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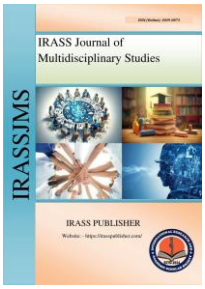

Devlopment and Formulation of Herbal Biscuits from Ashwagandha Root Powder and Ragi for Antidiabetic Activity

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Abstract: This study explores the development and evaluation of herbal biscuits incorporating ashwagandha root powder (Withania somnifera) and ragi flour (Eleusine coracana) to enhance their antidiabetic properties. Ashwagandha is well-known for its adaptogenic and medicinal properties, including blood sugar regulation, while ragi is a millet rich in dietary fiber, essential amino acids, and bioactive compounds, which are beneficial for managing diabetes. The preparation of herbal biscuits is a cutting-edge, futuristic study in the Research field of preparing useful foods. Herbal biscuits were made for this study with wheat flour, ragi flour, milk, ghee or white butter, stevia powder, baking powder, baking soda, vanilla extract, and powdered ashwagandha root. Various formulations were created to determine the optimal ratio for maximum acceptability and health benefits. Sensory evaluation was conducted to assess taste, texture, aroma, and appearance etc. it was discovered that the contents of 33 grams of wheat flour, 35 grams of ragi flour, 29 grams of stevia powder, 17 grams of unsalted white butter, and 2 grams of ashwagandha were all found to be highly acceptable. For the second flavor of biscuit, Ghee was substituted for white butter in order to enhance the flavor. Ghee was also prepared using the same method and ingredient combination . Given their nutritional advantages, ghee biscuits are superior to unsalted white butter ones. These herbal biscuits could serve as a functional food product, offering a convenient and effective way to incorporate bioactive compounds beneficial for managing diabetes into the diet.

Keywords: Herbal biscuit, Ashwagandha root powder, sensory and physical evaluation, Ragi flour

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Introduction

People's quality of life is diminished by fast-paced lifestyles and elevated stress levels. The competitive lifestyles of young people cause stress and stress-related disorders, which can result in a variety of illnesses. Eating a balanced diet is among of the most significant things you are able to do to live a long, healthy life. In today's fast-paced society, quick meals are rapidly taking the place of regular meals as the pace of life quickens. Foods are calorie-dense, highly processed, and low in nutrition. Numerous deficiencies may result from a diet that is abundant in energy but low in vital nutrients. Food from bakeries typically has a high starch content. There is a substitute for the classic herb-based cookies[1]. One baking product that has a great shelf life is cookies1. Biscuits are a tasty and nutritious snack that are high in fat, carbohydrates, proteins, minerals, and some vitamins. Biscuits are a popular food eaten by both children and adults. It would be easy for kids in underprivileged communities to add protein-rich biscuits to their diets. A biscuit, or cookie, is another term for a product that has been chemically leavened. Generally speaking, biscuits are used in European nations, while cookies are used in the USA .Herbal-based foods can help prevent a wide range of ailments[1,2.3].

Ashwagandha, is considered the mostimportant plants in traditional Indian medicine 4 . A little woody shrub, ashwagandha , is consists the Solanaceae family (Solanaceae Juss.). It is typically found in western India drier regions 5 .The Indian traditional medicinal system known as Ayurveda uses a lot of Withania somnifera Dunal, sometimes known as ashwagandha (WS) 6 . Additionally, ashwagandha is grown forits therapeutic qualities. The roots have been traditionally employed and have been the focus ofcontemporary medical research, despite the fact that the berries and leaves also seem to havesome therapeutic properties 7 Because ashwagandha has folkloric usage and similarpharmacological properties to ginseng, it has been referred to as Indian ginseng 8 . As an aphrodisiac, ashwagandha is one of

the most well-known plants in Ayurveda 9 . For fitness purposes, the leaves and roots are typically ground into a powder and used in tiny amounts in churna balls, biscuits, cookies, murku, namakpara, and missi roti 10 . It is one of the most important herb of Ayurveda (the traditional system of medicine in India) used for millennia as a Rasayana for its wide ranging health benefits. Rasayana is described as an herbal or metallic preparation that promotes a youthful state of physical and mental health and expands happiness. These types of remedies are given to small children as tonics, and are also taken by the middle-aged and elderly to increase longevity.11 Ashwagandha and its extracts are used in many tonics and preparations, such as chavanaprash, herbal tea, powders, tablets.12 Secondary metabolites isolated from the plants include alkaloids, steroids, triterpenoids plant phenols, etc.13 Eleusine coracana L, commonly called as ragi, is a notable millet that is extensively grown throughout India and Africa14. Nutritionally speaking, millet offers affordable health benefits for consistent use and helps manage conditions such as diabetes, obesity, hyperlipidemia, and others 15. Millet or Ragi sustains one third of the world's population and play a significant part of the diet in India and is largely eaten low income or poor section of society. Ragi is rich in calcium which helps in strengthening bones. It is an excellent source of natural calcium for growing children and people. Ragi consumption helps in development of bones in growing children and maintenance of bone health in adults 16.

