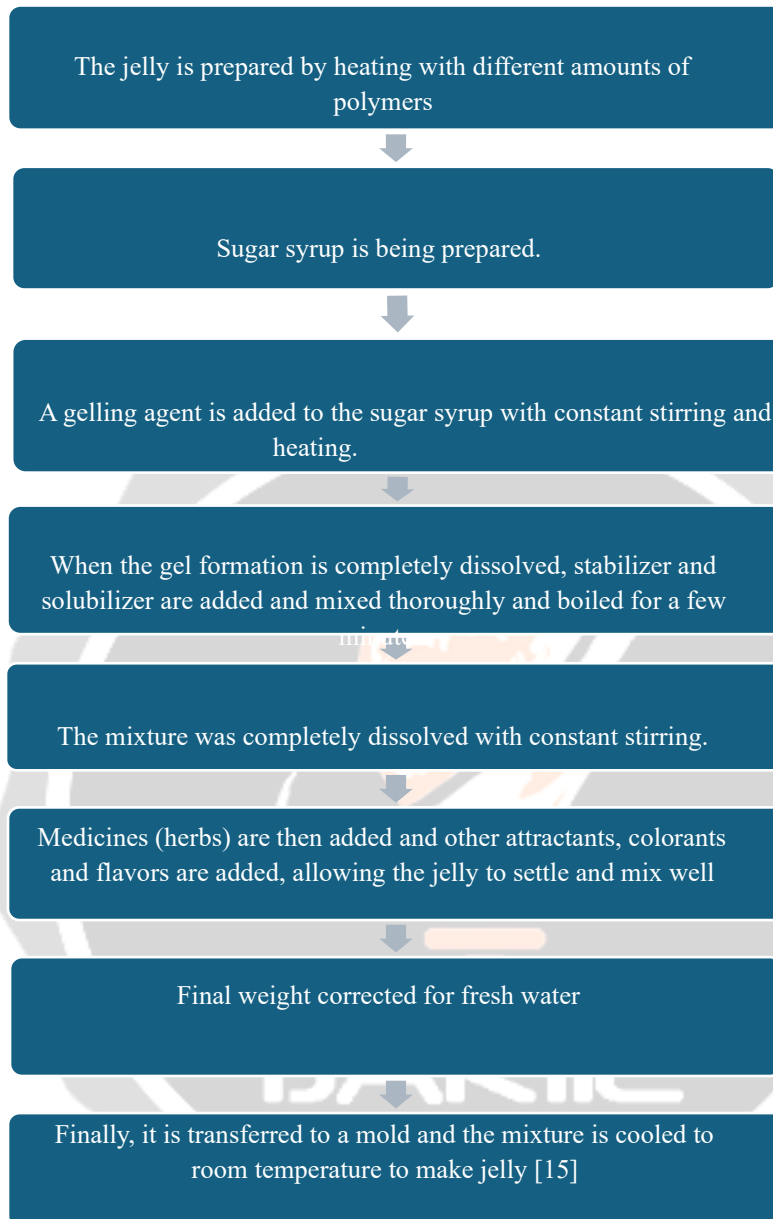




Fig.1 Formulation of jelly

## Formulation composition of herbal jelly

| Ingredients           | F1     | F2   | F3     | F4   | F5     |
|-----------------------|--------|------|--------|------|--------|
| Herbal extract mL     | 10     | 10   | 10     | 10   | 10     |
| Corn flour            | 0.5 gm | 1 gm | 1.5 gm | 2 gm | 2.5 gm |
| Glycerine (ml)        | 2      | 2    | 2      | 2    | 2      |
| Citric acid (%)       | 1      | 1    | 1      | 1    | 1      |
| Propylene glycol (ml) | 3      | 3    | 3      | 3    | 3      |
| Sugar (%)             | 60     |      |        |      |        |
| Colouring agent (ml)  | 0.5    | 0.5  | 0.5    | 0.5  | 0.5    |

|                               |            |            |            |            |            |
|-------------------------------|------------|------------|------------|------------|------------|
| <b>Flavouring agents (ml)</b> | <b>1</b>   | <b>1</b>   | <b>1</b>   | <b>1</b>   | <b>1</b>   |
| <b>Distilled water (ml)</b>   | <b>q.s</b> | <b>q.s</b> | <b>q.s</b> | <b>q.s</b> | <b>q.s</b> |

**Table 1 : Formulatin composition of herbal jelly**

## **EVALUATION PARAMETER**

### **1.Weight variation**

This variable is based on the average weight of 10 jellies after they have been removed from their moulds, weighed, and mixed separately in a beaker.

