

# Formulation and Evaluation of Oral Soft Jelly Containing Salbutamol Sulphate for the Treatment of Asthma

Vaishnavi S Honale<sup>1\*</sup>, Shraddha D Muneshwar<sup>1\*</sup>, Amol V Sawale<sup>2</sup>

<sup>1</sup>Vidyabharti College of Pharmacy, C K Naidu Marg Camp Amravati 444602

<sup>2</sup>Asst Professor, Vidyabharti College Of Pharmacy, C K Naidu Marg Camp Amravati 444602

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## Abstract



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### \*Address for Correspondence:

Shraddha D Muneshwar & Vaishnavi S Honale, Vidyabharti College of Pharmacy, C K Naidu Marg Camp Amravati 444602

Salbutamol sulphate oral soft jelly in asthma has been formulated and evaluated as the goal of the current investigation. A person with asthma has inflamed, narrowed, swollen, and excess mucus-producing airways, which makes breathing difficult. Salbutamol is used to treat asthma and chronic obstructive pulmonary disease (COPD). It works by relaxing the muscle of the airways into the lungs, which makes it easier to breathe. It functions by loosening the muscles in the lungs' airways, which facilitates breathing. Salbutamol is available as an inhaler, tablets, and certain liquid oral dose forms, but due to patient noncompliance issues, oral jellies containing salbutamol sulphate were developed. This study's aim is to create oral jelly, which by avoiding first pass effect, promotes patient compliance and bioavailability while avoiding many negative effects of conventional dosage forms. Salbutamol sulphate oral jelly is simple to swallow and improves patient compliance in paediatric patients. Many paediatric patients find it difficult to swallow tablets and capsules, as well as to use the salbutamol inhalation in cases of asthma. The best In vitro medication release was demonstrated by the salbutamol sulphate oral jelly (F2) batch at 85% in 60 minutes. The drug concentration was discovered to be between 98.23% and 99.25%, which was within the pharmacopoeial range of 98% to 101%. Salbutamol sulphate's UV spectra were examined, and it was discovered that its greatest absorption occurs at 217.50 nm. The cost-effective salbutamol sulphate oral soft jelly also demonstrated improved compliance and an increase in bioavailability.

**Keywords:** Oral Jelly, Asthma, Patient Compliance, Salbutamol Sulphate, Paediatric Patients

## 1. INTRODUCTION

A persistent inflammatory illness of the airways is what is known as asthma. An enhanced airway constriction response to stressors like allergens and exertion is known as airway hyperresponsiveness. An enhanced airway constriction response to stressors like allergens and exertion is known as airway hyperresponsiveness. Episodes of symptoms are typically linked to a widespread but variable obstruction of airflow in the lungs, which is typically reversible either naturally or with effective asthma therapy.

Short-acting 2-adrenergic receptor agonist. Salbutamol sulphate is used to treat bronchospasm in diseases including asthma and chronic obstructive pulmonary disease (COPD).

Short-acting beta-adrenergic agonist salbutamol sulphate has been used for its broncho dilating effects in the treatment of illnesses with reversible airway blockage, such as asthma and COPD. Due to substantial first pass metabolism in the liver, colon degradation, and site-specific absorption in the stomach and upper part of the small intestine, salbutamol sulphate has a short half-life and an oral bioavailability of 30 to 50%. Salbutamol sulphate has a half-life of roughly 4.5 hours<sup>1</sup>.

Transparent or translucent, non-greasy, semisolid preparations intended for both internal and external use are referred to as jelly. Oral jellies are water-soluble bases made from natural ingredients like tragacanth, pectin, alginate, and

boro Glycerin or from artificially created versions of those same ingredients like cellulose, sodium carboxymethylcellulose, and methylcellulose. In order to overcome this type of fear, many patients have medical phobia. Additionally, this preparation is attractive in appearance, making it suitable for both children and elderly patients<sup>2</sup>

### Types of Oral Jelly

#### Jellies come in three varieties:

**Medicated jelly:** Medicated jelly They are mostly used on skin and mucous membranes due to their spermicidal, local anaesthetic, and antiseptic properties. There is enough water in these jellies. Once the water has evaporated, jelly has a local cooling effect and any protective layer that is still present.

