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Formulations, Standardization and Quality Evaluation of Ready-to-Cook Pancake (*cheela*) Mix for Children

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Abstract: The purpose of this study was to investigate the quality of formulated ready-to-cook pancake (*cheela*) mix from blends of rice flour supplemented with ripe pumpkin powder with table salt, black salt, garam masala, kitchen king masala and refined oil was kept as constant (base recipe), rice flour supplemented with chickpea flour, rice flour supplemented with soybean flour and rice flour supplemented with green gram flour with pumpkin powder, table salt, black salt, garam masala, kitchen king masala and refined oil was kept as constant. Refined oil was used for the preparation of pancake (*cheela*) mix for serving. From each blend, six recipes were formulated, standardized and subjected to consumers for sensory evaluation. The best recipes from each blend based on sensory evaluation were prepared and referred to as R_1, R_2, R_3 and R_4. R_1 (75% rice flour+ 25% pumpkin powder), R_2 (65% rice flour +10% chickpea flour), R_3 (55% rice flour+20% soybean flour) and R_4 (45% rice flour+30% green gram flour) were prepared and kept to the Aluminiun Laminated Pouches (ALP) and glass jars for nutritional characteristics evaluation. Based on sensory evaluation, the ready-to-cook pancake (*cheela*) mix for serving from the recipe (R_1) had the highest overall acceptability score of 8.79 however all recipes had scores above the acceptable limit. The ready-to-cook pancake (*cheela*) mix supplemented with soybean flour (R_3) exhibited the highest nutritional values for crude protein 25.76%, crude fat 8.78 %, crude fibre 7.04 % and total energy 382.46 Kcal/100g. Soybean flour is very nutritious therefore, it should be incorporated into staple foods for children in least-developed countries to alleviate malnutrition, especially Protein Energy Malnutrition (PEM). The recipes of the present study are relevant to the Government, NGOs and other agencies to eradicate malnutrition.

Keywords: Pancake (*cheela*) Mix, Malnutrition, Recipes, Sensory Evaluation, Nutritional, Characteristics

1. Introduction

Malnutrition occurs due to shortage of nutrients in the body [19]. Children under the age of five are most vulnerable, particularly in underdeveloped nations [31]. PEM is a severe lack of macronutrients in the diet, such as proteins, carbohydrates, and fats that affects the growth of children under the age of five and causes impairment due to their high energy and protein requirements [35]. In addition, anemia is a global health issue that affects 43 per cent of children below five years, or approximately 273 million children [36]. These are the most prevalent health-related conditions, particularly among children from low-income families with other socioeconomic challenges. In developing countries, particularly in southern Asia and Sub-Saharan Africa, malnutrition remains a serious public health concern [37]. The period from birth to two years of age is considered to be a 'critical window' for the promotion of optimal growth, health and behavioural development in human life. Poor nutrition during these formative years causes significant morbidity,

mortality and delayed mental as well as motor development. Due to COVID-19 the global incidence of malnutrition, specifically the incidence of child wasting, was projected to increase by an alarming 143 per cent, of which approximately 80 per cent would be projected within Sub-Saharan Africa and South Asia [38]. Among all forms of malnutrition, PEM is the largest cause of death [37]. PEM is a series of diseases due to the malnutrition of all macronutrients, including marasmus, intermediate states of kwashiorkor-marasmus, and kwashiorkor. PEM is a common nutritional problem worldwide and can be seen in both developed and developing countries [17]. To address PEM a healthy balanced diet food is required which contains a combination of five groups of foods like carbohydrates, proteins, fats, fruits and vegetables.

Instant food mix can be defined as simple, fast and convenient food that is easy and fast to prepare [31]. Instant mixes comprise of processed cereals, pulses, condiments, spices, or other foods in varying combinations. These are used for the preparation of various dishes conveniently in a very short span of time. The mixes can be kept in airtight containers and used whenever required. These provide great convenience to the homemakers who have multifarious work participation both in rural and urban areas, therefore, their use has increased in recent years. Instant mixes that are available in the market include instant *gulab* jamun mix, *jalebi* mix, *idli* mix, *Dosa* mix, soup mix, porridge mix, muffin mix, cerelac mix, etc. of different brands. In addition to this, a highly innovative wide range of products is being developed keeping in view the nutritional properties as well as taste. The present study formulated a ready-to-cook pancake (*cheela*) mix for children using various combinations of rice flour, soybean flour, green gram flour and ripe pumpkin powder.

Rice (*Oryza sativa* L.) is a common cereal crop consumed by over half of the world's population as a staple food in Asia and Africa [17]. It ranks third in production next to sugarcane and maize Rice is a rich source of carbohydrates, the body's main fuel source. Carbohydrates keep energized and satisfied, and are important for fueling exercise. Brown rice, especially, is an excellent source of many nutrients, including fibre, manganese, selenium, magnesium, and B vitamins. Nearly half of the people in the world get approximately 50 per cent of their calories from rice. Without rice, or something to take the place of rice, many people would go hungry.

Chickpea (*Desi*) variety is an important source of protein in the diets of millions of people around the world [11]. Among the different legumes, chickpea (*Cicer arietinum* L.) is categorized in the Fabaceae (Leguminosae) family, one of the oldest and most widely consumed legumes in the world, and it is a staple food crop, particularly in tropical and subtropical areas [40]. *Desi* variety originated from India. It is a very important part of the human diet due to its nutritional and bioactive composition and its protein is considered better than some pulses [12].

Soybean belongs to the family Leguminosae and the subfamily Papilionceaceae. It is a legume crop and is also known as the Golden bean or Miracle crop [29]. The soybean seeds are categorized as a powerhouse of nutrients. These comprise 7.46-8.40 per cent moisture, 35.70-45.30 per cent protein, 18.20-25.40 per cent oil, 4.84-5.59 per cent ash, 13.91-35 per cent carbohydrates of which 17 per cent is the dietary fibre, vitamins and minerals [5]. The lipid content of soybean constituents 80 per cent of linoleic acid of total fatty acids and 20 per cent of saturated fatty acids with less saturated fat and no cholesterol [29]. Among micronutrients, potassium is found in the highest concentration, followed by phosphorus, magnesium and calcium, whereas iron, sodium, zinc, copper and manganese are present in minor and selenium in trace amounts [7]. The various functional components such as isoflavone, tocopherol, lecithin, bioactive peptides and phenolics including chlorogenic, caffeic, ferulic and p-coumaric acids present in soybean seeds possess numerous health benefits. Their availability in soybean has been claimed to act as an anticancer, cholesterol-lowering, antioxidant, antidiabetic and chelating agent [6].