Role of Ashwagandha and Ragi in antidiabetic activity :

Potential benefits in managing diabetes. Ashwagandha is known for its adaptogenic properties, which help the body manage stress. Stress management is crucial for diabetic patients, as stress can negatively impact blood sugar levels. Some studies suggest that ashwagandha can directly lower blood sugar levels through its hypoglycemic effects. hronic inflammation is associated with insulin resistance and type 2 diabetes. Ashwagandha has anti-inflammatory properties, which might help reduce inflammation and improve overall metabolic health. Ragi has a low glycemic index (GI), which means it releases glucose into the bloodstream more slowly compared to high GI foods. This slow release helps in maintaining stable blood sugar levels. The high fiber content in ragi aids in digestion and slows down the absorption of sugar, preventing sudden spikes in blood glucose levels. This makes it a suitable food for diabetic patients.

The incorporation of medicinal herbs and nutritive grains in the biscuits can aid in numerous health benefits, therefore a research article entitled "Devlopment and formulation of Herbal Biscuit from Ashwagandha Root Powder and Ragi" is written with following objectives:

- To prepare Herbal Biscuits incorporated with Ashwagandha and ragi for diabetic patients.
- To evaluate Sensory and Physical characteristics of Herbal Biscuit.

Materials and Methods

Ingredients required

Wheat flour, Ragi flour, Ashwagandha root powder, Milk, Stevia powder , White butter, Ghee, Salt, Vanilla essence, Baking powder, Baking soda.

Machines and apparatus required

Microwave oven, Weighing machine, Blenders, Digital vernier caliper, Sieve, Rolling pin, Rolling board, Cutter.

Method

1. Weighing the components.
2. Sifting both ragi and wheat flour.
3. Roasting ragi and wheat flour.
4. Addition of Stevia powder
5. Combining powdered ashwagandha root, wheat, and ragi.
6. Adding milk, vanilla essence, ghee/unsalted white butter, baking powder, and baking soda .
7. Creating dough from a combination
8. Dough chilling in 30 minutes.
9. Cutting and sculpting.
10. Microwave baking at 180°C for 25 minutes.
11. Allowing the room to cool.
12. Kept inside a sealed container.

Result and Discussion

Formulation with unsalted white butter:

Table 1:

INGREDIENTS	FORMULATION 1	FORMULATION2	FORMULATION3
Wheat flour.	**30gm**	**30gm**	**33gm**
Ragi flour	**32.4gm**	**31.5gm**	**35gm**
Ashwagandha root powder	**1.8gm**	**1.5gm**	**2gm**
Milk	**½ cup**	**½ cup**	**½ cup**
Stevia powder	**25gm**	**26gm**	**29gm**
Unsalted White butter	**17gm**	**17gm**	**17gm**
Vanilla essence	**3 to 4 drops**	**3 to 4 drops**	**3 to 4 drops**
,Baking powder, Baking soda	**1 gm**	**1 gm**	**1 gm**
Coco powder	**1.5 gm**	**1.5gm**	**1.5gm**

Table 2: Formulation with Ghee : (by using same quantity)

INGREDIENTS	FORMULATION 1	FORMULATION2	FORMULATION3
Wheat flour.	**30gm**	**30gm**	**33gm**
Ragi flour	**32.4gm**	**31.5gm**	**35gm**
Ashwagandha root powder	**1.8gm**	**1.5gm**	**2gm**
Milk	**½ cup**	**½ cup**	**½ cup**
Stevia powder	**25gm**	**26gm**	**29gm**
Ghee	**17gm**	**17gm**	**17gm**
Vanilla essence	**3 to 4 drops**	**3 to 4 drops**	**3 to 4 drops**
,Baking powder, Baking soda	**1 gm**	**1 gm**	**1 gm**
Coco powder	**1.5 gm**	**1.5gm**	**1.5gm**

Samples of unsalted with butter:

