How to Cite:
Sudha, U. V., Priya, G. C. G. T., & Yasmin, N. (2022). Phytochemical and nutrient analysis of glycine max [milk & okara] bi-products, formulation and it's acceptability. *International Journal of Health Sciences*, *6*(S1), 11268–11279. https://doi.org/10.53730/ijhs.v6nS1.7761

Phytochemical and nutrient analysis of glycine max [milk & okara] bi-products, formulation and it's acceptability

U.V. Sudha
Research Scholar, Reg.No: 20123092192008, P.G and Research, Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari-629174, Tamilnadu, India

G.C. Gilbis Tamil Priya
P.G and Research, Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari-629174, Tamilnadu, India, Manonmaniam Sundaranar University, Trinelveli-627012, Tamilnadu, India

N.Yasmin
P.G and Research, Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari-629174, Tamilnadu, India, Manonmaniam Sundaranar University, Trinelveli-627012, Tamilnadu, India

***Abstract*---**In this study, glycine max (milk and okara) is selected for the preparation of bi Products. Alterative medication and natural remedies have been used from ancient time for the treatment and wellbeing of human. Some of the natural medicinal plants are so common that we use them in daily life without knowing their medicinal importance. Glycine max is the best example of it. The plant is commonly known as soybean which is eatable. Green bean hull chewed to a pulp are applied to a pulp are applied to smallpox, ulcer and excoriations in children from urine, dried sprouts believed to be beneficial for hair growth and curative for ascites and rheumatism. Glycine max reported to possess various pharmacological activities, anti-microbial activity, antidiabetic activity, anti-hyperlipidemic activity, anti-arthritic activity, cardio protective activity, antioxidant activity. The aim of this research was to study the physiochemical constituents, nutrient analysis, keeping and microbial analysis and organoleptic properties of the glycine max milk and okara based bi products. In the present study physicochemical analysis of Glycine max revealed the presence of several physicochemical constituents such as Acidity, Total soluble solid, Ash, Moisture. Nutrients such as Fat and Protein were analyzed. Soybean is soaked overnight, milk and okara was separated to prepare several products. Both soymilk and okara are rich in extraordinary nutritional benefits. The products are

Manuscript submitted: 27 March 2022, Manuscript revised: 9 April 2022, Accepted for publication: 18 May 2022

kept for sensory evaluations of the formulated products were done by 25 selected panel members. The keeping quality and microbial analysis were also done.

Keywords---ascites, rheumatism, anti-microbial activity, antidiabetic activity, antioxidant Activity.

Introduction

Glycine max (soybean) has been grown throughout Asia for almost 5000 years, with its origins in China. China was the first stop, followed by Japan. It was first introduced to Europe in the 18th century, and subsequently to America in the 19th. Soybean has long been a significant economic crop in the United States. Since the 1940s, the United States has been a leader in the world. The United States is currently the leading producer and exporter. Over 30% of the world's manufacturing is produced in China. Brazil is the world's leading soybean producer, producing around 32% of the world's soybeans. With a percentage of 28% Soybeans were first domesticated in Southeast Asia in the year 2000. Currently, the United States is the main producer, accounting for more over 30% of global output. The United States is the world's largest producer, accounting for over 32% of global soybean production, followed by Brazil (Valli yodan B, et al 2016).

Glycine max is a leguminous plant, and the majority of non-vegetarians do not consume enough animal products to meet the necessary protein intake. Soybeans are high in fibre, vitamins, and minerals, as well as all of the important macronutrients needed for healthy nutrition. (Fan MZ, 1995).

Soy milk has a similar protein content to cow's milk, but the amino acid profile is different. Soy milk has around the same protein content as cow's milk, around 35%, as well as 2% fat, 2.9 percent carbohydrate, and 0.5 percent ash. It contains little saturated fat and no cholesterol, unlike cow's milk. The primary disaccharide in soy milk is sucrose, which breaks down into glucose and fructose. Soy-based infant formulae can safely replace breast milk in children with galactosemia, a rare illness caused by a lack of galactose, a result of lactose breakdown. Soy milk is lactose-free, making it an excellent choice for lactose-intolerant individuals (Dauda AO and Adegoke GO, 2014). In the light of the above mentioned facts certain objectives were formulated as follows:

1. To find out the physicochemical constituents in Glycine max [Milk & Okara].
2. To determine the nutrient composition of Glycine max [Milk & Okara].
3. To standardize Glycine max [Milk and Okara] products.
4. To evaluate the sensory qualities of the product.
5. To determine its keeping quality and microbial analysis.

