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Formulation and Evauation of Herbal Stevia Rebaudiana Syrup

Hitrath Jain, Anjali Sahu

1. Rungta Institute of Pharmaceutical Sciences And Research, Kohka Kurud Bhiali

ABSTRACT: - The number of people getting sick with diabetes obesity and heart disease is going up. This has made people want to use sweeteners that have fewer calories instead of regular sugar. Stevia rebaudiana is a plant that's very sweet and has healing properties so it is a good choice. This study is about making and testing a syrup that is made from Stevia rebaudiana leaves. We made a liquid from Stevia rebaudiana leaves using hot water and mixed it with other things like sorbitol, citric acid and flavoring to make a syrup. We then tested the syrup to see what it looked like how it tasted and if it was safe to use. We also checked to see if it had any germs in it and if it would last a long time. What we found out was that the syrup tasted good, good and looked good. When we tested it in the lab, we found out that it was stable and consistent. We also found out that it had helpers like glycosides, flavonoids, tannins and phenolic compounds that can help people get better. We did not find any germs in the syrup so it is safe to use. When we tested it to see if it would last a Stevia time, we found out that it did. So, we think that the Stevia rebaudiana syrup we made is a choice for people who want a natural sweetener that does not have sugar. It can be used in medicine, food that's good for you and special foods that help people get better especially for people who have diabetes and want to watch what they eat. Stevia rebaudiana syrup is a choice, for people who want a sweetener that is natural and does not have a lot of calories.

Key Words: - Stevia Rebaudiana, life style, stevia Rebaudiana syrup

1. INTRODUCTION: -

1.1 Background of life Style Disorders: -

We have a problem with health issues like obesity, diabetes, high blood pressure and heart disease. These health issues are mostly because people do not eat well they eat much sugar and food that is high in calories. When people eat a lot of sugar they take in many calories this makes them gain weight and it is bad for their body. Diabetes and high blood pressure can happen when people eat much sugar and unhealthy food. Over time these health issues can cause problems that affect the whole body and how people live their life. Lifestyle-related disorders like obesity, diabetes and heart disease are really bad, for people.

Figure No. 01 Pillars of Lifestyle Disorder

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People are starting to realize that they need to eat. This means they want to stay from bad foods and drinks. Lots of folks are looking for something than regular sugar to make their food taste sweet. They want something that's natural and not too many calories.

Researchers and companies are working on making kinds of food and drinks that are sweet and also good for people. These foods and drinks are called foods and herbal formulations. They do not just make food taste sweet. They also help people stay healthy. People, like these foods and drinks because they are natural and safe and they help people feel better.

1.2 Natural Sweeteners as Alternatives to sugar: -

Natural sweeteners are getting a lot of attention as a replacement for man-made sweeteners and refined sugars. They come from plants. Are thought to be safer with less side effects compared to artificial ones. People are choosing sweeteners because they want products, with simple labels and made from plants. Natural sweeteners fit into this trend.

Stevia is a good natural sweetener. Stevia is very sweet. Has almost no calories. People are using Stevia more in food, medicine and vitamins. The fact that Stevia is safe to use and big health organizations say it is okay helps people like Stevia as a substitute for sugar. Stevia is a choice because it is safe and Stevia has been approved by major health authorities, around the world.

1.3 Overview of Stevia Rebaudiana: -

Stevia rebaudiana is a herbaceous, perennial herb of the family Asteraceae and is indigenous to South America, specifically Paraguay and Brazil. The indigenous Guaranin people have long been using it since centuries calling it the sweet herb since it has naturally sweet leaves. It is now grown in many countries around the world like India, China, Japan and South Korea among others.

Figure No. 02 Stevia Rubidian

Stevia rubidian owes its sweetness mainly to the steviol glycosides which include stevioside and rebaudioside A. These are about 200-300 times sweeter than sucrose but have fewer or no calories. They are not metabolized to glucose like sugar and can thus be used by people with diabetes or on a calorie restricted diet.