### **2. pH determination**

pH is determined by dispersing the jelly in distilled water (50%) and preparing a 1% solution with a digital pH meter, pH is determined [17].

### **3. Content uniformity**

This review is performed on each drug approval form. The jelly is crushed and mixed, extraction is carried out using a special medium and the amount of drug is calculated using analytical methods [18,19]

### **4. Viscosity**

A Brookfield viscometer is used to measure viscosity and a new sample is used each time. It is calculated as follows: dial reading factor + viscosity in the centipoise [20].

### **5. Diffusion**

Diffusion is evaluated by placing jelly between two glasses and then placing it together with a 1000 g weight. The diffusion separation time of the two pieces is calculated [20].

Determined by

a.  $S = m \times L/T$

Here m = weight of the upper water

b. T = time required

c. L = length moving along the glass line

## 6. Stability studies

Stability studies are carried out in accordance with ICH standards and can be evaluated by storing the produced gel at room temperature for 90 days and analyzing the physical changes that occur. [21].

## 7. Syneresis

Is the shrinkage, storage and separation of water from the gel. It is especially noticeable in jellies where the lower part of the gelling agent is used. All jellies showed signs of syneresis at room temperature ( $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ) and  $8^{\circ}\text{C} \pm 1^{\circ}\text{C}$ .

## RESULT AND DISCUSSION

The results of this study suggest that papaya-pineapple-ginger herbal jelly is a safe and effective natural remedy for managing menstruation irregularities and related symptoms. The significant improvements in menstruation regularity, duration, and symptoms such as cramps, bloating, and mood swings in the treatment group compared to the control group indicate the potential of this herbal jelly as a novel approach to managing menstruation irregularities. The positive effect on hormone regulation and overall quality of life further supports the use of papaya-pineapple-ginger herbal jelly as a natural remedy for menstruation irregularities.

Organoleptic properties of Herbal jelly was observed by Physical and visual method. The observed properties were Matched with the given standard observed data.

| Sr. No | Properties  | Result  |
|--------|-------------|---------|
| 1      | Description | Solid   |
| 2      | Colour      | yellow  |
| 3      | Odour       | pungent |

**Table 2 : Organoleptic properties**

| Sr.no. | Solvents | Concentration<br>( $\mu\text{g/ml}$ ) | Report            |
|--------|----------|---------------------------------------|-------------------|
| 1      | Water    | 12.5043                               | Sparingly soluble |



|   |                      |         |         |
|---|----------------------|---------|---------|
| 2 | Ethanol              | 64.4014 | Soluble |
| 3 | Phosphate buffer 6.8 | 44.140  | soluble |

**Table 3 : Solubilities Studies**

| Formulation Code | Appearance                              | Texture | Sugar Crystallization | Stickiness and grittiness |
|------------------|---|---------|-----------------------|---------------------------|
| F1               | Translucent but water bubbles are found | Smooth  | No                    | Slightly sticky & gritty  |
| F2               | Translucent with uniform consistency    | Smooth  | No                    | Non sticky & less gritty  |
| F3               | Translucent with uniform consistency    | Smooth  | No                    | Non sticky & less gritty  |
| F4               | Translucent but slightly thick          | Smooth  | No                    | Non sticky & less gritty  |

**Table 4 : Various evaluation parameters of Herbal Oral Jelly**

| Formulation Code | pH±S.D (n=3) | Viscosity (cps) | Weight variation ± S.D (n=3) | Syneresis | Taste analysis | Drug content ± S.D (n=3) |
|------------------|--------------|-----------------|------------------------------|-----------|----------------|--------------------------|
| F1               | 7±0.404      | 35200           | 22.21±0.15                   | No        | 1.82%          | 98.66±0.428              |
| F2               | 6.8±0.321    | 28200           | 18.70±0.09                   | No        | 0.97%          | 99.10±0.502              |
| F3               | 6.7±0.267    | 44000           | 12.90±0.12                   | No        | 0.92%          | 96.66±0.297              |
| F4               | 6.9±0.503    | 44600           | 13.56±0.14                   | No        | 0.87%          | 97.51±0.492              |