Green gram (*mung* beans) are high in nutrients and antioxidants, which may provide health benefits. In fact, they may protect against heat stroke, aid digestive health, promote weight loss and lower “bad” LDL cholesterol, blood pressure and blood sugar levels. It’s a wholesome food as it provides essential nutrients to keep both the mind and body healthy. It belongs to the Fabaceae family and is widely consumed in Southern Europe and in Asian countries. Sprouted Green Gram or *moong* is named a “Super-food” due to its rich fibre, fat-free, and nutritious content. Instead of having unhealthy snacks or junk foods, people can move for this nutritious, filling, and exceedingly healthy option.

Ripe pumpkin is characterized by the hard outer cover, with yellow to orange-fleshed, firm texture and flavour depending on a different location. Based on the nutritional aspect, it contains low carbohydrates 8.8 % in comparison to other vegetables. Other nutrients like protein, fat, and fibre are less than two per cent. According to Rodríguez *et al*. [8], it is the richest source of minerals such as potassium (439 mg), calcium (26 mg) and phosphorus (17 mg). Furthermore, it contains the highest amount of β-carotene which is converted to vitamin A. Apart from this, vitamin C, vitamin E, lycopene and dietary fibre were found in higher amounts [39]. Many nutritional studies have shown that traditional vegetables, which are often overlooked by urban populations are an essential source of nutrients and vitamins for the rural population in low-income countries [10]. Since the pulp has a low lipid concentration, lipids are mobilized and retained in the seeds, making it a healthy food for people who are overweight. Excess fat intake has been linked to atherosclerosis, cancer and ageing in the cardiovascular system [9]. As a result, pumpkin diets should be recommended to minimize the risk of the aforementioned ailments in humans. These crops were used to formulate ready-to-cook pancake (*cheela*) mix for children below five years because of their nutritional and health benefits. The purpose of this study was to investigate the nutritional components of the ready-to-cook pancake (*cheela*) mix. The recipes of the products can be used by Governments and Non-Governmental Organisations to fight malnutrition, especially PEM in children below five years in developing countries.

2. Materials and Methods

A local food market, Solan, provided rice, ripe pumpkin fruits, soybean, and green gram, as well as refined oil, condiments and spices. All of the chemicals and reagents used in this investigation were analytical grade and came from Loba Chemie, International Scientific and Surgicals, in Solan Himachal Pradesh (HP). The same supplier also supplied PET jars and Aluminium Laminated Pouches (ALP). For all recipes and analyses, three replicates were employed, and the findings were calculated on a dry weight basis. The present study was conducted at the Department of Food Science and Technology, Dr Y.S. Parmar University of Horticulture and Forestry, Nauni, India for product development, standardization and quality evaluation.

2.1. Preparation of Food Material

2.1.1. Preparation of Rice Flour

The method described by Bazaz *et al*. [28] was followed for the preparation of rice flour in which the known weight of grains was cleaned thoroughly to remove extraneous material. The grains were washed, drained and soaked in warm water (1:3) overnight (12 h). The grains of each crop after soaking were spread on the trays and dried in a mechanical dehydrator at 60 ± 2^{o}C for 4h or till constant weight was attained. The dried grains were ground in a mixer cum grinder (Havells, Model MX-1155) and passed through a 36 mm mesh sieve to get fine and uniform flour [17]. The flours were packed in PET jars, sealed properly, labeled and stored under ambient condition for further use.

2.1.2. Preparation of Chickpea Flour

The chickpea flour was prepared by following the procedure described by Desalegn [22].

The known amount of cleaned green gram and chickpea seeds were washed and soaked overnight (12 h) in warm water (1:3). After soaking, the chickpea seeds were for (48 h) in a sprouting box. After completion of the germination process, the non-germinated seeds were segregated. The germinated seeds were dried in a mechanical dehydrator at 60 ± 2 ^{o}C for 10 hours or till constant moisture content. The seeds were ground in a mixer cum grinder (Havells, Model MX-1155) and passed through a 36 mm mesh sieve to get fine and uniform flour. The flour of both pulses was packed in PET jars, sealed tightly, labeled and stored under ambient condition for further use.

2.1.3. Preparation of Soybean Flour

Soybean flour was made by following the procedure of [32] A known amount of cleaned seeds was washed and soaked overnight (12 h) in warm water (1:4). The soaked seeds were kept in a sprouting box for germination (72 h). The germinated seeds were dried in a mechanical dehydrator at 60 ± 2 ^{o}C for 10 h until equilibrium moisture content was achieved. The dried seeds were ground in a mixer cum grinder (Havells, Model MX-1155) and passed through a 36 mm mesh sieve to get fine and uniform flours. The flours were packed in PET jars, sealed properly, labeled and kept for storage under ambient condition for further use.

2.1.4. Preparation of Green Gram Flour

As per the method suggested by Dipnaik and Bathere [24], the cleaned green gram of known weight was washed and soaked in warm water (1:3) overnight (24 h) for the preparation of flour. The known amount of cleaned green gram seeds was washed and soaked overnight in warm water (1:3) separately. After soaking, the green grams were germinated for (24 h) in sprouting boxes in separate lots. non-germinated seeds were segregated after germination process while the germinated seeds were dried in a mechanical dehydrator at 60 ± 2 ^{o}C for 10 hours or till constant moisture content. The seeds were pulverized in a mixer cum grinder (Havells, Model MX-1155) and passed through a 36 mm mesh sieve to get fine and uniform flour. The flour of pulses was packed in PET jars, sealed tightly, labeled and stored under ambient condition for further use.

