FORMULATION AND DEVELOPMENT OF MILLET PAPPAD, ANALYSIS OF PHYTOCHEMICAL, ANTIOXIDANT AND NUTRIENT ANALYSIS

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Abstract

Millet is a Poaceae family plant that is widely farmed. Millet has a lot of antioxidants and is a wonderful source of minerals like fibre, iron, calcium, protein, zinc, and magnesium. It contains a number of intriguing bioactive components and has health-promoting characteristics. Foxtail millet is high in important amino acids, fatty acids, and minerals, and it is one of the most digestible and non-allergenic grains available, making it vital to human health. Millet is beneficial to cancer patients, cardiac patients, anaemia, and celiac disease sufferers. Millet is non-toxic and safe to consume at ordinary doses on a daily basis. Finger millet flour has numerous health benefits, including weight loss, bone health, decreasing blood cholesterol, anaemia, and other health issues. Finger millet is high in calcium, phosphorus, and iron. Because of its functional components, such as slowly digesting starch and resistant starch, finger millet has gained relevance as the use of processed products has changed and consumers have become more aware of the health benefits. It demonstrated a wide range of health benefits and biological activities, including antioxidant, anti-hypertensive, and anti-tumor properties. Antidiabetic, hypolipidemic, and other properties. Pearl millet is a good source of energy, protein, vitamins, dietary fibers and minerals. It is high in fat and better fat digestibility than other cereals. This is also high in unsaturated fatty acids with higher content of nutritionally important n-3 fatty acid. Among all the millets, pearl millet has highest content of macronutrients and significantly rich in resistant starch, soluble and insoluble dietary fibers The nutrient analysis of millet in this study reveals the presence of elements such as glucose, protein, fat, and crude fibre. Total Antioxidant Activity was measured in millet to determine its activity. Millet phytochemistry reveals the presence of phenol, tannin, flavanoids, alkaloids, steroids, terpenoids, quinones, and fatty acid. Foxtail millet, small millet, finger millet, pearl millet, and proso millet were made from pappad, and sensory evaluation of the created products was performed by 25 panel members using a score card.

Keywords: Millet, Nutrients, Health effects, Phyto chemicals, Antioxidant, anti-hypertensive, Anti- tumor, Antidiabetic.

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INTRODUCTION

Millet crops are cultivated on marginal areas and in low-input agricultural conditions, where main cereal crops frequently provide low yields (Amadou et al., 2013). Millet can be productive even in tough growing circumstances, particularly in India, Sub-Saharan Africa, and West Africa, where average rainfall is frequently less than 500 mm and soils are sandy and slightly acidic. 74% of all millets planted in Africa are grown in Sub-Saharan and West Africa, accounting for 28% of global production (Changmei and Dorothy, 2014). Drought and a lack of irrigation are chronic restraints on agricultural productivity in many poor nations, as well as occasional causes of yield loss in industrialised countries (Ceccarelli and Grando, 1996).

One of the most significant components of foxtail millet quality is eating quality, and the colour, flavour, and taste of cooked millet or porridge represent eating quality. The three millet cooking quality characteristics stated above are significant for millet eating quality. Cooked millets with a high amylose concentration are dry, fluffy, and black, with a high degree of retrogradation, whereas cooked millets with a low amylose content are sticky, glossy, soft, and delectable (Gai 2003, Liu H and Zhang M 2010, Ma J et al., 2009). Foxtail millet is one of the grains popular among Chinese consumers, and breeding for excellent quality has become a priority.

Finger millet is commonly known by several regional names, such as ragi or mandua in India, koddo in Nepal, coracan, koracan in France, African millet, finger millet in England, tokuso in Ethiopia, fingerhirse in Germany, bulo in Uganda, wimbi in Kenya, and so forth. Finger millet is classified into 10 genera and 20 species (lupien, 2007). It is a small-seeded minor cereal with a light brown to brick red or dark brown seed coat that is high in phytochemicals like polyphenols and dietary fibres. Finger millet is high in minerals, including calcium, fibre, antioxidants, and photochemicals, making it easily and slowly digestible. In diabetic people, finger millet effectively helps to regulate blood glucose levels. Because of its low sugar content and gradual release of sugar/glucose in the body, finger millet is regarded an ideal diet for diabetic individuals (kothari., 2005).

