RESEARCH ARTICLE

Development and Assessment of a Nutritional Supplement Formulation for Diabetes Mellitus

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ABSTRACT

Diabetes, a major global health issue, affects 424.9 million people worldwide, with a significant portion undiagnosed, leading to severe health and economic impacts. Effective management of diabetes includes dietary interventions, among which nutraceuticals play a crucial role. Nutraceuticals are food-derived compounds that offer health benefits, including disease prevention and treatment. This study focuses on the development of an antidiabetic nutraceutical instant soup powder formulated with ingredients like fenugreek seed, finger millet, tomato, curry leaves, garlic, black pepper, black salt, stevia, and oyster mushrooms.

The raw materials were sourced from local markets and processed to create a fine powder mix. The soup powder's physicochemical parameters, including pH, viscosity, moisture content, and ash levels, were measured. Nutritional analysis, sensory evaluation, and heavy metal content determination were conducted following standard protocols. The soup powder exhibited significant antimicrobial, antioxidant, and antidiabetic properties, demonstrating potential as a dietary supplement for diabetes management. The sensory evaluation indicated high acceptability among the panelists, highlighting the product's feasibility for consumer use.

Keywords: Diabetes, Nutraceuticals, Instant soup powder, Hyperglycemia, Antidiabetic, Sensory evaluation, Nutrient analysis, Antimicrobial properties, Antioxidant properties.

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INTRODUCTION

Diabetes

As per the International Diabetes Federation (IDF) diabetes is one of the major worldwide health issues of the twenty-first century. IDF data from 2017 indicated that 424.9 million people globally, aged 20 to 79, were projected to have diabetes, amounting to an 8.8% prevalence rate. Startlingly, 212 million people are thought to be undiagnosed in half of these cases. Diabetes has a significant financial cost; around 2% of all health spending worldwide, or USD 727 billion, goes towards treating the illness. Unfortunately, diabetes is the fourth most common cause of years lived with a disability and ranked second in terms of years lost to premature mortality."[1]

Hyperglycemia, or increased blood sugar, is an early sign of the metabolic disease known as diabetes mellitus (DM). Polyuria, polydipsia and vision impairment are common symptoms of diabetes. It's important to keep in mind that these symptoms and indicators might not always be present, particularly if blood sugar levels are only slightly raised.[2] WHO recognizes three primary kinds of DM: type 1, type 2, and gestational diabetes, which develops during pregnancy.

While all types have the same symptoms, indicators, and outcomes but, their causes are different and their frequency varies among groups. Essentially, the root cause of all types of diabetes is the insufficient production of insulin by pancreatic beta cells, which results in hyperglycemia.[3,4]

Type 1 DM is usually caused by an autoimmune response to the beta cells of the pancreas, which are responsible for producing insulin.

Conversely, type 2 DM is considered systemic insulin resistance in all organs and requires compromised beta cell function from the outset. Gestational diabetes, like type 2 DM, is typified by insulin resistance resulting from the redistribution of prenatal hormones.[3,4]

One of the most important illnesses in the industrialized world is diabetes. Even though a wide range of treatments, including medications, have been developed, there is an increasing emphasis on finding efficient agents that work

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in tandem with current medications to treat this condition synergistically.[4]

Nutraceuticals in the Treatment of Diabetes

"Diet and homeopathic treatments are important components of international health systems. 'Nutraceuticals' are compounds found in or produced from food that give extra health advantages, such as disease prevention, in addition to nourishment. It was Dr. Stephen L. DeFelice who first used the word.