2.1.5. Preparation of Ripe Pumpkin Powder

Ripe pumpkin fruits were washed and cut into halves. After removing the seeds and fluffy portion (fibrous strains), the pumpkin was peeled and cut into slices of uniform size [34]. The slices were steam blanched for 4 minutes followed by dipping in 500 ppm potassium metabisulphite ($K_2S_2O_5$) solution for 15 minutes [23]. The slices were dried in a mechanical dehydrator at 60 ± 2°C for 16 hours to achieve the equilibrium moisture content. The dried slices were ground in a mixer cum grinder (Havells, Model MX-1155) and passed through a 36 mm mesh sieve to get uniform powder [34]. The powder was packed in PET jars which were closed tightly with a lid, labeled and kept for storage under ambient condition for further use.

2.1.6. Standardization of Ready-to-Cook Pancake (cheela) Mix Recipe

(i). Standardization of Ready-to-Cook Pancake (cheela) Mix Using Rice Flour

Several different trials were employed to standardize the recipe for the preparation of Ready-To-Cook Pancake (*Cheela*) Mix by using rice flour as the main ingredient. The pumpkin powder was used in varied amounts while the quantity of spices (black and table salt, kitchen king, *garam* masala) was kept constant. The refined oil was applied at the time of preparation of the Pancake (*Cheela*) for serving. A total of six recipes (Table 1) were taken to select the base recipe to be used in further experiments. The rice flour was roasted for 2-3 min in a non-stick pan till light brown colour. The flour was allowed to cool down under ambient condition and mixed with the rest of the ingredients. The different recipes were prepared by adding water to the mixture with constant stirring. The butter was poured on a preheated greased nonstick pan and fried upside down on a medium flame while adding the oil to light brown colour. The Pancake (*Cheela*) was subjected to the panelists for sensory evaluation. The best recipe was selected based on the highest sensory scores awarded by the panel of judges and referred to

as recipe 1 (R_1) for further study.

Table 1. *Standardization of recipe for preparation of Ready-To-Cook Pancake (Cheela) Mix using rice flour.*

Ingredients	Recipe I	Recipe II	Recipe III	Recipe IV	Recipe V	Recipe VI
Rice flour (g)	90	85	80	75	70	65
Pumpkin powder (g)	10	15	20	25	30	35
Table salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Black salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Garam masala (g)	1.2	1.2	1.2	1.2	1.2	1.2
Kitchen King masala (g)	0.8	0.8	0.8	0.8	0.8	0.8
Refined oil (mL)	12	12	12	12	12	12

(ii). Standardization of Amount of Water and Frying Time for Preparation of Ready-to-Cook Pancake (Cheela) Mix for Serving

Table 2. *Standardization of amount of water and fraying time for the preparation of Ready-To-Cook Pancake (Cheela) Mix for serving.*

Quantity of mix (g)	Amount of water (mL)	Frying time (min)
100	70	3
100	80	4
100	90	5
100	100	6

The amount of water and frying time was standardized by taking different combinations (Table 2) for preparation of Pancake (*Cheela*) from Ready-To-Cook Pancake (*Cheela*) Mix for serving. The Pancake (*Cheela*) of different combinations was prepared as the method discussed above (Section 2.1.6.1) and subjected to sensory evaluation. The best combination was chosen and used for the preparation of Pancakes (*Cheela*) in subsequent experiments.

(iii). Standardization of Ready-to-Cook Pancake (Cheela) Mix Supplemented with Chickpea Flour

The standard recipe under Section 2.1.6.1 was used for the preparation of pancake (*cheela*) mix for serving by replacing rice flour with chickpea flour at different proportions and keeping other ingredients constants (Table 3). The recipe which received the highest sensory scores was selected and referred to as recipe 2 (R_2) for further studies.

Table 3. *Standardization of Ready-To-Cook Pancake (Cheela) Mix supplemented with chickpea flour.*

Ingredients	Recipe I	Recipe II	Recipe III	Recipe IV	Recipe V	Recipe VI
Rice flour (g)	75	65	55	45	35	25
Chickpea flour (g)	0	10	20	30	40	50
Pumpkin powder (g)	25	25	25	25	25	25
Table salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Black salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Garam masala (g)	1.2	1.2	1.2	1.2	1.2	1.2
Kitchen King masala (g)	0.8	0.8	0.8	0.8	0.8	0.8
Refined oil (mL)	12	12	12	12	12	12

(iv). Standardization of Ready-to-Cook Pancake (Cheela) Mix Supplemented with Soybean Flour

The rice flour of the base/standard recipe (Section 2.1.6.1) was substituted with soybean flour in different proportions while the rest of the ingredients were kept constant (Table 4). The soybean flour was roasted for 2-3 minutes in a nonstick pan or till light brown colour and allowed to cool down under ambient condition. The Pancake (*Cheela*) was prepared from a mix of different combinations and subjected to sensory evaluation. The recipe which obtained the highest overall acceptability scores was referred to as recipe 3 (R_3) and selected for further investigation.

Table 4. *Standardization of Ready-To-Cook Pancake (Cheela) Mix supplemented with soybean flour.*

Ingredients	Recipe I	Recipe II	Recipe III	Recipe IV	Recipe V	Recipe VI
Rice flour (g)	75	65	55	45	35	25
Soybean flour (g)	0	10	20	30	40	50
Pumpkin powder (g)	25	25	25	25	25	25
Table salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Black salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Garam masala (g)	1.2	1.2	1.2	1.2	1.2	1.2
Kitchen King masala (g)	0.8	0.8	0.8	0.8	0.8	0.8
Refined oil (mL)	12	12	12	12	12	12

(v). Standardization of Ready-to-Cook Pancake (Cheela) Mix Supplemented with Green Gram Flour

The recipe standardized under Section 2.1.6.1 for rice flour Pancake (*Cheela*) Mix was taken as base/standard recipe to conduct this experiment. The rice flour was replaced with green gram flour in different ratios (Table 5). The green gram

flour was roasted for 2-3 minutes in a nonstick pan or till light brown colour and mixed with the rest of the ingredients after cooling. The Pancake (*Cheela*) mix for serving was prepared and subjected to a panel of ten judges for sensory evaluation. The recipe which got the highest scores was selected and referred to as recipe 4 (R_4) for further studies.