Methodology
Selection of topic:

Glycine max was chosen as a topic to increase the quality and acceptability. The reason for choosing this topic is because Glycine max has a lot of therapeutic value and contains a lot of nutrients. The theme was chosen to deliver health benefits to the population.

Collection of sample:

Glycine max seed was obtained from the Kulasekharam local market in Kanyakumari area. The seeds were soaked for 12-14 hours in regular water. They were then rinsed in fresh water after the soaked water was decanted. For grinding, 100gm of soaked yellow Glycine max seeds were added per litre of water (i.e. 1:10 (w/v). A two layer muslin cloth was used to filter the resultant suspension. In a skillet, the filtrate was cooked for around 20-30 minutes. For further development of my product, the soymilk was cooled and kept for 2-3 days. A weighing machine was used to weigh the Glycine max [Milk & Okara] and other materials.

Physiochemical and nutrient analysis:

The fat and protein content of Glycine max [Milk & Okara] were investigated. Moisture, acidity, ash, and total soluble solids were calculated using the official analytical chemists (AOAC) official technique of analysis (1990).

Formulation of the product:

Glycine max [Milk & Okara] were selected for the preparation of the products. The product prepared from Glycine max milk are Sharjah (SSS1), Falooda (SFS2), Smoothie (SSS3). The product prepared from Glycine max okara are Chapatti (OCS1), Noodles (ONS2), Kozhukattai (OKS3).

Table 1
Ingredients used for Soymilk Sharjah (SSS1)

INGREDIENTS	QUANTITY
Soymilk	100ml
Banana	1nos
Cashewnuts	50gm
boost	20gm
Coffee Powder	10gm
Sugar	10gm
Icecream	2 table spoon

Preparation method of Soymilk Sharjah (SSS1)
Take a frozen soymilk and thoroughly crush it. Combine the boost, coffee powder, diced banana, and sugar in a mixing bowl. Mix for 5 minutes after adding one tablespoon of vanilla ice cream, mix for another 5 minutes. Sharjah is finally ready decorate and serve.

Table 2
Ingredients used for Soymilk Falooda (SFS2)

INGREDIENTS	QUANTITY
Soymilk	100ml
Rose syrup	0.5ml
sugar	30gm
Ice cream	3 table spoon
Falooda semiya	2 table spoon
Sabja seed	10 gm
Jelly pieces	30 gm

Preparation method of Soymilk Falooda (SFS2)
Take a glass of Falooda semiya and fill it with bloomed sabja seeds, then add rose milk and vanilla ice cream. Sabja seeds should be soaked in water for 15 minutes and then allowed to blossom before being placed away. Fill the glass halfway with jelly cubes, then top with blossoms.

Table 3
Ingredients used for Soymilk Smoothie (SSS3)

INGREDIENTS	QUANTITY
Soymilk	100ml
Banana	1 nos
Dry fruits	50gm
Dates	15gm
Honey	2 table spoon
Ice cream	2 table spoon

Preparation Method of Soymilk Smoothie (SSS3)
Soak the dry fruits for 15 minutes in water. Put the banana, dates, and soaked dried fruits in a mixing jar and stir thoroughly. Then add the soymilk, honey, and ice cream and blend until smooth, then pour into a glass. Serve with a dollop of ice cream on top.

Table 4
Ingredients used for Okara Chapatti (OCS1)

INGREDIENTS	QUANTITY
Wheat flour	75gm
Okara	25gm
Salt	To taste

Preparation Method of Okara Chapatti
Take a big bowl and fill it halfway with water. In a mixing bowl, combine the wheat flour, okara, salt, and the needed amount of water. Knead the dough for a while until it has a supple and malleable texture. To achieve the desired consistency, add water and more flour. Roll out the dough into balls and cook Chapatti them on a pan on medium heat in a hot pan.