1.4 Pharmacological and therapeutic Properties: -

Stevia rebaudiana is not a natural sweetener. Stevia rebaudiana does a lot of things too. People have studied Stevia rebaudiana to see what it can do for our health. Stevia rebaudiana seems to help with things. These things include helping to lower blood sugar levels. Stevia rebaudiana also helps with blood pressure. Stevia rebaudiana has properties that fight against things that can harm us. Stevia rebaudiana has properties. Stevia rebaudiana has -inflammatory properties. Stevia rebaudiana even has properties.

The sweet stuff stevia has helps blood sugar. It does this by making the body release insulin and use up glucose better. It also stops the body from releasing much glucagon.

This helps keep blood sugar levels under control. Stevia also helps blood pressure.

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1. It makes blood vessels relax and get bigger.

2. This makes it easier for blood to flow and reduces pressure, on the blood vessels.

The result is blood pressure. Stevia does all this to help the body. It helps with sugar and blood pressure.

Stevia has some good things in it like flavonoids and polyphenols. These things in stevia are very good at stopping damage from things that can hurt our cells. Stevia has things that help keep us from getting sick, like tannins. The good things in stevia help stop things from happening in our bodies. Stevia is also good, for our mouths it helps prevent infections and keeps our teeth and gums healthy. Stevia really does a lot of things like reducing stress on our cells and stopping bad germs from making us sick.

1.5 Need for Herbal Syrup Formulation: -

Stevia rebaudiana is really good for us. When we eat it raw or use the crude extract it has some downsides. For instance Stevia rebaudiana can have a taste that is bitter or tastes like licorice and the ingredients in Stevia rebaudiana can be different each time. So we need to make mixes of Stevia rebaudiana that make it taste better last longer and be more appealing, to people who use Stevia rebaudiana.

Syrup formulations are really common in medicine and food supplements. This is because they are easy to take and people are more likely to take them as directed. Syrup formulations are especially good, for kids and older people who have trouble swallowing pills. Syrup formulations make it easy to get the amount of medicine and they work quickly. Syrup formulations are a way to get the active ingredients into the body fast.

So a syrup made with Stevia rebaudiana is really useful because Stevia rebaudiana gives it a sweet taste and it also has some good effects, on our health. The people who make this syrup can also add some things to it like flavoring agents and excipients to cover up any bad taste that the Stevia rebaudiana might have which makes people like the syrup more.

1.6 Role of Phytochemicals in Stevia: -

The benefits of Stevia rebaudiana come from its good compounds. This plant has types of helpful substances like glycosides, flavonoids, tannins and phenolic compounds. These compounds in Stevia rebaudiana help make it work well for health. Stevia rebaudiana has effects, which help protect against damage. It also has -inflammatory effects, which can reduce swelling. Additionally Stevia rebaudiana has effects, which help fight germs. These effects make Stevia rebaudiana a plant for health. The plants compounds are the reason, for its benefits. Stevia rebaudianas good compounds make it useful.

Phytochemical screening of stevia-based formulations is important to check for these bioactive compounds. This screening helps us understand how they work. If they are effective for treatment. The presence of these compounds makes stevia a valuable ingredient, in herbal products, especially stevia-based formulations. It also shows that stevia has health benefits.

1.7 Scope and Significance of the Study Scope: -

People are getting more interested in foods and products made from herbs that help us stay healthy and avoid getting sick. Stevia rebaudiana is one of these things that might help us eat less which's good for people who want to lose weight or stay at a healthy weight. Stevia rebaudiana is really good, at helping with weight management and controlling obesity. We can use Stevia rebaudiana to make foods that're better for us.

Despite its use as a sweetener not much research has been done on making stevia-based herbal syrups. Most studies look at stevia in powder or tablet form, which leaves a gap, in creating forms of stevia.

This study is trying to fill a gap by making and testing a syrup that is made from Stevia rebaudiana extract. The Stevia rebaudiana extract study looks at what the syrup's made of and how stable it is. It also looks at the benefits of using the Stevia rebaudiana extract syrup for health reasons.

2 MATERIALS AND METHODS: -

2.1 MATERILAS: -

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The stuff they use to make Stevia rebaudiana herbal syrup is the plant and other things that are needed to get it ready and make it last longer. They also add some things to make it taste and smell better. All the chemicals they use are really quality so the syrup is safe to use. They get these chemicals from places that make sure they are good enough to use in medicine.