Table 5. *Standardization of Ready-To-Cook Pancake (Cheela) Mix supplemented with green gram flour.*

Ingredients	Recipe I	Recipe II	Recipe III	Recipe IV	Recipe V	Recipe VI
Rice flour (g)	75	65	55	45	35	25
Green gram (g)	0	10	20	30	40	50
Pumpkin powder (g)	25	25	25	25	25	25
Table salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Black salt (g)	0.8	0.8	0.8	0.8	0.8	0.8
Garam masala (g)	1.2	1.2	1.2	1.2	1.2	1.2
Kitchen King masala (g)	0.8	0.8	0.8	0.8	0.8	0.8
Refined oil (mL)	12	12	12	12	12	12

2.2. Chemical Analysis

The moisture content (%), ash (%), protein (%) and minerals (iron mg/100 g) were determined as per the method suggested by AOAC [1]. Crude fibre (%) was analyzed as per [2], while crude fat (%) was determined using [3] method. Ranganna [16] procedure was employed in scrutinizing β-carotene (mg/ 100 g), total carbohydrates (%), whereas total energy (Kcal/100 g) was calculated by the differential method as per AOAC [4] method.

2.3. Sensory Evaluation

Ready-to-cook pancake (*cheela*) mix for serving was made by adding 90 mL of water to 100 g of mix and stirring constantly until the butter consistency was reached. The homogenous butter was prepared on a nonstick pre-heated pan and fried upside down on a medium flame while adding the oil to light brown colour. Panelists were asked to score the pancakes on a 9-point Hedonic scale for colour, texture/body, flavour, and overall acceptability (1=strongly dislike, 5=neither like nor dislike, 9=like greatly), according to Meilgaard *et al*. [15] and Thakur *et al*. [14].

2.4. Data Analysis

Complete randomized design (CRD) was used to examine chemical characteristics, while randomized block design (RBD) was used to examine sensory evaluation, as described by Cochran and Cox [26] and Mahony [27], respectively. The statistical significance was determined at $p < 0.05$ and Tukey's honest significant difference (HSD) was employed to separate the means for comparison.

3. Results

3.1. Standardization of Ready-to-Cook Pancake (cheela) Mix Using Rice Flour

The ready-to-cook pancake (*cheela*) mix for serving was standardized by comparing the results of six recipes in Table 1. Sensory evaluation of pancake (*cheela*) mix for serving was conducted by a panel of judges, and the findings are depicted in Table 6. The highest sensory scores for colour were recorded in R_4 (8.65), followed by R_3 (8.45), R_1 (8.37), R_2 (8.16), R_6 (7.73) and R_5 (7.38). In texture, the highest sensory scores were recorded in R_4 (8.82), followed by R_1 (8.40), R_2 (8.23), R_3 (8.21), R_6 (7.73) and R_5 (7.38). For taste, highest sensory scores recorded in R_2 (8.87), followed by R_4 (8.71), R_3 (8.32), R_2 (7.87), R_6 (7.47) and R_1 (7.39). Overall acceptability, the highest sensory scores were recorded in R_4 (8.79), followed by R_2 (8.31), R_3 (8.26), R_1 (8.18), R_5 (7.64) and R_6 (7.47). Statistical analysis recorded significant differences in sensory scores of all the parameters. Regarding the preparation of ready-cook-pancake (*cheela*) mix for serving, the amount of water, baking time and temperature were standardized by comparing different combinations (Table 2). The best combination was found to be 90 mL water, 20 min frying time for a mix of 100 g mix. This combination was used for the preparation of ready-to-cook pancake (*cheela*) for serving in the base recipe, pancake (*cheela*) mix supplemented with chickpea, soybean and green gram flours.

Table 6. *Sensory scores of standardized recipe for preparation of ready-to-cook pancake (cheela) mix using rice flour.*

Recipe (s)	Colour	Texture	Taste	Overall acceptability
R_1	8.37 ± 0.15^{c}	8.40 ± 0.13^{b}	7.39 ± 0.21^{f}	8.18 ± 0.09^{c}
R_2	8.16 ± 0.08^{d}	8.23 ± 0.10^{c}	7.87 ± 0.08^{c}	8.31 ± 0.15^{b}
R_3	8.45 ± 0.11^{b}	8.21 ± 0.15^{c}	8.32 ± 0.12^{b}	8.26 ± 0.19^{b}
R_4	8.65 ± 0.17^{a}	8.82 ± 0.12^{a}	8.71 ± 0.14^{a}	8.79 ± 0.08^{a}
R_5	7.38 ± 0.22^{f}	7.41 ± 0.25^{d}	7.65 ± 0.11^{d}	7.64 ± 0.27^{d}
R_6	7.73 ± 0.09^{e}	7.28 ± 0.31^{e}	7.47 ± 0.25^{e}	7.47 ± 0.13^{e}
$CD_{0.05}$	0.46	0.49	0.21	0.18

R_1 (90% rice flour +10% pumpkin powder); R_2 (85% rice flour +15% pumpkin powder); R_3 (80% rice flour +20% pumpkin powder); R_4 (75% rice flour +25% pumpkin powder); R_5 (70% rice flour +30% pumpkin powder); R_6 (65% rice flour +35% pumpkin powder) Data represented in table are the average pooled values (mean ± SD), The value with same lower case letter on superscript in the same column are non-significant at 0.05% level of significance

3.2. Standardization of Ready-to-Cook Pancake (cheela) Mix Supplemented with Chickpea Flour

The recipe for the preparation of ready-to-cook pancake (*cheela*) mix supplemented with chickpea flour (Table 3). The prepared pancakes were tasted by a team of judges, and the findings are shown in Table 7. The highest sensory scores for colour were recorded in R_5 (8.50), followed by R_6 (7.88), R_4 and R_2 (7.38), R_1 (7.33) and R_3 (7.20). In texture, the highest sensory scores were recorded in R_5 (8.53), followed by R_6 (7.90), R_4 (7.43), R_2 (7.40), R_1 (7.33) and R_3 (7.23). For taste, the highest sensory scores were recorded in R_5 (8.55), followed by R_6 (7.93), R_4 (7.48), R_2 (7.43), R_1 (7.33) and R_3 (7.25). Overall acceptability, the highest sensory scores were recorded in R_5 (8.58), followed by R_6 (7.98), R_4 (7.53), R_2 (7.45), R_1 (7.33) and R_3 (7.28). Statistical analysis recorded significant differences in sensory scores of all the parameters.