Table 5
Ingredients used for Okara Noodles (ONS2)

INGREDIENTS	QUANTITY
Wheat flour	75gm
Okara	25gm
Beans	10gm
Carrot	10gm
Capsicum	1nos
Onion	25ml
Soya sauce	15ml
Mustard	½ tbs
Chilli powder	1tbs
Masala powder	1tbs
Oil	1tbs
Salt	To taste

Preparation Method of Okara Noodles (ONS2)
In a large bowl, combine the wheat flour, Okara, salt, oil, and water. Make sure the dough is neither too thick nor too thin, and it should be softer than chapatti dough. Wrap it in a clean, damp cloth and set it away for 1 hour. Pour water and oil into a pot and bring it to a boil. Select the proper disc for making noodle and place the prepared dough in it. Cook until the noodles are done, about 10 minutes. Now toss in the cooked noodles and combine thoroughly. Turn off the heat and serve immediately.

Sensory evaluation of the formulated products:

A panel of 25 semi-trained panel members from the department of Nutrition & Dietetics at Muslim Arts College in Thiruvithancode, Kanyakumari District, examined the product. A scorecard was used to evaluate sensory assessments based on appearance, texture, taste, flavour, and overall acceptability.

Keeping quality:
The keeping quality was determined by observing the product's storage behaviour. They were maintained in a sterile container and stored for about 2-3 days in a refrigerator. After 3 days, there was a tiny growth of microorganisms, as well as off-flavor and discoloration.

Microbial analysis:
For the microbiological examination of the supplied sample, disc diffusion and further spread plating were used.

Antibacterial
Preparation of bacterial inoculums Inoculating a loopful of test organisms in 5mL of nutritional broth and incubating at 37oC for 3-5 hours until a moderate turbidity appeared were used to make bacterial inoculums. The antibacterial activity was determined by comparing the turbidity to a 0.5 Mc Farland standard.

Disc diffusion method
The antibacterial activity against bacteria was tested using the disc diffusion method. Known amounts of the test chemicals were impregnated into dried and sterilised paper discs (6 mm diameter) Discs containing the test material were planted equallywith the test microorganisms on nutrient agar medium. (Bauer et al., 1990).

Statistical analysis:

Statistical analysis of data obtained for the different variables were done using arithmetic mean and standard deviation.

Result and Discussion
Physiochemical Analysis (Glycine Max [Milk & Okara])

Moisture, acidity, ash, and total soluble solids were tabulated and evaluated in physiochemical analysis, which involved the use of several analytical techniques for the isolation and characterisation of the physiochemical analysis.

Table 6
Physiochemical Analysis - Glycine max [milk]

SI.No	Physiochemical constituent	Control
1	Moisture	89.47±0.174
2	Acidity	78.16±0.259

3	Ash	231.50±0.303
4	Total Soluble Solid	65.87±0.582

Each values represent mean values ± SD of experiment carried out with three replicates

Table 7
Physiochemical Analysis – Glycine max [okara]

SI.No	Physiochemical Constituent	Control
1	Moisture	62.41±0.110
2	Acidity	27.15±0.578
3	Ash	93.71±0.322
4	Total Soluble Solid	51.83±0.472

Nutrient Analysis

The Nutrient analysis such as protein & fat were analysed according to the official method of analysis described by the association of official analytical chemist AOAC (1990).

Table 8
Nutrient Analysis – Soymilk

SI.No	Nutrients	Control
1	Fat	121.06±0.052
2	Protein	93.85±0.175

Table 9
Nutrient Analysis – Okara

SI.No	Nutrients	Control
1	Fat	83.05±0.321
2	Protein	176.65±0.619

Sensory Evaluation

The sensory analysis of the formulated product is given below. The sensory parameters such as appearance, texture, taste, flavor, color and overall acceptability of glycine max- milk & Okara incorporated bi products were analysised.