**Lubricating jelly:** These jellies are used to lubricate medical instruments used in diagnostic procedures, including surgical gloves, cystoscopes, catheters, and rectal thermometers. Thin layer jellies must be sterile in order to be used as lubricants to insert objects into sterile bodily cavities like the urine bladder.

**Miscellaneous jelly:** These are intended for a variety of uses, including electrocardiography and patch testing.

**Patch Testing:** The allergens that are applied to test sensitivity are transported using these jellies. A residual layer

emerges after the patches have dried, which helps to keep the patches separate and prevents confused outcomes.

**Electrocardiography:** on reduce the electrical resistance between the patient's skin and the electrode, jelly is applied on the electrode. The jelly contains pumice powder, glycerine, and sodium chloride. In sodium chloride, which is a good conductor of electricity, glycerine acts as a humectant<sup>3</sup>.

A novel form of oral mucosal drug delivery is oral medicated jelly (OMJ). Compared to the different medication delivery techniques, it has many benefits. The benefits of both liquid and solid dose forms are combined in one consumable dosage form. The proposed method's simplicity of production and inexpensive excipients make it a viable choice for current medication formulations. The polymers employed in the production of OMJs are low-cost, readily available regionally, safe, ingestible, biocompatible, and biodegradable. Additionally, patients in the paediatric and geriatric populations as well as those who have dysphagia accept OMJs.

It is possible to use OMJs for both systemic and local treatments of illnesses of the oral cavity. They can get around all the drawbacks of the usual dose forms that are readily available. OMJs allow quick medication absorption through the buccal mucosa (pre-gastric absorption), avoiding the first pass effect, and quick drug disintegration in saliva without the need for water. Therefore, compared to oral tablets currently on the market, it significantly offers earlier onset of action and greater bioavailability of the drug<sup>4</sup>

#### Advantages<sup>5</sup>:-

1. If necessary, the treatment can be readily stopped at any time.
2. You can take your medication without water.
3. Convenient, simple, and trustworthy administration
4. Increase patient adherence.
5. Patients with dysphagia can benefit from it.
6. Enhance bioavailability or avoid first pass metabolism.
7. Paediatrics approve it with great approval.
8. Well received by geriatric and elderly patients
9. It can be administered at any time or place without water.

#### Objective:

1. Development of jelly candies is a result of children willingly consuming jelly candies because they admire the flavour and the fact that they are flavoured with fruit juice and extract.
2. To create a dose form that is appropriate for patients with dysphagia.
3. To increase the drug's bioavailability, effectiveness, and safety.
4. Developing patient-compliant dose forms is preferable to traditional ones.

#### Importance of proposed research

1. Oral medicated jelly is a novel oral mucosal drug delivery system.
2. The proposed technique could be considered as one of the alternative techniques for modern drug formulation due to its ease of preparation.
3. Oral medicated jellies are accepted by paediatric patients. In paediatric patients there are more compliance with ease administration and more palatable and attractive dosage form.

4. Oral are accepted by patients with Dysphagia.

5. They can overcome all the limitations of available conventional dosage form

6. Oral medicated jelly offers rapid dissolution in saliva without the need of water

7. It bypasses first pass effect

8. It significantly offers early onset of action and greater bioavailability of drug than the available oral tablet.

## MATERIAL AND METHODS

**Table 1: List of Material Used**

| S. N. | Materials                | Source                       |
|-------|--------------------------|------------------------------|
| 1     | Salbutamol Sulphate      | Obtained as gift sample      |
| 2     | Gelatin                  | SD. Fine chemical Ltd Mumbai |
| 3     | Trisodium Citrate        | SD. Fine chemical Ltd Mumbai |
| 4     | Citric acid              | SD. Fine chemical Ltd Mumbai |
| 5     | Sucrose                  | SD. Fine chemical Ltd Mumbai |
| 6     | Glucose Syrup            | SD. Fine chemical Ltd Mumbai |
| 7     | Citric acid solution 50% | SD. Fine chemical Ltd Mumbai |
| 8     | Sodium Benzoate          | SD. Fine chemical Ltd Mumbai |
| 9     | Water                    | SD. Fine chemical Ltd Mumbai |