"Nutraceuticals" is a concept that combines the words "nutrition" and "pharmaceuticals" to describe food ingredients that are beneficial to health, including illness treatment and prevention.[5,6]

Diabetes is one condition that is very closely related to diet. Even though nutrition is a crucial factor in its growth, it also turns out to be one of the most effective strategies for treating diabetes. It is commonly known that using dietary supplements, such as vitamins C and B, minerals like chromium, and herbs like *Gymnema sylvestre* to treat diabetes is a safe and efficient way to lower blood sugar levels and avoid problems from the disease. Crucially, these supplements function in concert with scientifically verified diabetic formulae to efficiently control diabetes and its related consequences.[7]

Instant Soup Powder

Convenient food formulations that are high in nutrients are about to take off to satisfy consumer demand. Instant soup powders satisfy consumers' increasing demand for quick, clean, and shelf-stable food options, as do canned, frozen, dried, and preserved foods. Because they frequently contain whole cereals, vegetables, and pulses in their formulations, these instant foods provide consumers with a complete diet without sacrificing nutritional value.[8]

MATERIALS AND METHODS

Selection of Raw Material

The following condiments and ingredients were purchased from community markets: gurmar powder, fenugreek seed, finger millet, tomato, curry leaves, garlic, black paper, black salt, etc.; stevia was purchased from Bhagyashree Lab. in Nagpur; oyster mushrooms were obtained from nearby cultivators in Kampthee, Nagpur.

Fenugreek Seed Powder Processing

From a residential area in Nagpur, India, fenugreek seeds were obtained. The seeds were processed by washing, draining, and allowing them to dry completely in the sun on sunny days. Once the seeds had dried completely, they were ground into a fine powder, sieved through sieve No. 44, and the powder was subjected to defatting. About 100 g of fenugreek seed powder was extracted overnight using a required amount of petroleum ether. The powder was then filtered out and drained.

Preparation of Spice Powder

First, the garlic was peeled, then the curry leaves and garlic were cleaned, drained, and chopped. Next, the pieces were dried in the sun on very sunny days until they were completely dry. After drying, the curry leaves and garlic were mashed independently and put through sieve No. 44 to create a fine powder. Lastly, the spice powder was made by combining the powdered garlic, curry leaves, stevia, black salt, and black paper.[9]

Critical Evaluation of Prepared Nutraceutical Instant Soup Powder for Diabetes Patients

Using tomato powder as the flavoring and prepared spice powder, finger millet flour, mushroom powder, and defatted fenugreek powder as the antidiabetic active herbs, an antidiabetic nutraceutical instant soup powder mixture was created. After being made, the instant soup powder was wrapped in colored or clear polythene bags and utilized for several other analyses, including proximate analysis, sensory evaluation, metal concentration, and microbial contamination.[9-11]

Formulation of Nutraceutical soup powder (Showed in Figure 1 and Table 1)

About 10 g of the prepared soup mix and powder should be added to 100 mL of water. After 3 to 5 minutes of boiling, move to a soup dish, stir, and serve hot.[12]

Analysis of Instant-Soup Powder Nutritional Therapy for Diabetes

Physicochemical parameters of the instant soup powder formulation

The following physicochemical parameters, such as pH, viscosity, moisture content, and ash levels, were measured using standard protocol.

Moisture content, ash levels, and designed instant soup powder for an active antidiabetic herb

The WHO standard approach was used to determine the instant soup powder's moisture content and ash levels.[10]

pH of soup powder

About 10 gm of were dissolved in 100 mL of water and a digital pH monitor was used to measure the formulation's pH.[10]

Viscosity of formulated instant soup powder

The Brookfield Viscometer was used to determine the instant soup formulation's viscosity. The measurement was performed in triplicate using spindle number 62 at 25 ± 1°C and 0.5 rpm.[10]