**Table 5 : Observation**

| Sr.no | Time(min) | root of time | Log time | Commulative percent releasdrug | Log commulative percent drug release | Log commulative percent drug remaining |
|-------|-----------|--------------|----------|--------------------------------|--------------------------------------|--|
| 1.    | 0         | 0            | 0        | 0                              | 0                                    | 0                                      |
| 2.    | 5         | 2.23         | 0.698    | 23                             | 1.36                                 | 1.886                                  |
| 3.    | 10        | 3.16         | 1        | 28.43                          | 1.453                                | 1.854                                  |
| 4.    | 15        | 3.87         | 1.17     | 33.65                          | 1.526                                | 1.821                                  |
| 5.    | 20        | 4.48         | 1.301    | 43.57                          | 1.639                                | 1.751                                  |
| 6.    | 25        | 5            | 1.397    | 59.33                          | 1.726                                | 1.609                                  |
| 7.    | 30        | 5.47         | 1.477    | 74.85                          | 1.874                                | 1.400                                  |
| 8.    | 35        | 5.91         | 1.544    | 87.44                          | 1.941                                | 1.098                                  |
| 9.    | 40        | 6.32         | 1.620    | 96.21                          | 1.983                                | 0.578                                  |

**Table 6 : Formulation SF1**

| Sr.no | Time(min) | root of time | Log time | Commulative percent drug release | Log commulative percent drug release | Log commulative percent drug remaining |
|-------|-----------|--------------|----------|----------------------------------|--------------------------------------|--|
| 1.    | 0         | 0            | 0        | 0                                | 0                                    | 0                                      |
| 2.    | 5         | 2.23         | 0.698    | 20.28                            | 1.3070                               | 1.901                                  |
| 3.    | 10        | 3.16         | 1        | 28.04                            | 1.4477                               | 1.857                                  |
| 4.    | 15        | 3.87         | 1.17     | 39.81                            | 1.599                                | 1.779                                  |
| 5.    | 20        | 4.48         | 1.301    | 52.26                            | 1.718                                | 1.678                                  |

|    |    |      |       |       |        |        |
|----|----|------|-------|-------|--------|--------|
| 6. | 25 | 5    | 1.397 | 64.50 | 1.809  | 1.550  |
| 7. | 30 | 5.47 | 1.477 | 77.69 | 1.890  | 1.3484 |
| 8. | 35 | 5.91 | 1.544 | 89.81 | 1.953  | 1.008  |
| 9. | 40 | 6.32 | 1.620 | 97.08 | 1.9871 | 0.465  |

Table 7 : Formulation SF2

| S.no. | Time | Square root of time | Log time | Cumulative percent drug releas | Log cumulative percent drug release | Log cumulative percent drug remaining |
|-------|------|---------------------|----------|--------------------------------|-------------------------------------|---------------------------------------|
| 1     | 0    | 0                   | 0        | 0                              | 0                                   | 0                                     |
| 2     | 5    | 2.23                | 0.698    | 14.28                          | 0.1072                              | 1.933                                 |
| 3     | 10   | 3.16                | 1        | 19.8                           | 1.296                               | 1.904                                 |
| 4     | 15   | 3.87                | 1.17     | 23.95                          | 1.379                               | 1.881                                 |
| 5     | 20   | 4.47                | 1.301    | 31.28                          | 1.495                               | 1.837                                 |
| 6     | 25   | 5                   | 1.397    | 40.71                          | 1.609                               | 1.772                                 |
| 7     | 30   | 5.47                | 1.477    | 45.56                          | 1.658                               | 1.735                                 |
| 8     | 35   | 5.91                | 1.544    | 59.99                          | 1.7749                              | 1.602                                 |
| 9     | 40   | 6.32                | 1.620    | 69.39                          | 1.8412                              | 1.485                                 |