Table 7. *Sensory scores of ready-to-cook pancake (cheela) mix supplemented with chickpea flour.*

Recipe (s)	Colour	Texture	Taste	Overall acceptability
R_1	7.33 ± 0.09^c	7.33 ± 0.09^d	7.33 ± 0.13^d	7.33 ± 0.16^e
R_2	7.38 ± 0.13^c	7.40 ± 0.06^c	7.43 ± 0.09^c	7.45 ± 0.12^d
R_3	7.20 ± 0.10^d	7.23 ± 0.12^e	7.25 ± 0.08^e	7.28 ± 0.10^e
R_4	7.38 ± 0.11^c	7.43 ± 0.07^c	7.48 ± 0.11^c	7.53 ± 0.11^c
R_5	8.50 ± 0.10^a	8.53 ± 0.07^a	8.55 ± 0.12^a	8.58 ± 0.65^a
R_6	7.88 ± 0.13^b	7.90 ± 0.14^b	7.93 ± 0.15^b	7.98 ± 0.16^b
$CD_{0.05}$	0.64	0.64	0.64	0.64

R_1 (75% rice flour +25% pumpkin powder); R_2 (65% rice flour +10% chickpea flour+25% pumpkin powder); R_3 (55% rice flour +20% chickpea flour+25% pumpkin powder); R_4 (45% rice flour +30% chickpea flour+25% pumpkin powder); R_5 (35% rice flour +40% chickpea flour+25% pumpkin powder); R_6 (25% rice flour +50% chickpea flour+25% pumpkin powder).

Data represented in table are the average pooled values (mean ± SD), The value with same lower case letter on superscript in the same column are non-significant at 0.05% level of significance

3.3. Standardization of Ready-to-Cook Pancake (cheela) Mix Supplemented with Soybean Flour

The recipe for the preparation of ready-to-cook pancake (*cheela*) mix supplemented with soybean flour (Table 8). The prepared ready-to-cook pancake (*cheela*) mix for serving was subjected to a panel of judges for sensory evaluation and the results are summarized in Table 8. The highest sensory scores for colour were recorded in R_5 (8.88), followed by R_4 (7.85), R_1 (7.33), R_3 (7.08), R_6 (6.95) and R_2 (6.58). In texture, the highest sensory scores were recorded in R_5 (8.53), followed by R_4 (7.90), R_1 (7.33), R_3 (7.13), R_6 (7.00) and R_2 (6.63). For taste, the highest sensory scores were recorded in R_5 (8.50), followed by R_3 (7.90), R_1 (7.33), R_4 (7.18), R_2 (7.08) and R_6 (6.80). Overall acceptability, the highest sensory scores were recorded in R_5 (8.60), followed by R_3 (8.00), R_1 (7.33), R_4 (7.28), R_2 (7.18) and R_6 (6.90). Statistical analysis recorded significant differences in sensory scores of all the parameters.

Table 8. *Sensory scores of ready-to-cook pancake (cheela) mix supplemented with soybean flour.*

Recipe (s)	Colour	Texture	Taste	Overall acceptability
R_1	7.33 ± 0.13^c	7.33 ± 0.16^c	7.33 ± 0.14^c	7.33 ± 0.18^c
R_2	6.58 ± 0.22^f	6.63 ± 0.11^f	7.08 ± 0.11^e	7.18 ± 0.17^e
R_3	7.08 ± 0.07^d	7.13 ± 0.17^d	7.90 ± 0.25^b	8.00 ± 0.22^b
R_4	7.85 ± 0.15^b	7.90 ± 0.08^b	7.18 ± 0.21^d	7.28 ± 0.06^d
R_5	8.48 ± 0.19^a	8.53 ± 0.26^a	8.50 ± 0.09^a	8.60 ± 0.07^a
R_6	6.95 ± 0.23^e	7.00 ± 0.18^e	6.80 ± 0.12^f	6.90 ± 0.14^f
$CD_{0.05}$	0.95	0.91	0.93	0.89

R_1 (75% rice flour +25% pumpkin powder); R_2 (65% rice flour +10% soybean flour+25% pumpkin powder); R_3 (55% rice flour +20% soybean flour+25% pumpkin powder); R_4 (45% rice flour +30% soybean flour+25% pumpkin powder); R_5 (35% rice flour +40% soybean flour+25% pumpkin powder); R_6 (25% rice flour +50% soybean flour+25% pumpkin powder)

Data represented in table are the average pooled values (mean ± SD), The value with same lowercase letter on superscript in the same column are non-significant at 0.05% level of significance

3.4. Standardization of Ready-to-Cook Pancake (cheela) Mix Supplemented with Green Gram Flour

The recipe for the preparation of ready-to-cook pancake (*cheela*) mix supplemented with green gram flour (Table 9). The made pancakes were tasted by a team of judges, and the findings are elucidated in Table 8. The highest sensory scores for colour were recorded in R_4 (8.55), followed by R_3 (7.88), R_1 (7.33), R_5 (7.23), R_2 (7.05) and R_6 (7.00). In texture, the highest sensory scores were recorded in R_4 (8.58), followed by R_3 (7.90), R_1 (7.33), R_5 (7.25), R_2 (7.08) and R_6 (7.03). For taste, the highest sensory scores were recorded in R_4 (8.68), followed by R_3 (7.95), R_1 (7.33), R_5 (7.30), R_2 and R_6 (7.10). Overall acceptability, the highest sensory scores were

recorded in R_4 (8.68), followed by R_3 (8.00), R_5 (7.35), R_1 (7.33), R_6 (7.18) and R_2 (7.15). Statistical analysis recorded significant differences in sensory scores of all the parameters.