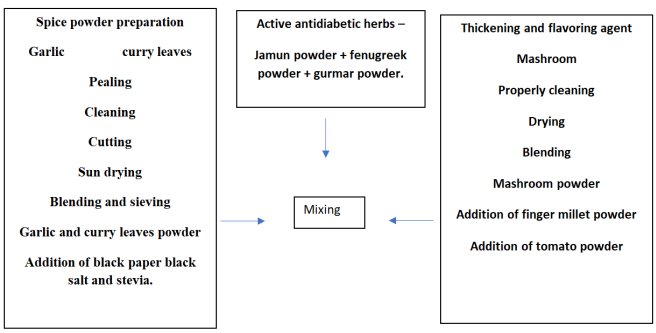

Figure 1: Instant soup powder containing antidiabetic nutrients

Table 1: Recipe for powdered soup mix

S. No	Groups	G1	G2	G3	G4
	Ingredients (powder blend)	Quantity (mg)			
1.	*Syzygium cumini*	630	520	430	320
2.	*Trigonella foenum-graecum*	630	520	430	320
3.	*Gymnema sylvestre*	610	510	410	310
4.	Mushroom	1020	1010	1010	1000
5.	*Eleusine coracana*	1400	1300	1200	1200
6.	*Solanum lycopersicum*	3100	3100	3100	3100
7.	*Allium sativum*	1010	1010	1000	1020
8.	*Murraya koenigii*	510	510	510	510
9.	*Piper nigrum*	510	510	510	510
10.	Black salt	1020	1030	1010	1020
11.	*Stevia rebaudiana*	420	420	410	420

Sensory evaluation

As part of the sensory evaluation procedure, the sample was given a five-point hedonic scale test (5 excellent, 4 good, 3 decent, 2 poor, and 1 extremely poor) and 27 unknown members evaluated the sample's acceptability. Panelists from the institute assessed the samples' overall acceptability as well as their look, consistency, taste, odor, and color.[13,14]

Analysis of the designed soup powder's nutrients

For the instant soup AOAC method (2000), moisture content, ash levels, and nutrient analysis—including protein, fat, carbohydrate, and energy value—were investigated.[15,16]

Determination of heavy metal content in prepared instant soup powder

The amounts of Ld, As, cd, and Hg in the made soup powder were measured using flame atomic absorption spectrometry.[17]

Soup powder's antimicrobial, antioxidant, and antidiabetic properties

The methanolic extract of the material was diluted in DMSO to produce doses ranging from 10 to 100 µg/mL for assay of α-amylase inhibition. Next, the substrate and 0.2 mL sample solution in a certain concentration were combined in a test tube. An additional 0.1 mL of porcine pancreatic amylase (PPA) in tris-HCl buffer (2 units/mL) is mixed in the tube holding both solutions. For ten minutes, the response was accepted at 37°C. After the incubation period, 0.5 mL of 50% acetic acid was added to each tube to stop the process. Centrifuge mixture for five minutes at 4°C and 3000 rpm was done using a spectrophotometer that was calibrated to detect absorbance at 595 nm.

The standard medicine was acarbose, α-amylase inhibitor. After the experiment was repeated three times, the activity was computed from a given formula.[18,19]

$$\%\text{Inhibition} = (\text{Control} - \text{Sample}/\text{Control})*100$$

RESULT AND DISCUSSION

Physicochemical Parameter

Values for ash and moisture content

Pre- and post-stability assessments were conducted on formulation batches as well as raw herbal medications. Physicochemical quality standardization, including measurements of moisture content and ash content. It was discovered that the ideal range of 1.39 to 2.52% w/w for individual herbal medications and 1.44 to 2.48% w/w for formulation batches for moisture content, a critical factor impacting drug stability, was met. The formulation G4 showed the best stability, with moisture content ranging from 1.44 to 1.57% w/w. Notably, all values stayed below 5% showed in Tables 2 and 3.

Elevated ash readings may suggest adulteration, substitution, contamination, or carelessness in the drug production process. The range of ash values for each herbal treatment was 4.53 to 10.82% w/w for WSM, 1.32 to 2.46% w/w for AIM, and 2.43 to 3.24% w/w for TM.

Total ash readings for the formulation batches ranged from 8.25 to 9.32% w/w, water-soluble ash values from 2.98 to 4.45% w/w, and acid-insoluble ash values from 0.9 to 2.1 w/w. These results were all rather low, suggesting little contamination.