**Table 2: List of Equipment Used**

| S. N. | Equipment                             | Source                              |
|-------|---------------------------------------|-------------------------------------|
| 1     | Calibrated weighing balance           | Contech Instruments Ltd Navi Mumbai |
| 2     | UV-1800 spectrophotometer single beam | Shimadzu UV-Spectrophotometer       |
| 3     | Dissolution test apparatus            | G.G Technologies                    |
| 4     | FTIR                                  | Agilent Technologies Product        |
| 5.    | Brookfield Viscometer                 | U Tech Labs                         |

## Methodology

### 1. Requirement:

**Apparatus:** Beaker, Measuring cylinder, Burner, Stirrer, Mould, Spatula, Pipette, Glass slides

**Equipment:** Calibrated Weighing Balance, Burner, UV Spectrophotometer, pH meter, Brookfield Viscometer, USP Paddle Type 2 Dissolution Apparatus.

**Chemicals:** Salbutamol sulphate, Gelatin, Trisodium citrate, Citric acid, Sodium benzoate, Sucrose, Glucose syrup, Mango Flavour

### 2 Method of Preparation:

#### Preformulation Study<sup>6</sup>

#### Organoleptic Parameter of Drug

The drug's state, taste, colour, and other characteristics were assessed.

### Determination of Solubility

Solubility was obtained by adding the solute in a small amount to a fixed volume of solvents like water, ethanol, ether, and 0.1 N HCl during the pre-formulation solubility analysis.

### Determination of melting point:

The obtained drug sample's melting point was determined since it provides a preliminary indication of sample purity. Reduced and increased melting point ranges can be used to identify comparatively small amounts of impurities.

### Determination of Lambda max

To find the maximum concentration of salbutamol sulphate, ethanol was chosen. To obtain a concentration of 1000 ppm,

100 mg of the medication were dissolved in 100 ml of ethanol before being used as stock solution. To create primary stock solution, this stock solution was further diluted. Utilizing a UV Spectrophotometer, the resultant solution was examined for  $\lambda_{\text{max}}$  in the 200–400nm wavelength range.

### FTIR Analysis:

The samples were examined using an FT-IR spectrophotometer for infrared analysis. Dry potassium bromide (KBr) was combined with around 4 to 5 mg of material, and the mixture was then analysed in transmission mode with a wave number range of 4000 to 400  $\text{cm}^{-1}$ .

## Formulation of Oral Jelly <sup>7</sup>

**Table 4: Formulation of oral jelly**

| Ingredients (%)           | F1   | F2    | F3   | F4   | F5    |
|---------------------------|------|-------|------|------|-------|
| Salbutamol sulphate       | 4    | 4     | 4    | 4    | 4     |
| Gelatin                   | 1.3  | 3     | 3.3  | 3.5  | 4     |
| Trisodium citrate         | 3.3  | 0.4   | 1.3  | 3.3  | 1.3   |
| Citric acid               | 1    | 0.40  | 0.35 | 1    | 1     |
| Sucrose                   | 50   | 30    | 30   | 50   | 55    |
| Glucose syrup             | 30   | 52    | 52   | 30   | 30    |
| Citric acid solution 50 % | 1ml  | 0.8ml | 1ml  | 1ml  | 1.5ml |
| Sodium benzoate           | 0.01 | 0.01  | 0.01 | 0.01 | 0.01  |
| Water                     | 22   | 30    | 30   | 20   | 22    |

### Preparation of Oral Jelly

- 1 Precisely weighed in order to dissolve the gelatin powder and 10% sucrose, purified water containing citric acid and trisodium citrate was used.
2. The drug was triturated with sucrose, which was then dissolved in dextrose syrup.
3. Throughout the mixing of the two mixes, the temperature was held at 60°C.
4. The syrup mixture was thereafter added to the polymer solution. The solution was heated until the complete solid content was reached.
5. Mango flavour was added after sodium benzoate had been dissolved in a small amount of water, with constant stirring.
6. To bring the pH of this mixture to 3.7, citric acid solution was added while being continuously stirred at 60°C.
7. The liquid was then poured into the suitable moulds and given a variety of drying times.
8. From mold, Formulated Oral Jellies were measured, packaged.