Table 9. *Sensory scores of ready-to-cook pancake (cheela) mix supplemented with green gram flour.*

Recipe (s)	Colour	Texture	Taste	Overall acceptability
R_1	7.33 ± 0.17^{c}	7.33 ± 0.13^{c}	7.33 ± 0.26^{c}	7.33 ± 0.15^{c}
R_2	7.05 ± 0.18^{e}	7.08 ± 0.17^{e}	7.10 ± 0.13^{d}	7.15 ± 0.19^{d}
R_3	7.88 ± 0.18^{b}	7.90 ± 0.22^{b}	7.95 ± 0.09^{b}	8.00 ± 0.22^{b}
R_4	8.55 ± 0.17^{a}	8.58 ± 0.17^{a}	8.63 ± 0.26^{a}	8.68 ± 0.08^{a}
R_5	7.23 ± 0.13^{d}	7.25 ± 0.16^{d}	7.30 ± 0.17^{c}	7.35 ± 0.12^{c}
R_6	7.00 ± 0.21^{e}	7.03 ± 0.26^{e}	7.10 ± 0.18^{d}	7.18 ± 0.22^{d}
$CD_{0.05}$	1.05	1.05	1.01	1.02

R_1 (75% rice flour +25% pumpkin powder); R_2 (65% rice flour +10% green gram flour+25% pumpkin powder); R_3 (55% rice flour +20% green gram flour+25% pumpkin powder); R_4 (45% rice flour +30% green gram flour+25% pumpkin powder); R_5 (35% rice flour +40% green gram flour+25% pumpkin powder); R_6 (25% rice flour +50% green gram flour+25% pumpkin powder) Data represented in table are the average pooled values (mean ± SD), The value with same lower case letter on superscript in the same column are non-significant at 0.05% level of significance

3.5. Chemical Characteristics of Ready-to-Cook Pancake (cheela) Mix

The ready-to-cook pancake *(cheela)* mix selected from the base recipe 1 (R_1), ready-to-cook pancake *(cheela)* mix supplemented with chickpea flour recipe 2 (R_2), ready-to-cook pancake *(cheela)* mix supplemented with soybean flour recipe 3 (R_3) and ready-to-cook pancake *(cheela)* mix supplemented with green gram flour recipe 4 (R_4) were analyzed for different chemical characteristics (Table 10).

Table 10. *Chemical Characteristics of Ready-To-Cook Cheela (Pancake) Mix.*

Parameters	Recipes (Mean +SE)			
	R_1	R_2	R_3	R_4
Moisture (%)	5.53 ± 0.11^{a}	5.73 ± 0.50^{a}	5.64 ± 0.31^{a}	5.78 ± 0.11^{a}
Crude protein (%)	10.61 ± 0.04^{c}	17.03 ± 0.67^{b}	25.76 ± 0.57^{a}	16.45 ± 0.58^{b}
Crude fat (%)	0.75 ± 0.34^{c}	2.42 ± 0.35^{b}	8.78 ± 1.41^{a}	1.73 ± 0.05^{b}
Crude fibre (%)	2.49 ± 0.10d	6.01 ± 0.07b	7.04 ± 0.04^{a}	4.23 ± 0.08c
Total carbohydrates (%)	81.29 ± 0.87^{a}	58.63 ± 1.28^{b}	56.14 ± 0.03^{b}	59.73 ± 2.99^{b}
β-carotene (mg/100 g)	1.25 ± 0.11^{b}	2.44 ± 0.06^{a}	1.95 ± 0.26^{a}	2.23 ± 0.24^{a}
Ash (%)	1.82 ± 0.15^{c}	3.19 ± 0.53^{b}	4.68 ± 0.19^{a}	3.31 ± 0.61^{b}
Total energy (Kcal/ 100 g)	364.39 ± 1.26^{b}	378.38 ± 1.41^{a}	382.46 ± 1.96^{a}	375.37 ± 0.59^{a}

R_1 (75% rice flour +25% pumpkin powder); R_2 (65% rice flour +10% chickpea flour+25% pumpkin powder); R_3 (55% rice flour +20% soybean flour+25% pumpkin powder); R_4 (45% rice flour +30% green gram flour+25% pumpkin powder). Data represented in table are the average pooled values (mean ± SD), The value with same lowercase letter on superscript in the same column are non-significant at 0.05% level of significance

4. Discussion

4.1. Sensory Scores of Ready-to-Cook Pancake (cheela) Mix Using Rice Flour

Table 6, highlights the sensory scores of ready-to-cook pancake *(cheela)* mix for serving. The highest scores for colour, texture, taste and overall acceptability were noted as 8.65, 8.82, 8.71, and 8.79, respectively in pancakes of recipe 4 (R_4). Based on the highest sensory scores, R4 was selected and referred to as R_1 (75% rice flour +25% pumpkin powder) for conducting further experiments.

4.2. Sensory Scores of Ready-to-Cook Pancake (cheela) Mix Supplemented with Chickpea Flour

Data in Table 7 revealed significantly higher scores for colour (8.50), texture (8.53), taste (8.55) and overall acceptability (8.58) were awarded to recipe 5 (R_5). The parameters of different recipes were above the acceptable limit but R_5 (65% rice flour +10% chickpea flour+25% pumpkin powder) was selected on the basis of sensory scores and referred to as R_2 for further evaluation.

4.3. Sensory Scores of Ready-to-Cook Pancake (cheela) Mix Supplemented with Soybean Flour

The data (Table 8) showed significant differences among all the different recipes. It can be seen that recipe 5 (R_5) got the highest overall acceptability score of 8.48, followed by 8.53, 8.50 and 7.60, respectively for colour, texture, taste and overall acceptability. Keeping in view the highest overall acceptability scores, recipe 5 (R_5) was selected and referred to as R_3 (55% rice flour +20% soybean flour+25% pumpkin powder) for further evaluation.

4.4. Sensory Scores of Ready-to-Cook Pancake (cheela) Mix Supplemented with Green Gram Flour

Significant differences in scores of various recipes can be seen from the data (Table 9). The highest overall acceptability score of 8.68 was given to R_4, followed by R_3

(8.00), R_5 (7.35), R_1 (7.33), R_6 (7.18), and R_2 (7.15). The scores obtained by recipe 4 (R_4) for colour, texture and taste were 8.55, 8.58, 8.63, and 8.68, respectively. Based on the highest overall acceptability score, recipe 4 (R_4) was selected and referred to as R_4 (45% rice flour +30% green gram flour+25% pumpkin powder) for conducting further studies.