Pearl millet is high in energy, protein, vitamins, fibre, and minerals. It contains more fat and has a higher fat digestibility than other grains. This is also high in unsaturated fatty acids, with a larger concentration of the nutritionally important omega-3 fatty acid. Pearl millet has the most macronutrients and is particularly high in resistant starch, soluble and insoluble dietary fibres (Ragaee et al., 2006). Pearl millet effectively helps diabetes patients keep their blood sugar levels stable over time (Diao X.2011).

Proso millet (Panicum miliaceum L.) is an important minor millet that is widely grown in the tropics and is a staple meal in some developing countries. Journal of Chemical Studies International It has good nutritional qualities, including a high protein content, vitamins, minerals, and phytochemicals including phenolic acids, flavonoids, and phytate, as well as a high antioxidant capacity (Thatola et al., 2011, Mishra, 2012). It is suitable for human consumption because it is easily digested and free of gluten (Reddy et al., 2007).

Methodology

Selection and Collection of Samples

Millet flour was the sample utilized in the investigation. The fresh samples and other ingredients were purchased from the nearby supermarket in Thuckalai, Kanyakumari District, Tamilnadu.

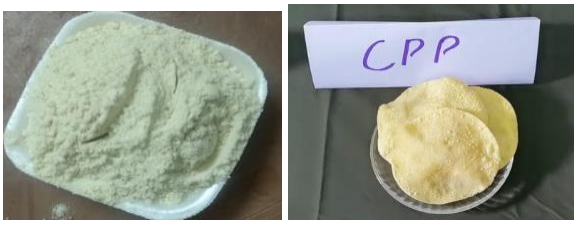
The fresh sample used in the investigation are depleted in the plate.

Processing of the sample:

To get rid of the dust and other foreign materials, the samples were carefully washed. Then it was dried using the old-fashioned method of sun drying, with special attention. For further investigation, the samples were grind to fine powder and sealed separately in an airtight container and kept at room temperature.

Standardization and formulated Millet pappads

After cleaning and letting the urad dal sit in the sun for a few hours, crush it into a fine powder. Add salt, cooking soda, and asafoetida powder. To make a thick dough, add enough water and knead thoroughly. Add the cumin seeds and oil. Re-knead until the consistency of chapati dough. Pinch small balls of the dough and roll them out into thin circles as the dough begins to turn pale yellow. After the moisture has drained, let them in the sun (or under a fan) for 30 to 45 minutes. Keep them in a dry, spotless container. Cook them in. hot oil and serve them over rice or anything you choose.



Chick peas powder and chick peas pappad (Standard)

After cleaning, spread out the Foxtail millet/ Little millet/ Finger millet/ Pearl millet/ Proso millet and urad dal and leave them in the sun for a few hours. Next, grind till a fine powder. Add salt, cooking soda, and asafoetida powder. To make a thick dough, add enough water and knead thoroughly. Add the cumin seeds and oil. Reknead until the consistency of chapati dough. Pinch small balls of the dough and roll them out into thin circles as the dough begins to turn pale yellow. After the moisture has drained, let them in the sun or beneath a fan for 30 to 45 minutes. Keep them in a dry and hygienic container. Serve them with rice or as desired after frying them in heated oil.

Formulated Millet pappads

Foxtail millet powder & pappad (FOP) Little millet powder & pappad (LIP)
Finger millet powder & pappad (FIP),Pearl millet powder & pappad (PEP), Proso millet powder & pappad(PRP)

Sensory evaluation of the formulated products

The organoleptic qualities of millet pappads was conducted by score card method using nine -point hedonic scale by a panel of 20 selected judges. A score card for sensory assessment was evaluated on the basis of. appearance, texture, taste, flavor, color, and overall acceptability

FormulatedMilletPappad

Laboratory Analysis

Millet flour was analysised for phytochemicals. Quantitative analysis of the major constituent present in millet flour and antioxidant activity was carried out using the standard procedure. Nutrient analysis such as carbohydrate by anthrone method, protein by lowry method, Fat by batch solvent extraction method and crude fibre content was estimated using standard procedures.