The formulations' moisture and ash values correlated with the average values of the different medications. F4 showed greater stability with total ash values ranging from 9.1 to 9.3%, water-soluble ash from 4.43 to 4.45%, and acid-insoluble ash from 1.9 to 2.0%. Notable variations were seen in formulations G1, G2, and G3 showed in Table 4.

pH and viscosity

The prepared instant soup powder's pH and viscosity were measured and found to be, respectively (showed in Table 5)

Sensory Analysis

In the process of developing new food products, sensory evaluation is essential since it reduces the possibility of a

Table 2: %LoD, total ash value for antidiabetic

S No.	*Powdered composition*	*%LoD mean*	*Total ash mean (TSM)*	*Water-soluble ash mean (WSM)*	*Acid-insoluble ash mean (AIM)*
1	*Syzygium cumini*	2.10 ± 1.11	3.23 ± 1.10	3.10 ± 1.12	2.11 ± 1.02
2	*Trigonella foenum-graecum*	3.21 ± 1.10	8.21 ± 1.14	3.10 ± 0.04	2.11 ± 1.02
3	*Gymnema sylvestre*	2.19 ± 1.14	9.11 ± 1.10	2.01 ± 1.02	3.12 ± 1.02

Table 3: %LoD and total ash value

Formulations	*Pre-stability*		*Post stability (After 1 month)*	
	(% w/w)	*Total ash value Mean+SD (% w/w)*	*%LOD Mean+SD (% w/w)*	*Total Ash value Mean+SD (% w/w)*
F1	2.48+0.015	8.25+0.065	3.13+0.081	8.12+0.095
F2	2.38+0.055	9.35+0.045	3.19+0.034	9.11+0.078
F3	1.78=0.035	8.59+0.11	2.27+0.045	8.43+0.065
F4	1.44+0.040	9.32+0.075	1.57+0.057	9.11+0.076

Table 4: Water soluble and acid insoluble ash values

Groups	*Pre-stability (PRS)*		*Post stability (POS) (after 1.month)*	
	Water-soluble ash	*Acid-insoluble ash*	*Water-soluble ash*	*Acid-insoluble ash*
G1	3.18 ± 1.01	2.1 ± 1.013	1.20 ± 1.13	1.18 ± 1.10
G2	2.25 ± 1.07	2.01 ± 01.13	1.20 ± 1.10	2.10 ± 1.11
G3	1.05 ± 1.10	2.11 ± 1.11	1.01 ± 1.50	2.02 ± 1.018
G4	2.40 ± 1.31	1.5 ± 1.12	1.03 ± 1.00	2.22 ± 1.017

product failing and establishes a clear connection between food quality and consumer perception. Even though designed food products may be nutrient-dense, successful market adoption depends heavily on aspects like taste and odor. The findings of the sensory assessment for formulation batches G1, G2, G3, and G4 are shown in Table 6.

Based on the statistics, it can be concluded that formulation G4 was highly favorable and stood out from the other formulations. The soup's flavor, aroma, consistency, and color were all better at G4. The study concludes that the formulation of G4 instant soup powder is optimized for market acceptance based on these findings showed in Table 6.

Estimation of Nutritional Values

A quick soup powder was developed with flavor, spices, and antidiabetic herbs; finger millet flour was used for thickening. A nutritional examination of the optimized formulation revealed good acceptance. Table 7 shows the formulation's nutrient makeup. A high protein content, which is crucial for diabetes patients, as indicated by the protein content measurement of 10.55 gm/100 gm. The measured carbohydrate content of 64.97 gm/100 gm was confirmed to be within the safe limit needed for persons with diabetes. The total fat content was 1.06 gm/100 gm, which is low—a critical factor for persons with diabetes. Furthermore, an acceptable calorie value of 311.62 Kcal/100 gm was found for the energy value (calories). These results imply that the developed formulation has an excellent and secure nutritional composition, making it appropriate for people with diabetes[20] (Showed in Table 8).

Heavy Metal Content

An important finding that suggests the safety of the antidiabetic nutraceutical formulation for eating is the lack of heavy metals (HM) in it. It is well recognized that consuming more heavy metals than the daily intake can have hazardous effects on health. But, the fact that no heavy metals were found in this formulation during the investigation gives consumers confidence that it is safe to eat showed in Table 8.