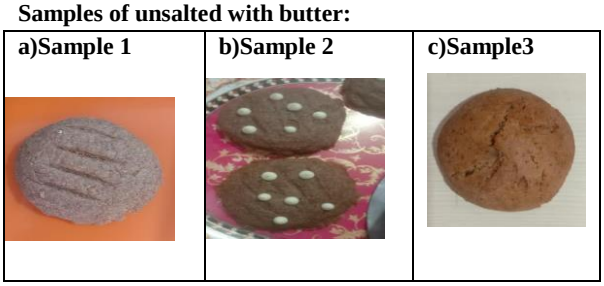


Fig 1: Different samples of biscuits with unsalted white butter

Samples of Ghee

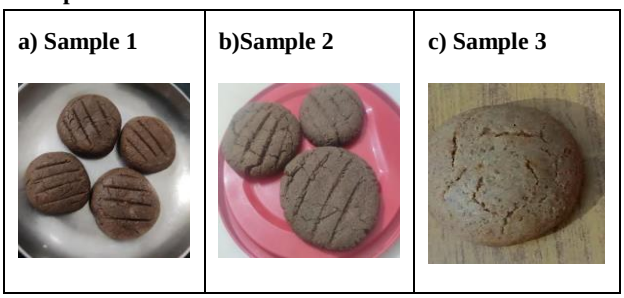


Fig 2: Different samples of biscuits with Ghee

Storage: Store in a air tight container. best use before 30 days.

Experimental Work

Physical and Sensory Analysis of Herbal Biscuits

- For analysis, three or three samples of each of the permitted compositions of ghee and white butter are chosen. The three samples of Ghee and unsalted White Butter biscuits have completed their physical features.

Physical parameters are computed from the following formulas:

- **Spread ratio:** The following formula was used to calculate the spread ratio.
- Diameter (mm) / thickness (mm) is the spread ratio.
- **Thickness:** The thickness was measured in mm by digital vernier caliper.
- **Volume:** The area of a biscuit multiplied by its thickness is the definition of its volume.

Volume (cm3) = d 2πT/ 4

t = Average thickness of biscuit (mm)

d = Diameter of biscuit (mm)

- **Diameter:** The diameter was measured in mm by digital vernier calipe
- **Density:** The weight-to-volume ratio was used to determine density once volume was calculated.

Density(g /cm3) = mass of sample (g)/ volume of sample (cm3)

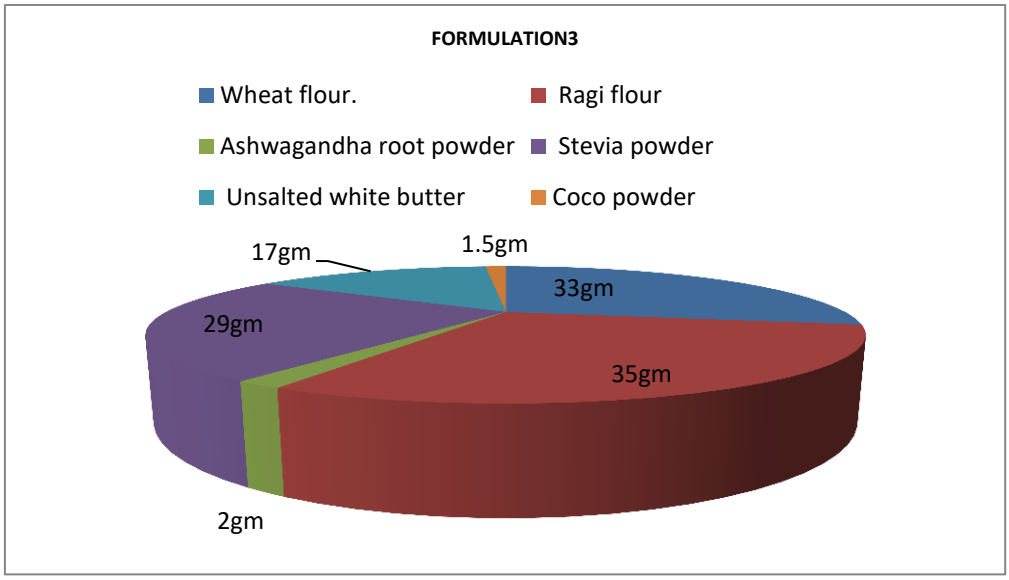
Sensory Analysis of samples

Five panelists, chosen from the faculty of the Shree Swami Samarth Institute of Pharmacy, assessed the samples.The samples were rated by them.Every sample of ghee and white butter underwent a sensory examination. Following the fabrication of several samples, it was discovered that the mixture of 33 grams of wheat flour, 35 grams of ragi flour, 29 grams of stevia powder, 17 grams of unsalted white butter, and 2 grams of ashwagandha had a good flavor and baking qualities and was therefore quite acceptable. To improve flavor For the second variety of biscuit, ghee was selected rather than unsalted white butter. Ghee biscuits were made using the same method and component combination. After that, 2 grams of ashwagandha root powder and 35 grams of ragi flour are used for the sensory and physical analyses of the white butter and ghee biscuits