4.5. Chemical Characteristics of Ready-to-Cook Pancake (cheela) Mix

The ready-to-cook pancake *(cheela*) mix selected from the base recipe (R_1), ready-to-cook pancake *(cheela*) mix supplemented with chickpea flour (R_2), ready-to-cook pancake *(cheela*) mix supplemented with soybean flour (R_3) and ready-to-cook pancake *(cheela*) mix supplemented with green gram flour (R_4) were analyzed for different chemical characteristics (Table 10). The range of moisture content in this study was similar to the range reported by [33] Rani and Sood (2020), but lower than the range observed by [41] Sneha and Haripriya (2018) and those suggested by [25] Codex Alimentarius (CODEX, 1985). Roasting of flours of rice, chickpea and green gram before mixing with other ingredients followed by proper packaging immediately of the mixed powder in ALP and glass jars may prevent the absorption of moisture from the environment (hygroscopic) in the present investigation. The lower the moisture content of the pancake mix, the better the shelf life of product quality, as chemical and physical deterioration is less likely at such low moisture content [21] (Intipunya and Bhandari, 2010). Recipe 3 (R_3) ready-cook pancake (*cheela*) mix supplemented with soybean flour had a significantly higher amount of protein as compared to other recipes. The increase in protein content may be due to soybean which has the highest protein as compared to other pulses. The protein range analyzed in this study was higher than that investigated by [33] Rani and Sood (2020), [13] Kavitha *et al*. (2018) and Sneha and Haripriya (2018). Nutritionally, protein content in all recipes supplemented with pulses was above the amount of protein needed from complementary foods for children in the age group of 1-3 and 4-6 years. The amount of crude fibre range of the present study surpasses the amount investigated by Rani and Sood [33], Kavitha *et al*. [13] and Sneha and Haripriya [41]. The results of the present study for total carbohydrates are lower than the range of Sneha and Haripriya [41] and similar to Rani and Sood [33]. The lower carbohydrate content in the current study may be due to the low glycemic index of pulses [18]. The range of ash content in the present study is in line with the results of Rani and Sood [33], and Kavitha *et al*. [13]. The total energy content in the current study on recipes 1-4 differs significantly. These results are lower than the range obtained given by Rani and Sood [33] but meet the daily requirement of energy intake for infants in the age group of 6-9 months as recommended by Butte [20] and above the recommendation of ICMR [30] for children in the age group of (6-12 months).

5. Conclusion

Ready-to-cook pancake (*cheela*) mix supplemented with soybean flour (R_3) showed the highest chemical characteristics in protein 25.76 per cent, fat 8.78 per cent, ash 4.68 per cent, fibre 7.04 per cent and energy 382.46 Kcal/100 g while pancake (*cheela*) mix for serving prepared with rice flour had the highest overall score of 8.79. To address malnutrition in children especially PEM, in developing nations, soybean flour should be incorporated into staple foods to improve the nutritional contents. The protein content obtained in this study was beyond and above the amount of protein needed from complementary foods to satisfy the daily nutritional requirements for children in the age group of 4-6 years. It was determined that the ready-to-cook pancake (*cheela)* mix developed in this study was highly nutritious. The Government and non-Governmental Organizations (NGOs) could embrace these efforts to improve the nutritional quality of children's diets in many developing countries to combat malnutrition.

Conflicts of Interest

The authors declare no conflicts of interest relevant to this article.

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References

[1] AOAC, (2012). Official Methods of Analysis of AOAC International. 19th ed. Gaithersburg, Washington DC, USA.

[2] AOAC, (2010). Association of Official Analytical Chemists - Official methods of analysis. 18th edn. Washington DC.

[3] AOAC, (2009). Association of Official Analytical Chemists - Official Methods of analysis. 6th edn. Inc, USA IL.

[4] AOAC, (2006). Association of Official Analytical Chemists - Official methods of analysis 18th edn. Gaithersburg, M.D. USA.

[5] O'Keefe S, Bianchi L and Sharman J. (2015). Soybean nutrition. SM Journal of Nutrition and Metabolism 1: 1006.

[6] Sharma A and Baluja Z. (2015). Therapeutic effects of Glycine max (Soybean): A summary. International Journal of Research in Pharmacy and Biosciences 2: 22-27.

[7] USDA. (2020). Soybeans, mature seeds, raw. U.S. Department of Agriculture. https://fdc.nal.Usda.gov [12 PM, 9th March 2023].

[8] Rodríguez RR, Valdes R, Ortiz GS. (2018). Características agronomicas y calidad nutricional de los frutos y semillas de calabaza Cucurbitasp. Revista Colombiana de Ciencia Animal – RECIA. 10(1): 86–97.

[9] Chuwa C, Dhiman AK, Kathuria D, Mwita MA., Gautam S. (2020). Food Fibres: A solution to combat non-communicable diseases. Nutrition and Metabolism: An Open Access.

[10] Food and Agriculture Organization of the United Nations, Wild food plants: agrobiodiversity strategies to combat food insecurity and HIV/AIDS impact in rural Africa, Food and Agriculture Organization; 2003.

[11] Ramakrishna V., Rani P. J., and Rao P. R., (2006). "Anti-nutritional factors during germination in Indian bean (dolichos lablab l.) seeds," World Journal of Dairy Food Sciences, vol. 1, no. 1, pp. 6– 11.

[12] Jukanti, a K., Gaur, P. M., Gowda, C. L. L., Chibbar, R. N., (2012). Nutritional quality and health benefits of chickpea (Cicer arietinum L.): a review. Br. J. Nutr. 108 (Suppl), S11–26.

[13] Kavitha, B., Sugasini, D., Poorna, C. R. Y., Hemalatha, C., Kanchana, S., Meenakshi, V and Umamaheshwari R. (2018). Nutritional and structural evaluation of selected black gram varieties of preparation of fermented thick pancake (*Dosa*). *Archive of Food and Nutritional Sciences* 2: 1-9.

[14] Thakur, N. S.; Kashyap, S.; Thakur, A.; Sharma, A.; Gautam, S. and Hamid (2021). Development of dehydrated pomegranate arils from unmarketable pomegranates and evaluation of their functional and organoleptic attributes during storage. Ann. of Phytomed., 10(2): 335-340. http:/ /dx.doi.org/10.21276/ap.2021.10.2.45.

[15] Meilgaard, M.; Civille, G. V. and Carr, B. T. (1999). Sensory evaluation techniques. Boca Raton: CRC Press. 4th ed. CRC Press, New York, NY.