### Evaluation Parameter of Oral jelly <sup>8</sup>

#### Organoleptic properties of jelly:

**Appearance:** - Visual inspection of the consistency and physical appearance of the medicated jelly was done.

#### Texture: -

It was physically investigated for how the jelly surface felt to the touch.

#### Sugar crystallization: -

Examined by looking for sugar crystals in the medicated jelly

**Stickiness:** - Visually assessed by rubbing the jelly between two fingers.

#### pH:

0.5 g of jelly was dissolved in 50 mL of distilled water to form a 1% solution, and the pH was then measured using a digital pH meter.

#### Viscosity:

A Brookfield viscometer was used to measure the viscosity at room temperature using spindle number 64 at 3 RPM.

#### Spreadability:

The spreadability of jelly was tested by placing it between two slides with a 1000 g weight and pressing it for 5 minutes to a consistent thickness. The spreading area of the jelly was then estimated using the equation ( $A = \pi r^2$ ), which is represented as the area of a circle.

#### Weight variation:

The jellies were removed from the moulds and weighed separately. The observed data was reported as mean standard deviation (SD), with the average weight of 10 jellies being used as the reference point.

**Syneresis:**

Jelly's shrinkage and water's break-up during storage have both been noted. For syneresis, all jellies are observed at room temperature. The jellies that showed syneresis were discarded.

**Drug content uniformity:**

Salbutamol sulphate jellies were used to assess the consistency of the drug's active pharmaceutical ingredient (API) concentration across all dose forms. Using phosphate buffer 6.8, all formulations of jellies were tested for content uniformity, and the results were evaluated using a UV spectrophotometer with a maximum wavelength of 276 nm.

**In vitro drug release:**

With the help of a USP paddle device type 2 and 900 ml of phosphate buffer 6.8 as the dissolution media, jelly was successfully dissolved in vitro. The temperature was kept at  $37^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ . At predetermined intervals of 5, 10, 15, 20, 25, 30, 35, and 40 minutes, 5 ml of sample was removed from the dissolution equipment and replaced with new dissolution media. A U.V spectrometer was used to determine the release method, and the release study was computed using kinetic models.

**RESULT AND DISCUSSION****Results****Pre-formulation Study****Organoleptic Parameter of Drug****Table 5: Organoleptic Parameter**

| Parameters | Results    |
|------------|------------|
| Color      | White      |
| Taste      | Unpleasant |
| Odour      | Odorless   |
| State      | Semi Solid |

**Determination of Solubility****Table 6: Solubility of drug**

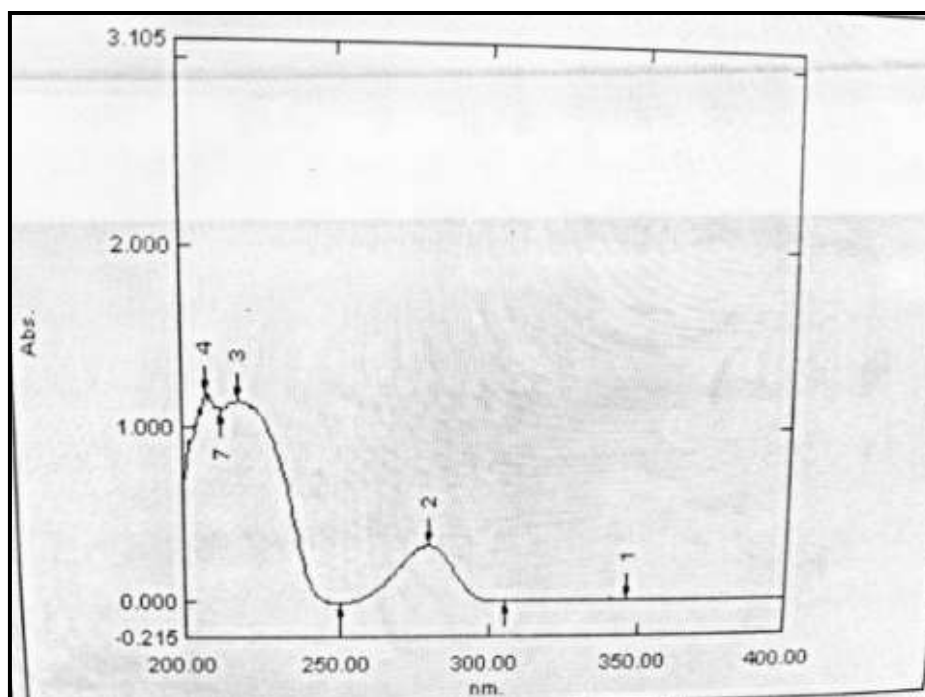
| Solvent       | Solubility behavior |
|---------------|---------------------|
| Water         | Sparingly Soluble   |
| Ethanol (96%) | Soluble             |
| Ether         | Slightly Soluble    |
| 0.1 N HCl     | Easily soluble      |