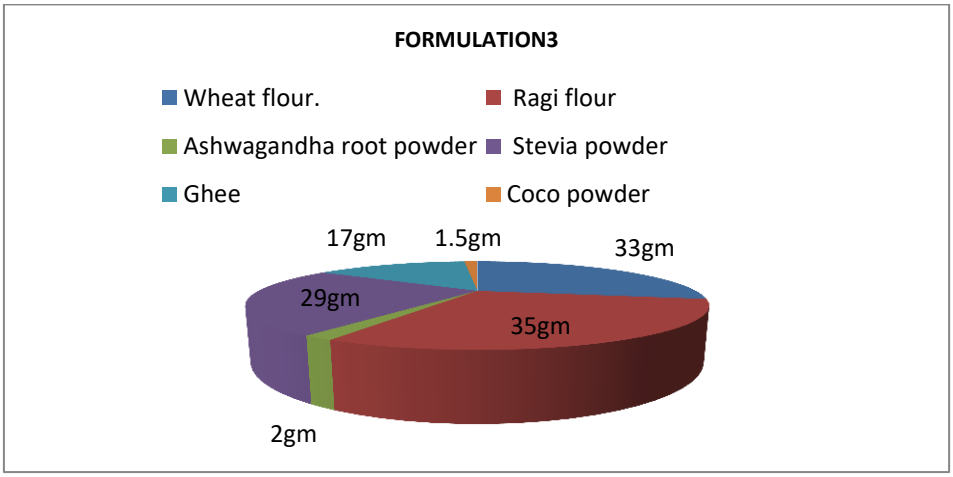
Sensory Analysis of ghee and white butter samples

The semi-skilled panel evaluates six biscuits (three of each of ghee and unsalted white butter) using their senses. For analysis, three or three samples of each of the permitted compositions of ghee and white butter are chosen.

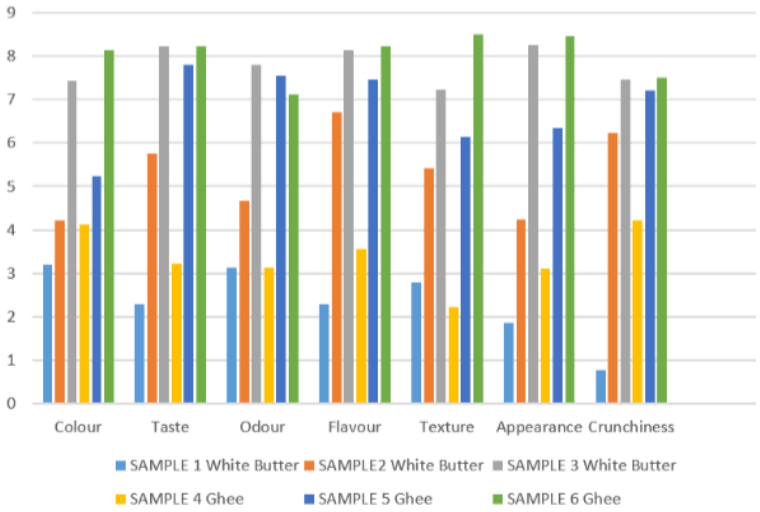
Observation:



Graph 1: Formulation 3 with unsalted white butter (highly acceptable)



Graph2: Formulation 3 with ghee .(highly acceptable)



Graph3: Sensory analysis for herbal biscuits with unsalted white butter and ghee

Observation table

Table 3:

Sensory evaluation of samples of unsalted white butter of different composition and ghee biscuit.