Antimicrobial Assessment

The antimicrobial examination evaluated the sustainability of both the instant soup powder sample and the standard medication ofloxacin against *S. bacillus*. After evaluating the sample extract at different doses, the following zones of inhibition were identified: 50 mg/mL demonstrated a 10.50 mm zone, 100 mg/m: a 12.50 mm zone, 150 mg/ml a 13.50 mm zone, and 200 mg/mL a 16.00 mm zone in contrast to the standard ofloxacin. The sample extract showed good susceptibility against *S. bacillus*, even if it did not outperform the conventional medication. These results imply that the instant soup powder sample extract has potential antibacterial activity and may be useful in preventing the growth of *S. bacillus*.[21] (Showed in Figures 2 and 3 and Table 9).

Assay for antioxidant activity using DPPH

The antioxidant activity of standard and test samples, an instant soup powder with antidiabetic properties, both exhibit antioxidant activity. The sample's percentage inhibition for distinct concentrated ranged from 48.798 to 66.996%, falling

Table 5: pH and viscosity for the instant soup powder

Groups	*PRS*		*POS (After 1 month)*	
	Viscosity (cPs)	*pH*	*Viscosity (cPs)*	*pH*
G1	700 ± 2.10	4.21 ± 1.010	710 ± 3.1	3.01 ± 1.01
G2	710 ± 3.11	4.11 ± 0.011	810 ± 1.05	4.10 ± 1.10
G3	712 ± 4.00	4.02 ± 1.10	700 ± 2.101	3.11 ± 1.10
G4	601 ± 5.10	4.13 ± 1.010	611 ± 1.07	4.49 ± 1.10

Table 6: Sensory evaluation

	Constraint	*Very poor*	*Poor*	*Good*	*Very good*	*Excellence*
	Odor	08	10	-	-	-
	Taste	10	06	06	-	-
	Consistancy	08	06	05	01	-
	color	11	05	05	-	-
F2	Odor	07	10	06	-	-
	Taste	07	11	01	-	-
	Consistancy	06	06	06	04	-
	color	11	05	01	03	-
F3	Odor	02	11	04	02	-
	Taste	02	06	08	04	-
	Consistancy	-	04	11	04	01
	color	-	05	11	04	-
F4	Odor	-	01	06	11	01
	Taste	-	01	08	11	02
	Consistancy	-	01	05	06	05
	color	-	02	03	11	03

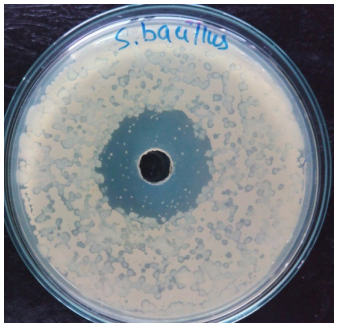

Figure 2: The standard medication, ofloxacin, displays an inhibitory zone

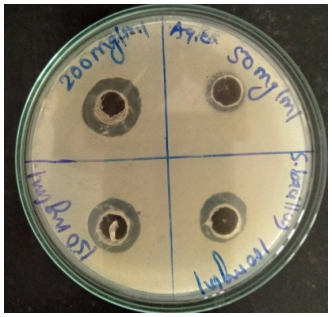

Figure 3: Sample of instant soup powder displaying the zone of inhibition

Table 7: Nutritional values

S. No	*Nutritional value (per 100 gm)*	
1	Energy value (Calories)	310.50 Kcal/100 gm
2	Carbohydrates	60.97 gm/100 gm
3	Total fat	1.01 gm/100 gm
4	Protein	09.30 gm/100 gm

Table 8: Presence of HM

S. No.	*HM*	*Observation (mg/kg)*
1.	Lead (Pb)	ve
2.	Arsenic (As)	ve
3.	Cadmium (Cd)	ve
4.	Mercury (Hg)	ve

Table 9: Area of inhibition of sample and standard

Strain used: S. bacillus *Zone of inhibition (ZI) in mm*					*Standard drug (Ofloxacin)*
Concentration (C) mg/mL	50	100	150	200	10 mcg/mL
Sample (S)	09.10 ± 1.51	10.30 ± 1.40	1.57 ± 0.547	16.02 ± 1.826	34.25 ± 2.957