**Determination of melting point**

Salbutamol Sulphate's melting point was found to be  $158^{\circ}\text{C}$ .

**Determination of Lambda max**

Salbutamol Sulphate's UV spectra were examined, and it was discovered that the wavelength at which it absorbs most strongly is 217.50 nm. Salbutamol sulphate was therefore considered to have a maximum absorbance at 217.50 nm.

**Figure 4: UV Spectra of Salbutamol Sulphate****FTIR Analysis**

Salbutamol Sulphate's FT-IR spectra revealed prominent peaks at  $1112.01\text{ cm}^{-1}$  (C-O Stretching),  $3473.95\text{ cm}^{-1}$  (O-H

Stretching),  $3164.36\text{ cm}^{-1}$  (N-H Stretching),  $2794.97\text{ cm}^{-1}$  (C-H Stretching),  $1486.22\text{ cm}^{-1}$  (C=C Stretching), and  $1387.84\text{ cm}^{-1}$  (S=O Stretching).

Table 7: FT-IR Interpretation of Salbutamol Sulphate

| Sr No | Functional Group | Theoretical Peaks (cm <sup>-1</sup> ) | Practical Peak (cm <sup>-1</sup> ) |
|-------|------------------|---------------------------------------|------------------------------------|
| 1     | C-O              | 1300-900                              | 1112.01                            |
| 2     | O-H              | 3700-3000                             | 3473.95                            |
| 3     | N-H              | 3500-3100                             | 3164.36                            |
| 4     | C-H              | 3300-2700                             | 2794.97                            |
| 5     | C=C              | 1610-1475                             | 1486.22                            |
| 6     | S=O              | 1380-1415                             | 1387.84                            |