CHARACETRSTICS	SAMPLE 1	SAMPLE2	SAMPLE 3	SAMPLE 4	SAMPLE 5	SAMPLE 6
FAT USED	**Unsalted White Butter**	**Unsalted White Butter**	**Unsalted White Butter**	**Ghee**	**Ghee**	**Ghee**
Colour	**3.2**	**4.22**	**7.44**	**4.13**	**5.23**	**8.13**
Taste	**2.3**	**5.77**	**8.23**	**3.23**	**7.80**	**8.23**
Odour	**3.12**	**4.66**	**7.80**	**3.12**	**7.56**	**7.12**
Flavour	**2.30**	**6.70**	**8.13**	**3.56**	**7.45**	**8.24**
Texture	**2.8**	**5.42**	**7.24**	**2.23**	**6.15**	**8.50**
Appearance	**1.86**	**4.25**	**8.25**	**3.1**	**6.34**	**8.46**
Crunchiness	**0.78**	**6.23**	**7.45**	**4.22**	**7.2**	**7.50**

Table 4:

Physical characteristics of Ghee and Unsalted white butter samples

	Samples	DIAMETER (mm)	THICKNESS (mm)	SPREAD RATIO	VOLUME	DENSITY
	Sample 1	**50.48**	**10.4**	**4.853**	**20803.74**	**0.0006**
Ghee	**Sample 2**	**80.57**	**15.2**	**5.3**	**77437.64**	**0.00016**
	Sample3	**20.53**	**12.1**	**1.696**	**4003.43**	**0.0032**
	Average values	**50.523**	**12.56**	**3.94966**	**34081.6033**	**0.00132**
	Sample 1	**20.48**	**11.2**	**1.828**	**3687.62**	**0.0037**
Unsalted White Butter	**Sample 2**	**80.56**	**12.3**	**6.549**	**62663.32**	**0.00025**
	Sample3	**30.49**	**13.2**	**2.309**	**9632.92**	**0.0015**
	Average values	**43.843**	**12.23**	**3.562**	**25327.9533**	**0.0018166**

Result

The creation, formulation, sensory evaluation, and physical examination of herbal biscuits made with ragi and ashwagandha root powder were the focus of the current study.The mixture of 33 grams of wheat flour, 35 grams of ragi flour, 29 grams of stevia powder, 17 grams of unsalted white butter, and 2 grams of ashwagandha had a good taste and baking qualities; it was a much better composition than the other two formulations. For the second flavor of biscuit, Ghee was substituted for white butter in order to enhance the flavor. Ghee was also prepared using the same method and ingredient combination.These herbal biscuits offer a variety of health advantages.These ragi and ashwagandha root powder-made herbal biscuits are high in fat, carbs, and fiber and also it contain active substances like Withanolides, Alkoloids, polyphenolic compounds,minarals,phytic acid that used for antidiabetic activity so these herbal Biscuits beneficial for diabetic patients.It also has anti-aging, anti-obesity, blood sugar-regulating, anti-inflammatory, and anti-cancer properties.It contributes to bettering general health.

White butter and ghee are utilized as sources of fat in the recipe for herbal biscuits. The study reveals that the ghee-prepared biscuits had greater diameter and thickness and notably received the highest score across all sensory analysis dimensions.Given their nutritional advantages, ghee biscuits are superior to white butter ones. Ghee biscuits are therefore better than unsalted white butter biscuits. As a result, adding ragi flour and ashwagandha root powder to ghee biscuits will improve their nutritional value.and also gives antidiabetic activity. Tables 5and 6display the results of the sensory and physical investigation of the herbal biscuits.

These herbal biscuits formulated with antidiabetic ingredients have shown promising results in managing blood sugar levels and improving overall health in diabetic individuals.

Conclusion

Samples of white butter biscuits were made using varying amounts of ragi flour and ashwagandha root powder. Following sample production, it was discovered that the contents of 33 grams of wheat flour, 35 grams of ragi flour, 29 grams of stevia powder, 17 grams of unsalted white butter, and 2 grams of ashwagandha were all found to be highly acceptable. For the second flavor of biscuit, Ghee was substituted for white butter in order to enhance the flavor. Ghee was also prepared using the same method and ingredient combination. After that, a sensory and physical study is conducted on the unsalted white butter and ghee sample (which includes ragi and powdered ashwagandha root). After investigation, it was discovered that the ghee-prepared biscuits were thicker and more round, and they also received the top rating across the board for sensory analysis. Given their nutritional advantages, ghee biscuits are superior to unsalted white butter ones. Ghee biscuits are therefore better than white butter biscuits. As a result, adding ragi flour and ashwagandha root powder to ghee biscuits will improve their nutritional value and their active substances gives antidiabetic property. The creation of these biscuits will aid in the treatment of diabetic illnesses in addition to enhancing their nutritional standards.

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