Table 10: In DPPH assay, the proportion of STD ascorbic acid inhibition

C in mg/mL	*%Inhibition*
15	41.63
30	51.31
50	50.40
70	58.84
100	71.71

IC_{50} = 10.31

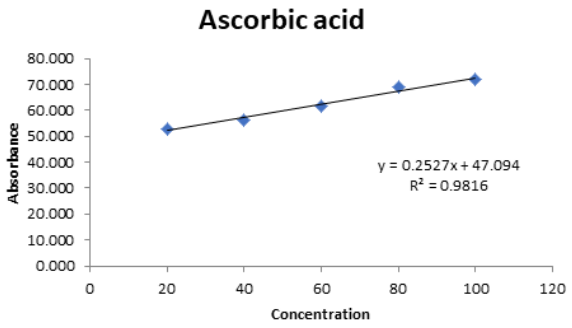

Figure 4: Evaluation of antioxidants in Std ascorbic acid

Table 11: In DPPH assay, the proportion of STD ascorbic acid inhibition

C in mg/mL	*%Inhibition*
25	47.68
45	51.72
65	56.23
85	61.05
125	65.88

IC_{50} = 25.06

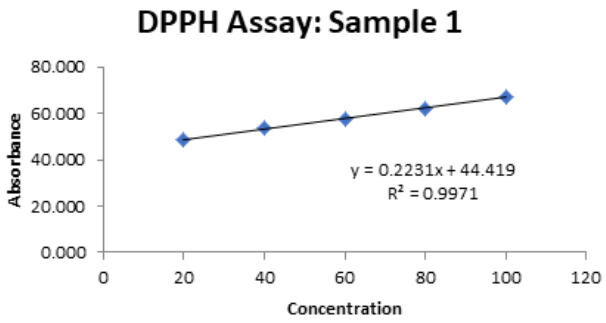

Figure 5: Antioxidant investigation of nutraceutical antidiabetic instant soup powder

within the acceptable range[22] showed in Table 10, Figures 4 and 5.

Antimicrobial Assessment

Both the extract from the instant soup powder sample and the conventional medication ofloxacin were examined in the antibacterial evaluation against *S. bacillus*. The sample extract at different doses produced the following zones of inhibition:

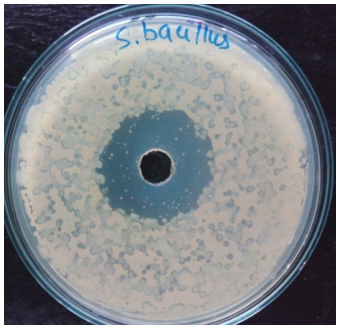

Figure 6: ZI shown by Std drug

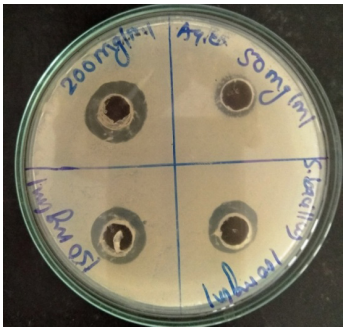

Figure 7: ZI shown by sample

50 mg/mL demonstrated a 10.50 mm zone, 100 mg/mL a 12.50 mm zone, 150 mg/mL a 13.50 mm zone, and 200 mg/mL a 16.00 mm zone in contrast to the standard ofloxacin.

The sample extract showed good susceptibility against *S. bacillus*, even if its efficacy was not greater than that of the usual medication. These results imply that the instant soup powder sample extract has potential antibacterial action and may be able to effectively suppress the growth of S. bacillus showed in Figures 6 and 7, Tables 11 and 12.

Antioxidant activity by DPPH assay

Antioxidant activity of test sample - Antidiabetic nutraceutical instant soup powder and standard ascorbic acid. The sample's percentage inhibition for distinct concentrated ranged from 48.798 to 66.996%, falling within the acceptable range showed in Tables 13 and 14, Figures 8 and 9.