Table No. 01 Ingredient Table

S. No.	Ingredient	Category / Function	Quantity for 100 mL
1	*Stevia rebaudiana* leaf extract	Active ingredient (sweetener)	10 mL
2	Sorbitol syrup	Sweetening agent / vehicle	40 mL
3	Purified water	Solvent / vehicle	q.s. to 100 mL
4	Citric acid	pH adjuster	0.2 g
5	Methylparaben	Preservative	0.1 g
6	Propylparaben	Preservative	0.02 g
7	Lemon flavor	Flavoring agent	0.1 mL
8	Sodium benzoate (optional)	Additional preservative	0.1 g
9	Food-grade color (optional)	Aesthetic agent	q.s.

2.2 METHODOLOGY: -

The methodology for the preparation of Stevia rebaudiana herbal syrup involved: -

1. Preparation of plant materials

2. Extraction of active Constituents

3. Formulation of herbal syrup

2.2.1 Preparation of Plant Materials: -

1. Fresh or dried leaves of *Stevia rebaudiana* were collected from a reliable source.
2. The leaves were washed thoroughly with distilled water to remove dust, dirt, and other impurities.

Figure no. 03 Stevia Rebaudiana

3. The cleaned leaves were shade-dried at room temperature for several days to preserve active phytoconstituents.

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4. After complete drying, the leaves were pulverized using a mechanical grinder to obtain a coarse powder.
5. The powdered material was passed through a sieve to ensure uniform particle size.
6. The prepared powder was stored in an airtight container to prevent moisture absorption and degradation.

2.2.2. Extraction of stevia Leaves: -

A. Aqueous Extraction Method

1. Accurately weighed 10 g of powdered *Stevia rebaudiana* leaves.
2. Transferred the powder into a clean beaker containing 100 mL of distilled water.
3. The mixture was heated at 60–70°C for about 2 hours with occasional stirring to ensure proper extraction of active constituents.
4. After heating, the mixture was allowed to cool at room temperature.
5. The extract was filtered using Whatman No. 1 filter paper to remove insoluble plant material.
6. The filtrate obtained was collected and, if necessary, concentrated using a water bath to obtain a desired consistency.
7. The final extract was stored in a clean, airtight container for further use in formulation.

B. Soxhlet Extraction Method (Alternative Method)

Figure No. o4 Extraction of Stevia Rebaudiana

1. Approximately 25 g of dried and powdered stevia leaves were placed in a thimble.
2. The thimble was inserted into a Soxhlet extractor.
3. About 250 mL of ethanol was used as the solvent and placed in a round-bottom flask.
4. The apparatus was heated, allowing the solvent to evaporate, condense, and repeatedly extract phytoconstituents.
5. The extraction process was continued for 6–8 hours until the solvent in the siphon tube became colorless.
6. The extract was concentrated using a rotary evaporator to remove excess solvent.

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7. The concentrated extract was stored for further formulation.

Figure No. 05 Filtration

2.2.3 Preparation of Herbal Syrup

The herbal syrup was prepared using the aqueous extract of stevia rebaudiana and suitable excipient

The herbal syrup was prepared using the aqueous extract of *Stevia rebaudiana* and suitable excipients.

Procedure (Point-wise)

1. **Preparation of Base Solution**
    a) A measured quantity of purified water (approximately 30–40 mL) was taken in a clean beaker.
    b) The water was gently heated to facilitate dissolution of excipients.
2. **Dissolution of Preservatives**
    a) Methylparaben and propylparaben were dissolved in a small quantity of warm water or ethanol due to their limited solubility.
    b) The preservative solution was added to the base solution with continuous stirring.
3. **Addition of Citric Acid**
    a) Citric acid was accurately weighed and added to the solution.
    b) It was stirred until completely dissolved to adjust the pH of the formulation.
4. **Incorporation of Stevia Extract**
    a) The prepared *Stevia rebaudiana* extract was slowly added to the solution.
    b) The mixture was stirred continuously to ensure uniform distribution of active constituents.
5. **Addition of Sorbitol Syrup**
    a) Sorbitol syrup was added as a sweetening agent and vehicle.
    b) It also contributed to the viscosity and mouthfeel of the formulation.
6. **Flavoring and Coloring**
    a) Lemon flavor was added to improve palatability and mask any herbal aftertaste.