Shelf-Life Studies

The millet pappads that were chosen for treatment were stored at room temperature in 250-gauge polythene pouches. The Pappads were stored more than six months. Initially, and until the end of 15 days, the following factors were examined in the chosen samples.

Statistical analysis of the data

The observation was recorded and analyzed statistically. Data collected on sensory parameters were subjected to statistical analysis namely mean, standard deviation and standard mean error.

Result and Discussion

Table:1 Sensory Parameters of Chick peas pappad (CPP) and Foxtail Millet pappad (FOP)

Sl.No	Sensory Parameter	Standard CPP		Product FOP	
		MEAN ± SD	SME	MEAN ± SD	SME
1.	Appearance	4.88 ± 0.4	0.08	4.88 ± 0.31	0.06
2.	Texture	4.6 ± 0.63	0.12	4.92 ± 0.26	0.05
3.	Taste	4.7 ± 0.6	0.12	4.92 ± 0.26	0.05
4.	Flavour	4.68 ± 0.53	0.10	4.8 ± 0.4	0.08
5.	Colour	4.68 ± 0.53	0.10	4.92 ± 0.26	0.05
6.	Over all Acceptability	4.84 ± 0.36	0.07	4.92 ± 0.26	0.05

The above table it shows that the overall acceptability, the mean score of foxtail millet is higher than the standard chick peas pappad.

Table:2 Sensory Parameters of Chick peas pappad (CCP)and Little Millet pappad (LIP)

Sl.No	Sensory Parameter	Standard CCP		Product LIP	
		MEAN ± SD	SME	MEAN ± SD	SME
1.	Appearance	4.88 ± 0.4	0.08	4.88 ± 0.31	0.06
2.	Texture	4.6 ± 0.63	0.12	4.8 ± 0.4	0.08
3.	Taste	4.7 ± 0.6	0.12	4.84 ± 0.36	0.07
4.	Flavour	4.68 ± 0.53	0.10	4.92 ± 0.26	0.05
5.	Colour	4.68 ± 0.53	0.10	4.92 ± 0.26	0.05
6.	Over all Acceptability	4.84 ± 0.36	0.07	4.96 ± 0.17	0.03

The above table it shows that the overall acceptability, the mean score of little millet is higher than the standard chick peas pappad.

Table:3 Sensory Parameters of Chick peas pappad (CPP) and Finger Millet pappad (FIP)

Sl.No	Sensory Parameter	Standard CCP		Product FIP	
		MEAN ± SD	SME	MEAN ± SD	SME
1.	Appearance	4.88 ± 0.4	0.08	4.88 ± 0.31	0.06
2.	Texture	4.6 ± 0.63	0.12	4.84 ± 0.36	0.07
3.	Taste	4.7 ± 0.6	0.12	4.6 ± 0.48	0.09
4.	Flavour	4.68 ± 0.53	0.10	4.92 ± 0.26	0.05
5.	Colour	4.68 ± 0.53	0.10	4.72 ± 0.44	0.08
6.	Over all Acceptability	4.84 ± 0.36	0.07	4.72 ± 0.44	0.08

From the above table it shows that the overall acceptability, the mean score of finger millet is lower than the standard chick peas pappad.