Inhibition test for alpha-amylase

A diabetes-related enzyme is alpha-amylase, which is in line with other research showing the phytochemicals found in plants only slightly inhibit alpha-amylase. It has a benefit over synthetic drugs like acarbose because of its alpha-amylase stronger characteristic. Diabetes patients utilize this feature to control their postprandial blood glucose levels. Both sample 2

Table 12: ZI that the sample and std

	Strain Used: S. bacillus ZI in mm				*Standard drug (Ofloxacin)*
C	50 mg/mL	100 mg/mL	150 mg/mL	200 mg/mL	10 mcg/mL
S	12.30 ± 1.56	13.30 ± 1.64	12.40 ± 1.45	15.01 ± 1.70	30.20 ± 1.80

Table 13: In DPPH assay, the percentage of inhibition of Std ascorbic acid

C in mg/mL	*%Inhibition*
25	51.530
45	55.250
65	60.401
85	67.858
125	70.600

IC_{50} = 10.53

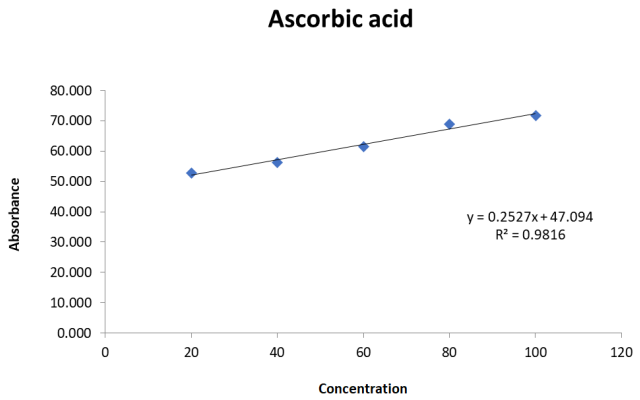

Figure 8: Antioxidant study of std ascorbic acid

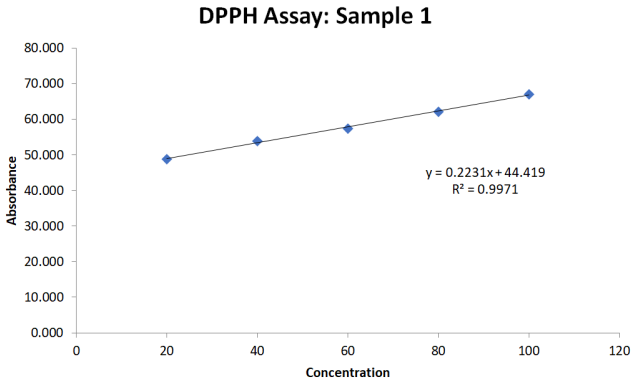

Figure 9: Antioxidant study

(marketed) and sample 1: Instant soup powdered composition with antidiabetic nutritional supplements, underwent routine alpha-amylase inhibitory activity testing and acarbose testing. The percentage inhibition for 15 to 55 (µg/mL) ranged between 47.61 and 69.93%, according to the data.

The aforementioned investigation's findings show that sample 2 (a commercialized formulation) shows 30.85 to 53% inhibition, while sample 1 (instant soup powder) exhibits percentage inhibition in the range of 45.68 to 56.58% for 10 to 50 µg/mL.

The created sample 1 (instant soup powder) has a larger percentage of inhibition, showing that it has antidiabetic activity, than sample 2, which is a commercialized antidiabetic nutraceutical formulation showed in Tables 15 to 20.