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b) Food-grade color (if required) was added to enhance visual appeal.

7. **Make-up of Volume**
   a) The final volume was adjusted to 100 mL using purified water.
   b) The solution was mixed thoroughly to ensure homogeneity.
8. **Filtration**
   a) The prepared syrup was filtered using muslin cloth or filter paper to remove any particulate matter.
9. **Filling and Storage**
   a) The final formulation was transferred into clean, dry, amber-colored glass bottles.
   b) The bottles were properly labeled and stored in a cool, dry place.

Figure No. 06 Final product

3. RESULT AND DISCUSSION: -

3.1 EVALUATION PARAMETER: -

3.1.1 Organoleptic Evaluation

Organoleptic properties are important for determining patient acceptability and overall product quality. The prepared syrup was evaluated visually and sensorially.

Figure No. 07 Organoleptic study

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Table 2: Organoleptic Properties

S. No.	Parameter	Observation	Acceptability
1	Color	Pale green to amber	Acceptable
2	Odor	Characteristic herbal	Acceptable
3	Taste	Sweet, pleasant	Acceptable
4	Clarity	Slight turbidity	Acceptable

3.1.2 pH Determination

- The pH of the syrup was measured using a calibrated digital pH meter.
- A small quantity of syrup was diluted with distilled water before measurement.
- The pH was found to be within the acceptable range for oral formulations (4.0–6.5).

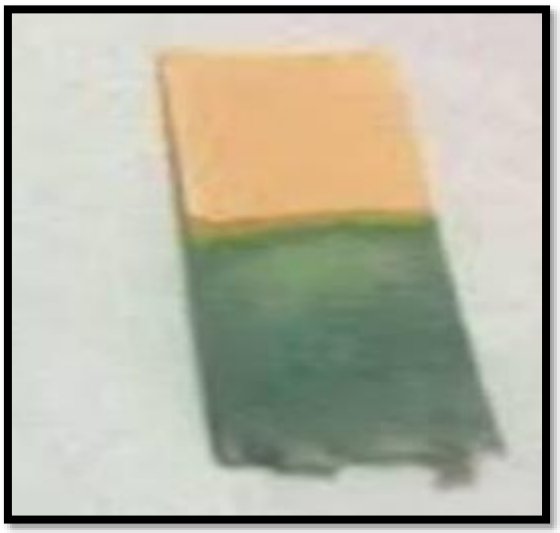

Figure no. 08 pH Study

Table 3: pH Measurement

Sample	Observed pH	Standard Range	Result
Syrup	5.2–5.4	4.0–6.5	Within limits

3.1.3 Viscosity

- Viscosity was measured using a Brookfield viscometer.
- It determines the flow property and consistency of the syrup.
- Moderate viscosity ensures easy pouring and good mouthfeel.

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Figure No. 09 Viscosity Study

Table 4: Viscosity Measurement

Sample	Viscosity (cP)	Observation
Syrup	~280 cP	Suitable

3.1.4 Specific Gravity

- Specific gravity was determined using a specific gravity bottle.
- It indicates the density and concentration of dissolved solids.

Table 5: Specific Gravity

Sample	Observed Value	Standard Range	Result
Syrup	1.20–1.22	1.1–1.3	Acceptable

3.1.5 Total Solid Content

- Total solids were determined by evaporating a known volume of syrup and measuring residue.
- It reflects concentration and consistency.

Table 6: Total Solid Content

Sample	Observed Value (%)	Result
Syrup	~30–32%	Acceptable

3.1.6 Phytochemical Evaluation

Preliminary phytochemical screening was carried out to identify bioactive compounds present in the formulation.

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Table 7: Phytochemical Screening

S. No.	Test for Compound	Result
1	Glycosides	Present
2	Flavonoids	Present
3	Tannins	Present
4	Phenolic Compounds	Present

3.1.7 Microbial Evaluation

Microbial limit tests were performed to ensure the safety and hygiene of the formulation.