Table 10
Sensory parameters of Standard and Formulated Sharjah (Glycine Max – Milk)

S.No	Sensory Parameters	SSP1		SSS1	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.9 ± 0.2	0.04	4.8 ± 0.3	0.06
2	Texture	4.8 ± 0.4	0.08	4.8 ± 0.3	0.07
3	Taste	4.8 ± 0.36	0.07	4.8 ± 0.3	0.06
4	Flavour	4.7 ± 0.42	0.08	4.8 ± 0.4	0.08
5	Color	4.8 ± 0.36	0.07	4.9 ± 0.26	0.05
6	Overall acceptability	4.9 ± 0.2	0.04	4.9 ± 0 .01	0.01

SSP1 – Standard Sharjah SSS1 – Soymilk Sharjah S.D – Standard Deviation M.S.E – Mean
Standard Error

Table 11
Sensory parameters of Standard and Formulated Falooda (Glycine Max – Milk)

S.No	Sensory Parameters	SFP2		SFS2	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.8 ± 0.36	0.07	4.9 ± 0.26	0.05
2	Texture	4.8 ± 0.36	0.07	4.8 ± 0.3	0.06
3	Taste	4.9 ± 0.2	0.04	4.9 ± 0.26	0.05
4	Flavour	4.9 ± 0.3	0.04	4.9 ± 0.36	0.07
5	Color	4.8 ± 0.4	0.08	4.9 ± 0.26	0.05
6	Overall acceptability	4.8 ± 0.36	0.07	4.8 ± 0 .29	0.05

SFP2-Standard Falooda, SFS2- Soymilk Sharjah, S.D- Standard Deviation, M.S.E Mean
Standard Error

Table 12
Sensory parameters of Standard and Formulated Smoothie (Glycine Max – Milk)

S.No	Sensory Parameters	SFP3		SSS3	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.8 ± 0.36	0.07	4.9 ± 0.26	0.05
2	Texture	4.8 ± 0.36	0.07	4.8 ± 0.3	0.06
3	Taste	4.8 ± 0.4	0.08	4.8 ± 0.36	0.07

4	Flavour	4.7 ± 0.4	0.08	4.8 ± 0.36	0.07
5	Color	4.8 ± 0.4	0.08	4.9 ± 0.26	0.05
6	Overall acceptability	4.9 ± 0.2	0.04	4.9 ± 0 .26	0.05

SSP3-Standard Smoothie, SSS3-Soymilk Smoothie, S.D-Standard Deviation, M.S.E Mean
Standard Error

Table 13
Sensory parameters of Standard and Formulated Chapatti (Okara)

S.No	Sensory Parameters	WCP1		OCS1	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.9 ± 0.2	0.04	4.9 ± 0.2	0.04
2	Texture	4.7 ± 0.4	0.08	4.7 ± 0.36	0.07
3	Taste	4.8 ± 0.4	0.08	4.8 ± 0.3	0.06
4	Flavour	4.8 ± 0.36	0.07	4.8 ± 0.3	0.06
5	Color	4.7 ± 0.4	0.08	4.7 ± 0.36	0.07
6	Overall acceptability	4.8 ± 0.3	0.06	4.9 ± 0 .26	0.05

WCP1-Standard Chapatti, OCS1-Okara Chapatti, S.D-Standard Deviation, M.S.E-Mean
Standard Error

Table 14
Sensory parameters of Standard and Formulated Noodles (Okara)

S.No	Sensory Parameters	WNP2		ONS2	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.8 ± 0.32	0.04	4.9 ± 0.2	0.06
2	Texture	4.7 ± 0.3	0.08	4.8 ± 0.4	0.06
3	Taste	4.8 ± 0.3	0.04	4.9 ± 0.2	0.06
4	Flavour	4.8 ± 0.3	0.06	4.8 ± 0.3	0.06
5	Color	4.8 ± 0.29	0.07	4.9 ± 0.36	0.05
6	Overall acceptability	4.8 ± 0.3	0.06	4.9 ± 0 .2	0.04

WNP2-Standard Noodles, ONS2-Okara Noodles, S.D-Standard Deviation, M.S.E-Mean Standard Error.