Table 14: Percentage of sample inhibition in HPPH test

C in mg/mL	*%Inhibition*
25	47.683
45	52.727
65	56.235
85	61.051
125	65.885

IC_{50} = 25.06

Table 15: %inhibition of alpha-amylase for std acarbose

Observation 1		*Observation 2*		*Observation 3*	
C (µg/mL)	*% I*	*C (µg/mL)*	*% I*	*C (µg/mL)*	*% I*
15	46.99	15	47.44	15	47.66
25	52.00	25	52.56	25	52.78
35	59.13	35	60.02	35	59.69
45	63.25	45	64.37	45	62.14
55	69.71	55	70.04	55	69.93

Table 16: IC_{50} for std acarbose

No.	*IC_{50} (µg/mLL)*
Count 1	13.3
Count 2	13.3
Count 3	13.2
MEAN ± SD	13.43 ± 0.654

Table 17: The percentage of inhibition of alpha-amylase for standard glucose in test sample 1 was measured

Observation 1		*Observation 2*		*Observation 3*	
C (µg/mL)	*% I*	*C (µg/mL)*	*% I*	*C (µg/mL)*	*% I*
15	44.13	15	43.63	15	44.57
25	46.23	25	47.21	25	46.53
35	50.13	35	51.20	35	50.25
45	53.12	45	53.87	45	53.17
55	55.14	55	55.30	55	55.78

Table 18: IC_{50} for test sample 1 (powder-based antidiabetic nutritional instant soup)

S. No.	*IC_{50} (µg/mL)*
Count 1	26.06
Count 2	24.40
Count 3	25.01
MEAN ± SD	24.10 ± 0.704

Table 19: Alpha-amylase inhibition percentage for test sample 2 (marketed)

Observation 1		*Observation 2*		*Observation 3*	
C (µg/mL)	*% I*	*C (µg/mL)*	*% I*	*C (µg/mL)*	*% I*
15	30.06	15	30.51	15	30.50
25	34.20	25	33.50	25	35.50
35	42.10	35	40.30	35	40.50
45	45.00	45	45.40	45	45.65
55	53.11	55	54.35	55	50.20

Table 20: IC_{50} for test sample-2 (Marketed)

S. No.	*IC_{50} (µg/mL)*
Count 1	20.50
Count 2	20.52
Count 3	20.20
MEAN ± SD	20.50 ± 1.070

CONCLUSION

Combining antidiabetic herbs, spices, flavorings, and thickeners resulted in the successful development of a safe and effective antidiabetic nutraceutical composition that is sold as instant soup powder. Based on sensory analysis and preliminary accelerated stability testing, the F4 formulation shows its low moisture content. This formulation was then subjected to additional analysis, which showed that trace elements like arsenic, cadmium, lead, and mercury were absent. Crucially, the soup powder is recognized for having a low-fat content, a high protein, ash, and carbohydrate content, and for being nutritionally balanced. The soup powder's high energy content makes it a good option for satisfying dietary needs.

The substance is high in antioxidants and has antibacterial activity, according to more research on its antioxidant and antimicrobial qualities. Additionally, alpha-amylase inhibition assays were used to evaluate *in-vitro* antidiabetic efficacy. Results showed that the instant soup powder formulation, which was intended to treat diabetes, performed better than the nutraceutical formulation that was sold.

Overall, these results highlight the potential of the developed instant soup powder with antidiabetic properties as a secure and efficient dietary choice for controlling diabetes and enhancing general health.

SUMMARY

Experiments were conducted following standard operating procedures and safety precautions throughout. Long-term usage of standard diabetic treatments, such as insulin and medications like metformin, may result in adverse effects. Nutraceutical formulations are used these days for the management of several illnesses. Nutraceuticals are crucial for managing diabetes.

The antidiabetic properties of nutritional herbs, such as gurmar leaves, fenugreek seed, and Jamun seed, are essential in managing diabetes. Instant soup powder was used as the form of nutraceutical compositions. Components for the formulation include garlic and salt, black paper and curry leaves, stevia for sweetness, tomato for flavor, finger millet give thickness, and oyst mushroom's flavor and thickening. All components are sourced from a local market and are of high quality.

The formulated antidiabetic nutraceutical formulation was assessed for its nutrient and heavy metal content, antioxidant and antimicrobial properties, pH, viscosity, moisture, ash values, micromeritics properties, and initial accelerated stability study. The formulation's *in-vitro* alpha amylase inhibition assay yielded acceptable results. For ninety days, the stability investigations were conducted according to ICH guidelines.

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