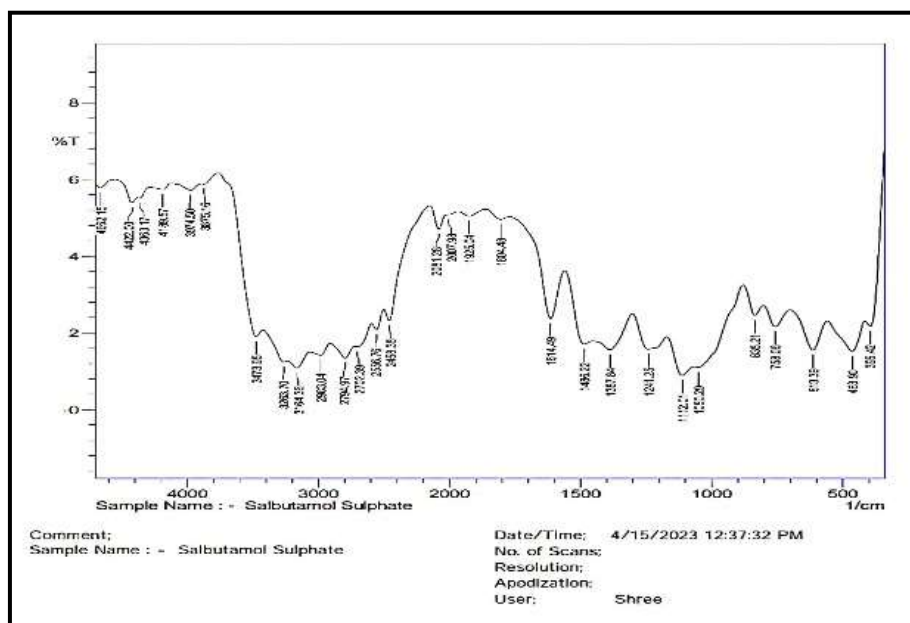


Figure 5: FT-IR of Salbutamol Sulphate

### Evaluation Parameter of Finished Product

#### Organoleptic properties of jelly

Table 8: Organoleptic Parameter

| Formulation Code | Appearance                               | Texture        | Sugar Crystallization | Stickiness      |
|------------------|------------------------------------------|----------------|-----------------------|-----------------|
| F1               | Translucent with non uniform consistency | Smooth         | Yes                   | Slightly Sticky |
| F2               | Translucent with uniform consistency     | Smooth         | No                    | Non sticky      |
| F3               | Translucent with uniform consistency     | Smooth         | No                    | Non sticky      |
| F4               | Translucent with loose consistency       | Smooth         | No                    | Sticky          |
| F5               | Translucent but Slightly thick           | Slightly rough | No                    | Non sticky      |

### 6.2.2. Physical Evaluation for Oral Jelly

Table 9: Physical Parameter

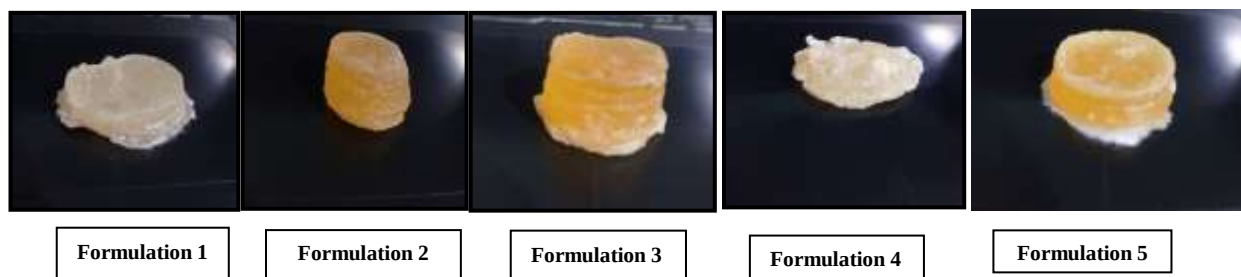
| Formulation Code                | F1          | F2           | F3         | F4         | F5         |
|---------------------------------|-------------|--------------|------------|------------|------------|
| pH                              | 6.94±0.02   | 6.72±0.03    | 6.74±0.02  | 6.65±0.04  | 6.91±0.03  |
| Viscosity (cp)                  | 5438±0.76   | 6882±0.88    | 7134±0.57  | 9692±1.24  | 10837±0.92 |
| Spreadability(cm <sup>2</sup> ) | 27.32±0.15  | 12.56±0.09   | 4.40±0.12  | 19.63±0.16 | 16.61±0.09 |
| Weight Variation(%)             | 0.88±0.0321 | 0.811±0.0233 | 0.83±0.022 | 0.91±1.24  | 1.01±0.74  |
| Syneresis                       | No          | No           | No         | No         | No         |
| Drug Content Uniformity(%)      | 98.78±0.33  | 99.25±0.35   | 99.19±0.67 | 98.23±0.58 | 96.37±0.35 |



### 6.2.3. In vitro drug release

**Table 10: In vitro drug release profiles of salbutamol sulphate jelly formulations**

| Time (min) | F1(%) | F2(%) | F3(%) | F4(%) | F5(%) |
|------------|-------|-------|-------|-------|-------|
| 0          | 0     | 0     | 0     | 0     | 0     |
| 5          | 23.25 | 35.87 | 34.91 | 33.12 | 28.98 |
| 10         | 33.12 | 42.93 | 41.23 | 36.01 | 32.92 |
| 15         | 45.19 | 55.56 | 54.39 | 39.23 | 37.17 |
| 20         | 54.43 | 67.99 | 66.55 | 42.52 | 41.35 |
| 25         | 68.32 | 79.76 | 78.48 | 45.68 | 44.73 |
| 30         | 73.23 | 86.37 | 87.53 | 49.27 | 47.09 |
| 40         | 76.56 | 91.52 | 91.33 | 55.92 | 53.64 |
| 50         | 78.62 | 95.69 | 96.41 | 60.89 | 59.37 |
| 60         | 85.76 | 98.34 | 98.17 | 68.44 | 67.23 |