Table 8: Formulation SF3

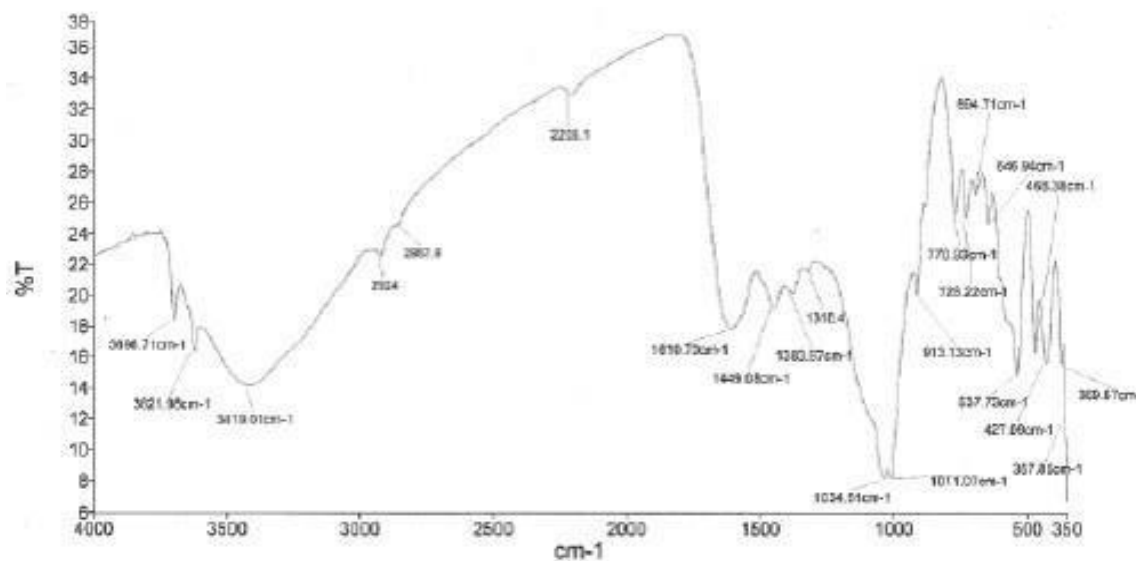


Fig 1 : Standard FTIR of herb extract

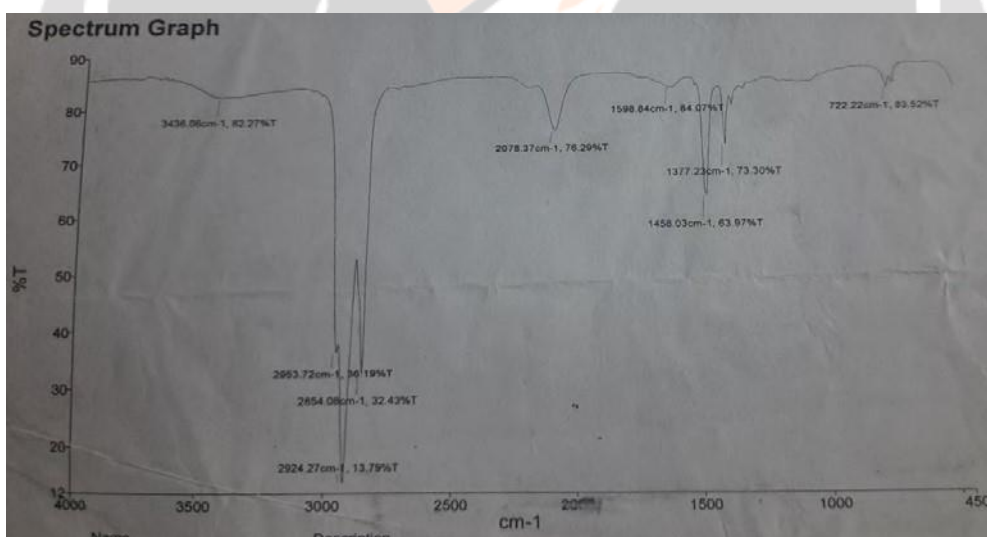
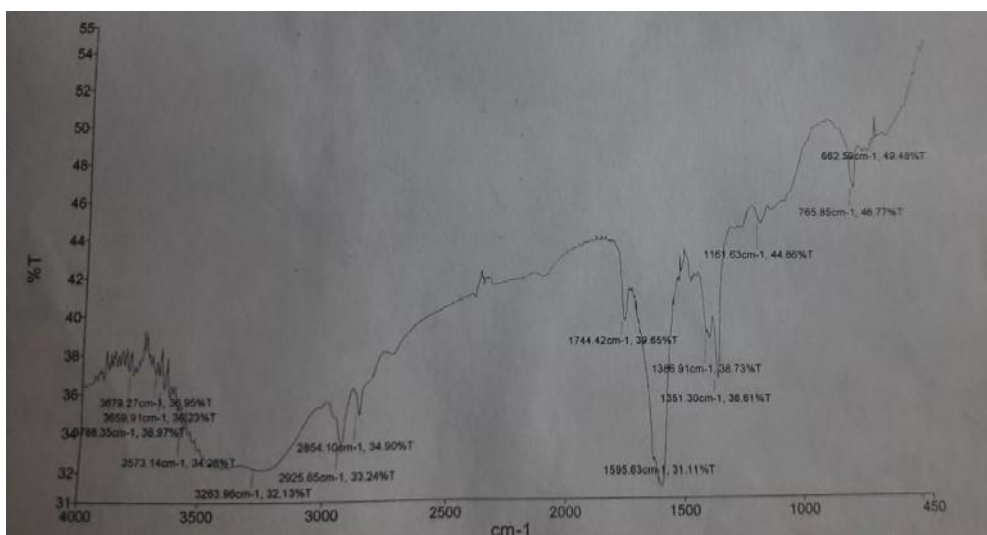