[16] Ranganna, S. (2009). Handbook of analysis and quality control of fruit and vegetable products. 2nd edn. Tata McGraw Hill Publishing Company Limited, New Delhi, India.

[17] Chuwa C, Saidia P and Dhiman AK (2022). Formulation, nutritional and sensory evaluation of ready-to-reconstitute instant weaning mix. Ann. Phytomed., 11(2): 1-10.

[18] Chuwa C, Sharma B, Mwita MA, Gwandu FB, Waibe JM (2021) Low Glycemic Index Foods: A Resolution to Ameliorate Type 2 Diabetes. Journal of Diabetes and Treatment 6: 1-9. 1087. DOI: 10.29011/2574-7568.001087.

[19] Chuwa C and Dhiman AK (2021). Development and nutritional evaluation of ready-to-cook porridge mix as a weaning food for infants. *The Pharma Innovation Journal* 2021; 10(12): 2259-2265.

[20] Butte NF. (1999). Energy requirements of infants. European journal of clinical nutrition50: S24-S36.

[21] Intipunya P, Bhandari BR. (2010). Chemical deterioration and physical instability of food powders. In L. H. Skibsted, J. Risbo, & M. L. Andersen (Eds.), Chemical Deterioration and Physical Instability of Food and Beverages Cambridge, U.K.: Woodhead Publishing., 663-700.

[22] Desalegn BB. (2015). Effect of Soaking and Germination on Proximate Composition, Mineral Bioavailability and Functional Properties of Chickpea Flour. Food and Public Health. 5: 108-113.

[23] Dhiman AK, Vidiya N, Attri S, Ramachandran P. (2017). Studies on development and storage stability of dehydrated pumpkin based instant soup mix. Journal of Applied and Natural Science.; 9(3): 1815-1820.

[24] Dipnaik K, Bathere D. (2017)."Effect of soaking and sprouting on protein content and transaminase activity in pulses." International Journal of Research in Medical Sciences.; 5(10): 4271-4276.

[25] CODEX. Standard for wheat flour. (CODEX STAN 152– 1985). 1985. Retrieved from http://www.fao.org/input/download/standards/50/CXS_1 52e.pdf. (Accessed March 23, 2023).

[26] Cochran WG, Cox CM. Experimental Designs. John Wiley and Sons, New York. (1967), 171-217. 24.

[27] Mahony MO. Sensory evaluation of food. In: Statistical Methods and Procedures. Marcel Dekker Inc, New York. 1985, 168-169.

[28] Bazaz R, Baba W N and Masoodi F A. (2016). Development and quality evaluation of hypoallergic complementary foods from rice incorporated with sprouted green gram flour. Cogent Food and Agriculture 2: 1-17.

[29] Kathuria D. (2021). Extraction of isoflavone and development of functional food products from soybean (*Glycine max* L. Merrill). Ph.D. Thesis. Department of Food Science and Technology, Dr Yashwant Parmar University of Horticulture and Forestry, Nauni-Solan (HP). 339 pp.

[30] ICMR, (2010). Recommended dietary allowances and RDA of Indians and their uses in planning diets. cbseacademic.nic.in/webmaterial/ Curriculum/Vocational/2018/Food %20 Nutrition % 20 and %20Dietetics_XI.pdf [23 PM, 21st January 2020].

[31] Chuwa, C. (2022). Low-cost complementary food formulations to combat malnutrition in infants and children. Ph.D. Thesis. Department of Food Science and Technology, Dr Yashwant Parmar University of Horticulture and Forestry, Nauni-Solan (HP). 239 pp.

[32] Wang L, Wang H, Lai Q, Li T, Fu X, Guo X, Wand Liu R H. (2015). The dynamic changes of ascorbic acid, tocopherols and antioxidant activity during germination of soya bean (Glycine max). International Journal of Food Science and Technology 50: 2367-74.

[33] Rani A and Sood S. (2020). Development and quality evaluation of pancakes prepared by utilizing field pea (Pisum sativum var. arvense) grown in Himachal Pradesh. International Journal of Chemical Studies 8: 2597-600.

[34] Chuwa C, Dhiman AK and Kathuria D. (2022). Effect of Processing Methods on the Nutritional Composition of Ripe Pumpkin Fruit. Current Journal of Applied Science and Technology, 41(20): 47-56.

[35] Sheetal, A., Hiremath, V. K., Patil, A. G., Sajjansetty, S. and Kumar, S. R., (2013). Malnutrition and its oral outcome–a review. *Journal of Clinical and diagnostic research: JCDR*, *7*(1), p. 178.

[36] Stevens, G. A., Finucane, M. M., De-Regil, L. M., Paciorek, C. J., Flaxman, S. R., Branca, F., Peña-Rosas, J. P., Bhutta, Z. A. and Ezzati, M., (2013). Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. *The Lancet Global Health*, *1*(1): e16-e25.

[37] Chuwa, C. and Dhiman, A. K., (2022). Development and nutritional evaluation of iron rich instant muffin mix as a complementary food for children. *Annals of Phytomedicine*, *11*(1): 638-647.

[38] Headey, D., Heidkamp, R., Osendarp, S., Ruel, M., Scott, N., Black, R., Shekar, M., Bouis, H., Flory, A., Haddad, L. and Walker, N., (2020). Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality. *The Lancet*, *396*(10250): 519-521.

[39] Chuwa, C. and Dhiman, A. K., (2023). Nutrition and Health Benefits of Ripe Pumpkin Fruit, Pulp and Powder. *Recent Progress in Science and Technology Vol. 4*, pp. 123-133.

[40] Alajaji, S. A. and El-Adawy, T. A., (2006). Nutritional composition of chickpea (Cicer arietinum L.) as affected by microwave cooking and other traditional cooking methods. *Journal of Food Composition and Analysis*, *19*(8), pp. 806-812.

[41] Sneha, A. and Haripriya, A., (2018). Development of amaranth grain (Amaranthus cruentus) based instant Dosa mix and its quality characteristics. *Development*, *3*(1), pp. 6-11.

[42] Jukanti, A, K., Gaur, P, M., Gowda, C. L, & Chibbar, R. N. (2012). Nutritional quality and health benefits of chickpea (*Cicer arietinum* L.): A review. *British Journal of Nutrition*. 108, S11–S26.