## DISCUSSION

### 1. Organoleptic properties:

We deduced from all formulations that each batch had a smooth texture. Although all formulations appeared translucent, only the F5 is slightly thick, the F4 had a loose consistency, and the F2 and F3 formulations had a consistent consistency. F2 and F3 do not, however, display this stickiness. The absence of sugar crystallisation in formulations F2 to F5 indicates that the sugar was properly dissolved in the mixture, i.e., there were no crunches. It was determined that the F2 and F3 formulations demonstrated an acceptable jelly formulation, as stated in table no. 8.

### 2. pH:

The taste and stability of oral jellies are influenced by the formulation's pH. The pH of the generated jellies was determined to be in the range of 6.54 0.06 to 6.74 0.02, which was slightly acidic, as indicated in table no. 9.

### 3. Viscosity:

As indicated in table no. 9, the viscosities of salbutamol sulphate jellies ranged from 5438 cp 0.76 to 10837 cp 0.92 and depended on the type and quantity of the gelling agent. All of the formulations' viscosities (F1 to F5) were discovered to be within the permissible range. Formulations F2 and F3 displayed the best viscosity. Formulations F4 and F5 generates excessively thick and sticky jellies due to their higher viscosities of 10837 cp 0.92 and 9692 cp 1.24, respectively. The viscosity was directly controlled by the gelling agent's concentration.

### 4. Spreadability:

As stated in table no. 9, it was discovered that the spreadability of the formulation decreased as the gelling agent concentration increased.

### 5. Weight variation:

The weight variation in all developed jelly compositions ranged from 0.99% 1.24 to 1.01% 0.74, as indicated in table no. 9.

### 6. Syneresis:

The optimised formulation did not exhibit syneresis at the given temperature.

### 7. Drug content uniformity:

According to table no. 9, the drug content was found to be between 98.23% and 99.25% and was therefore in compliance with the pharmacopoeial standard of 98% to 101%.

### 8. In vitro drug release studies:

To compare the salbutamol sulphate release kinetics from the created jelly formulations, an in vitro dissolving research was conducted. Table No. 10 is a summary of the findings. The bio-pharmaceutical classification system (BCS) idea was found to be more accurate and the rate of salbutamol sulphate dissolution from F2 and F3 was higher (>85% in 30 min). For Formulations F2 & F3, the full drug release was seen to occur within 60 minutes. With the exception of formulations F4 and F5, every formulation showed a medication release of more than 85% within 60 minutes. The increased gelatin concentration in formulations F4 and F5, which led to the production of thick jellies and slowed drug diffusion, may be the cause of the formulations' slower drug release.

The improved drug release and physiochemical characteristics of formulation F2 were satisfactory.

## RESEARCH OUTCOME:

1. Because it is convenient to use and doesn't need water, medicated jelly can be given anywhere, at any time.
2. For easier administration and higher patient compliance, the oral route is suggested. For paediatrics, salbutamol sulphate oral jellies are the most appealing dose forms.
3. Many paediatric patients have trouble swallowing tablets and capsules, and they often struggle to utilise salbutamol inhalers when they have asthma, which results in patient noncompliance. However, salbutamol sulphate oral jelly is simple to take and improves patient compliance.
4. It offers a quicker start to action to provide quick relief from asthma symptoms.
5. It is regarded as the most natural, simple, practical, safe way to administer medications. It also offers greater design flexibility for dosage forms, ease of production at low cost, self-administration convenience, compactness, and manufacturing simplicity.
6. Salbutamol sulphate oral jelly is a cutting-edge oral dose form that quickly dissolves in saliva. Compared to standard dose forms, this jelly has a higher rate of drug disintegration, absorption, and the beginning of clinical effects.