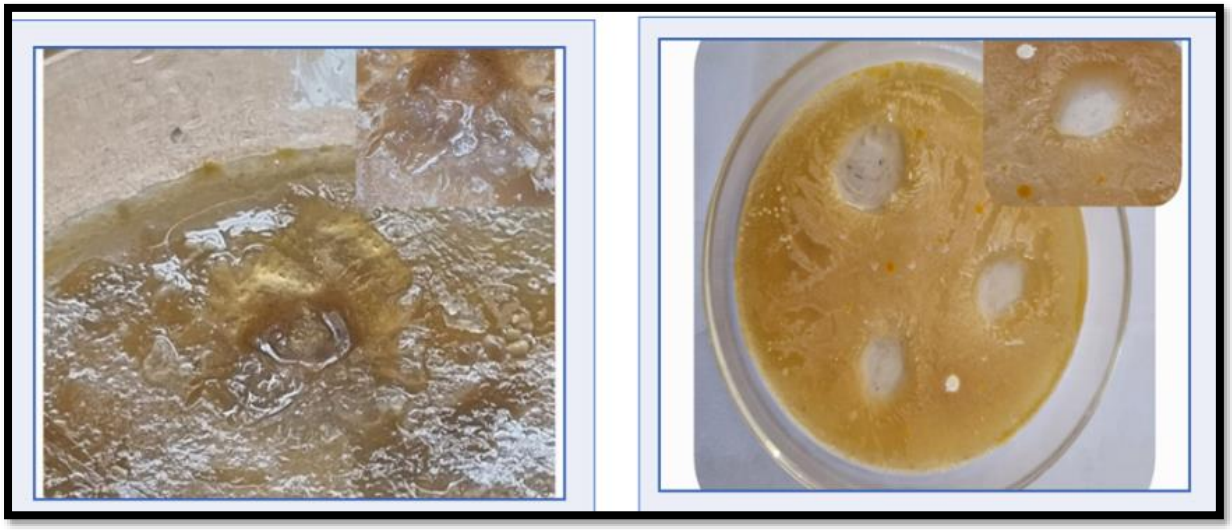

Figure No. 10 Microbial Study

Procedure

- Samples were cultured on nutrient agar plates.
- Incubation was carried out at 37°C for 24–48 hours.
- Colony formation was observed.

Table 8: Microbial Limit Test

Parameter	Observation	Result
Bacterial Growth	No significant growth	Acceptable
Fungal Growth	Absent	Acceptable

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3.1.8 Stability Studies

Stability studies were conducted to evaluate the shelf-life and performance of the syrup under different storage conditions.

Figure No. 11 Stability Study

Conditions

- Temperature: 40°C ± 2°C
- Humidity: 75% RH
- Duration: 1–3 months

Table 9: Stability Study

Duration	Observation	Result
1 Month	No change in color, pH, or viscosity	Stable
3 Months	Slight color change, acceptable	Stable

4. CONCLUSION: -

The study on Stevia rebaudiana syrup was done to make a syrup that is good for people. This syrup uses Stevia rebaudiana, a sweetener that has extra health benefits. Many people are looking for options to sugar especially those with diabetes, obesity and other health issues.

The syrup was made using Stevia rebaudiana leaves and some other ingredients like sorbitol, citric acid and flavorings. Making this syrup is easy can be. Does not cost a lot. This makes it good for making amounts in a lab or large amounts in a factory. The syrup was. Found to have a good color, smell and taste. It does not have a taste, which is good for people, especially kids and old people.

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The syrups properties like pH, thickness and solid content were also found to be okay. This means the syrup is stable and of quality. The syrup was checked for its plant compounds. Was found to have glycosides, flavonoids, tannins and phenolic compounds.

These compounds help make the syrup have antioxidant, -inflammatory and antimicrobial properties. This means the syrup is not a sweetener but also a healthy herbal product. The syrup was also checked for germs. Was found to be clean. It was tested for stability. Was found to be okay over time. This means the syrup can be stored and used for a time. Overall, the Stevia rebaudiana syrup is safe, stable and effective. It can be used of sugar-based syrups and artificial sweeteners.

It may also help with weight management. Making healthy products. In conclusion this study helps in making functional products by providing a scientifically validated approach for developing a Stevia rebaudiana-based syrup. Future studies may focus on making amounts testing on people and finding more uses to establish its role, in healthcare and nutrition.

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