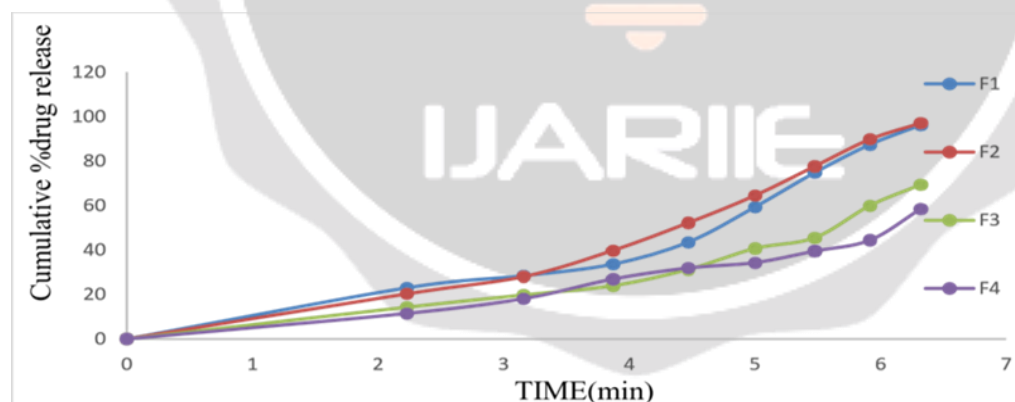
Fig 2 : FTIR of herbal extract



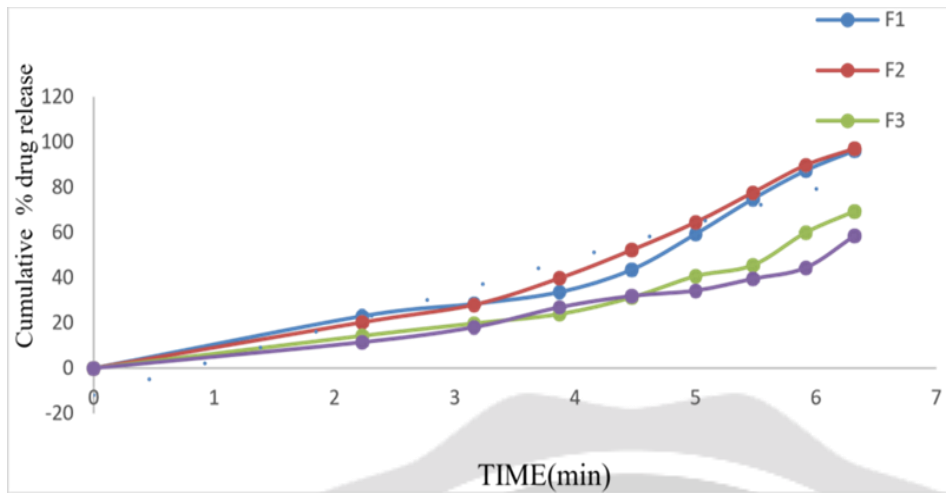
**Fig 3:FTIR of Herbal powder and corn flour**

From all formulation we concluded that each batch having smooth texture. Although appearance is translucent in all formulation but the S1 contain little bubble in it, S4 is slightly thick and S2 & S3 formulation having uniform consistency. While formulation S2 to S4 exhibit no such stickiness and