## CONCLUSION

Gelatin served as the gelling agent in the successful formulation of a medicated oral jelly that contained salbutamol sulphate. Short acting beta-adrenergic agonist salbutamol sulphate is utilised for its bronchodilating effects in the treatment of conditions with reversible airway obstructions, such as asthma and COPD. Without consuming water, salbutamol sulphate jelly can be taken orally and chewed. This will unquestionably encourage high patient compliance and acceptance. Salbutamol sulphate was shown to be soluble in ethanol in preformulation experiments of solubility. Salbutamol sulphate's  $\lambda_{\text{max}}$  was determined to be 217.50 nm, and an FT-IR research revealed the presence of functional groups like hydroxyl, amino, alkyl, and sulphate groups in the provided sample of medication. The F2 formulation has a consistent consistency and lacks this stickiness. Furthermore, there are no sugar crystals. The flavour and stability of oral jellies are influenced by the formulation's pH. The pH of the generated jellies was found to be slightly acidic, ranging from 6.54 to 6.74. The salbutamol sulphate jellies' viscosities ranged from 5438 cp 0.76 to 10837 cp 0.92, with Formulation F2 having the best viscosity. With an increase in gelling agent concentration, it was discovered that the spreadability of the formulation decreased. In all prepared jelly formulations, the weight variation was observed to range between  $0.99\% \pm 1.24$  and  $1.01\% \pm 0.74$ . At the specified temperature, the improved formulation lacked syneresis. The optimised formulation did not exhibit syneresis at the given temperature. It has been shown that the drug content, which ranged from 98.23% to 99.25%, demonstrates a large amount of drug release due to the low concentration of gelling agent. The rate of salbutamol sulphate dissolution from F2 was found to be greater and consistent with the bio-pharmaceutical categorization system (BCS) concept for the instant release formulations (>85% in 30 min), according to the in vitro dissolution investigation. The improved drug release and physiochemical characteristics of formulation F2 were satisfactory.

## Conflict of Interest

The authors have no known conflict of interest concerning the present article.

## Abbreviations

1. COPD : Chronic obstructive pulmonary disease
2. OMJ : Oral medicated jelly
3. FBP : Flurbiprofen
4. CMC : Carboxymethyl cellulose
5. HPMC : Hydroxypropyl methylcellulose
6. HCl : Hydrochloric acid
7. CBZ : Carbamazepine
8. GIT : Gastro intestinal tract
9. UV : Ultra violet
10. USP : United state Pharmacopoeia
11. PPM : Parts per mole
12. FT-IR : Fourier transfer infrared spectroscopy
13. KBr : Potassium bromide
14. RPM : Revolution per minute
15. SD : Standard Deviation
16. API : Active pharmaceutical ingredients
17. cP : One hundredth of a poise
18. BCS : Bio-pharmaceutical classification system

## REFERENCES

1. Arifa Begum Sk et al (Formulation and Evaluation Of Pediatric Oral Soft Jellies of Salbutamol Sulphate), Research Journal of Pharmacy and Technology, 2018; 11(11). <https://doi.org/10.5958/0974-360X.2018.00899.5>
2. Kadam VS et al (Formulation And Evaluation of medicated jelly of Trazadone Hydrochloride ) International Journal of Science and Research, 2020; 11(12):6251-6252
3. Sarangpani SV et al. Oral medicated jellies -A review; World Journal of Pharmaceutical Research, 2018; 7(6):352-365
4. Elshafeey AH et al (A novel oral medicated jelly for enhancement of etilefrine hydrochloride bioavailability: In vitro characterization and pharmacokinetic evaluation in healthy human volunteers) Saudi Pharmaceutical Journal , 2022; 1435-1447 <https://doi.org/10.1016/j.jsps.2022.07.004>
5. Yadav Chudamani et al (A review recent advancement in formulation of oral medicated jelly), World Journal of Pharmacy and Pharmaceutical Sciences, 2018; 7(7):417-426
6. Arifa Begum Sk et al (Formulation and evaluation of pediatric oral soft jellies of salbutamol sulphate) Research Journal of Pharmacy and Technology, 2018; 11:1- 3 <https://doi.org/10.5958/0974-360X.2018.00899.5>
7. Cardoz MR et al .Design, development and evaluation of novel oral medicated jellies) Indo American Journal of Pharmaceutical Sciences, 2017; 4(06):1747-1748
8. Gananrajan G. et al . Formulation and evaluation of montelukast sodium oral jelly for pediatrics) The International Journal of Emerging Technologies and Innovative Research, 2018; 5:449-450.