Table 15
Sensory parameters of Standard and formulated Kozhukattai (Okara)

S.No	Sensory Parameters	WNP2		ONS2	
		Mean ± SD	S.M.E	Mean ± SD	S.M.E
1	Apperance	4.9 ± 0.26	0.05	4.8 ± 0.29	0.05
2	Texture	4.7 ± 0.4	0.08	4.9 ± 0.26	0.05
3	Taste	4.9 ± 0.26	0.05	4.8 ± 0.29	0.05
4	Flavour	4.7 ± 0.4	0.08	4.9 ± 0.2	0.04
5	Color	4.8 ± 0.3	0.06	4.9 ± 0.26	0.05
6	Overall acceptability	4.9 ± 0.26	0.05	5 ± 0	0

WKP3-Standard Kozhukattai, OKS3-Okara Kozhukattai, S.D-Standard Deviation, M.S.E-Mean Standard Error.

Keeping Quality

The soymilk and okara were kept in an airtight container and stored at room temperature for 3 days to observe their storage behaviour. It was examined on a daily basis, and any modifications were recorded. The third day saw the development of off flavour, discoloration, and gas generation.

Microbial Analysis

Disc diffusion and further spread plating was performed for the microbial analysis of the given sample.

Antibacterial

Bacterial inoculums was prepared by inoculating a loopful of test organisms in 5mL of nutrient broth and incubated at 37°C for 3-5 hrs till a moderate turbidity was developed. The turbidity was matched with 0.5 Mc Farland standard were used for the determination of antibacterial activity.

Table 16
Antibacterial Analysis – (Glycine Max – Milk)

Pathogens	Zone of inhibition (in diameter)					
	Ethanol	Acetone	Chloroform	Methanol	Aqueous	Positive control
Klebsiella pneumoniae	4.5±0.21	5.7±0.15	----	----	9.5±0.16	7±0.10
E.coli	1.4±0.11	3.2±0.31	---	3.2±0.09	---	4.1±0.23

Table 17
Antibacterial Analysis – Okara

Pathogens	Zone of inhibition (in diameter)					
	Ethanol	Acetone	Chloroform	Methanol	Aqueous	Positive control
Bacillus subtilis	----	2.13±0.73	1.97±1.21	17±0.23	7.29±0.31	3.2±0.65
E.coli	3.3±0.27	1.5±0.31	---	-----	5.2±0.02	1.9±0.15

Summary

Standard procedures were used to establish the physiochemical analysis of Glycine max. Moisture, acidity, ash, and total soluble solids are all visible. Sensory evaluation was based on quality descriptions such as appearance, texture, taste, flavour, colour, and overall acceptability. Nutrients such as protein and fat were examined using conventional procedures. Soymilk Sharjah, Soymilk Falooda, Soymilk Smoothie, and Okara Chapatti, Okara Noodles, Okara Kozhukattai were all subjected to sensory testing. The product was reviewed by a semi-trained panel of 25 individuals from the Muslim Arts College's PG and Research Department of Nutrition and Dietetics, Thiruvithancode, Kanyakumari District. To determine the product's quality, quality control and antibacterial activity were performed.

Conclusion

Soymilk is a good substitute milk since it has a similar nutritional profile to regular milk. Because soymilk is less expensive than milk, it is quite popular in developing and underdeveloped countries. It may aid in the prevention of heart disease, the prevention of diabetes, and the growth of bone density in some persons. Soybean is a prospective source of peptides with a variety of biological activities, including hypolipidemic, anti-oxidant, anti-inflammatory, immunological stimulatory, and neuromodulatory qualities. When compared to soymilk, the okara extract has a high protein density. As a result, soybeans may play an essential role in health promotion.

Bibiliography

Valli Yodan B, Dan Q, Patil G, Zeng P, Huang J, Dail, Chen C, Li Y, Joshi T, Sang L. (2016). Landscape of genomic diversity and trait discovery in soybean. 23598.

Fan MZ, Sauer WC, De Lange CFM. (1995). Amino acid digestibility in soybean meal, extrude soybean meal, extruded soybean and full – fat canola for early – weaned pigs: Anim Feed Sci.

Tech. 52: 189 – 203.

Duda AO, Adegoke GO. (2014). Preservation of some physico – chemical properties of Soymilk –Based Juice with Aframomum Danielli Spice Powder. American Journal of Food Science & Technology.

Barnes S, Grubbs C, Setchell S & Carlson J. (1990). Soybean inhibit mammary tumors in models of breast cancer, in Pariza.