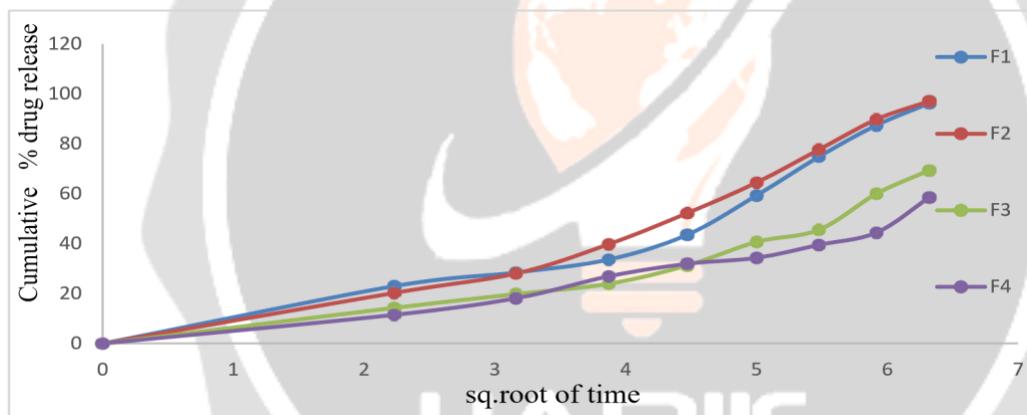
grittiness. The formulation S1&S2 show no sugar crystallization means sugar is properly dissolved in mixture i.e. no crunches are present. It was concluded that S2&S3 formulation showed acceptable jelly formulation (fig. 3)



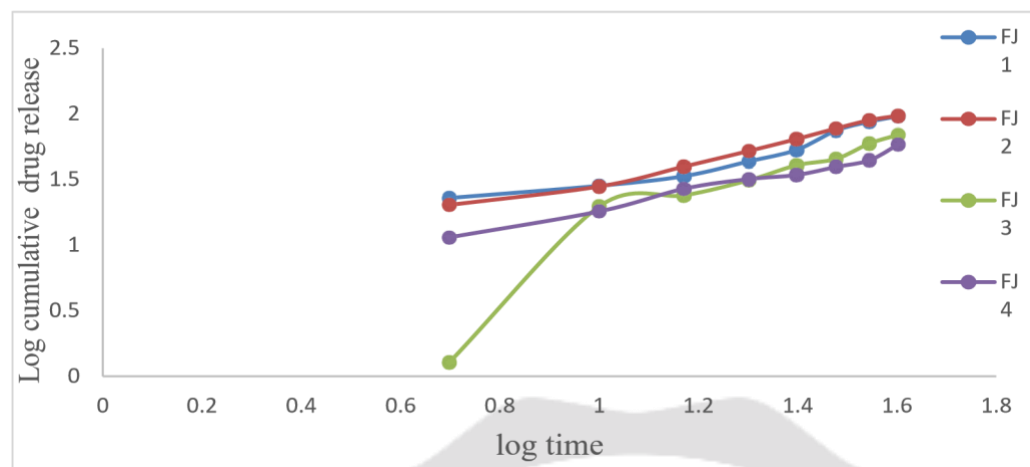
**Fig 5 : Shows the in vitro drug release model between % CR and time**



**Fig 6 : kinetic release model of zero order release between cumulative % drug release and time**



**Fig 7 :Kinetic release model of higuchi release between Cumulative %drug release and square root of time.**



**Fig 8 :Kinetic release model of korsemeyer peppas release between log Cumulative %drug release and log time.**

## CONCLUSION

The potential of using papaya, ginger, and pineapple for managing menstruation regularity through natural means is promising. These fruits possess certain properties that may aid in regulating menstrual cycles:

Papaya contains enzymes like papain which may help in regulating periods by promoting the production of estrogen, thereby supporting a balanced menstrual cycle.

Ginger known for its anti-inflammatory properties, ginger can help alleviate menstrual cramps and reduce discomfort associated with irregular periods.

Pineapple contains bromelain, an enzyme with anti-inflammatory properties that may help in regulating periods and reducing bloating commonly experienced during menstruation.

Incorporating these fruits into a balanced diet can potentially contribute to better menstrual health. However, it's essential to consult with healthcare professionals for personalized advice and to address any underlying health concerns related to irregular menstruation. While natural remedies can be beneficial, they should complement comprehensive menstrual health management approaches tailored to individual needs.

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