Table:4 Sensory Parameters of Chick peas pappad (CPP) and Pearl Millet pappad (PEP)

Sl.No	Sensory Parameter	Standard CCP		Product PEP	
		MEAN ± SD	SME	MEAN ± SD	SME
1.	Appearance	4.88 ± 0.4	0.08	4.72 ± 0.52	0.10
2.	Texture	4.6 ± 0.63	0.12	4.84 ± 0.36	0.07
3.	Taste	4.7 ± 0.6	0.12	4.64 ± 0.48	0.09
4.	Flavour	4.68 ± 0.53	0.10	4.84 ± 0.36	0.07
5.	Colour	4.68 ± 0.53	0.10	4.76 ± 0.50	0.1
6.	Over all Acceptability	4.84 ± 0.36	0.07	4.88 ± 0.31	0.06

From the above table it is clear that the overall acceptability, the mean score of pearl millet is higher than the standard chick peas pappad.

Table: 5 Sensory Parameters of Chick peas pappad (CPP)and Proso Millet pappad (PRP)

Sl.No	Sensory Parameter	Standard CCP		Product PRP	
		MEAN ± SD	SME	MEAN ± SD	SME
1.	Appearance	4.88 ± 0.4	0.08	4.88 ± 0.31	0.06
2.	Texture	4.6 ± 0.63	0.12	4.72 ± 0.44	0.08
3.	Taste	4.7 ± 0.6	0.12	4.88 ± 0.31	0.06
4.	Flavour	4.68 ± 0.53	0.10	4.84 ± 0.36	0.07
5.	Colour	4.68 ± 0.53	0.10	4.8 ± 0.4	0.08
6.	Over all Acceptability	4.84 ± 0.36	0.07	4.88 ± 0.31	0.06

From the above table it is clear that the overall acceptability, the mean score of proso millet is higher than the standard chick peas pappad.

Table:6 Qualitative analysis of Little Millet Flour

SI.No	NAME OF TEST	SAMPLE CODE (LIP)
1	Phenol	+
2	Flavonoids	+
3	Alkaloids	+++
4	Tannins	++
5	Glycoside	-
6	Saponins	-
7	Terpenoids	++
8	Quinines	+
9	Fatty acid	++

NB*:The colour of the sample flour may interfere with some of the result.

+ = Positive, - = Negative

From the table, it is found that the millet flour showed the presence of Phenol, Flavonoids, Alkaloids, Tannins, Terpenoids, Quinines, Fatty acid. Glycoside and Saponins were absent in the little millet flour.

Table: 7 Total Antioxidant Activity

SI.No	Sample Code	OD AT 695 nm	Concentration Of Antioxidants in µg/mg
1	LIP	0.714	55.42

The total antioxidant presents in little millet is 55.42 µg/mg at 0.714 OD

Table :8 OVER ALL TABULATION OF NUTRIENT ANALYSIS

Sl.No	Nutrient	Amount
1	Carbohydrate (gm)	69.9
2	Protein (gm)	10.29
3	Fat (g)	2.9
4	Fiber (g)	3.3

The nutrient analysis for little millet was carried out using the standard procedure. The carbohydrate content of little millet was 69.9 gm/100 g. The protein content of little millet 10.9gm/100g. The fat content of little millet was 2.9 g/100 g & 3.3 g/100g of fiber content was present iin little millet.

Table :9 Shelf life studies

Days	Room Temperature
1 -15	No change
15-30	No change
30-45	No change
45-60	No change

The keeping quality of the millet flour was hold for 60 days in room temperature. Among these there is no change, discolouration and off flavours in millet flour.

Discussion

According to Manach et al. (2005), millets have a number of significant health benefits, including lowering the risk of heart disease, assisting with diabetes, enhancing the digestive system, promoting respiratory health, preventing cancer, assisting with several degenerative diseases like metabolic syndrome, enhancing the neurological and muscular systems, and promoting respiratory health.

Stanley Joseph and others (2013) Research found that traditional growing methods for millets do not require the use of pesticides, and the land utilized for millets is completely free of pests. When pulses like green gram are stored, millets like foxtail millet work as anti-pest agents and are free of pests. Fumigants are not required for the millets. When it comes to feed crops in India, millets are very low on the list, but they are crucial for regional and farm food security.

According to O.S.K. Reddy (2017), finger millet is a very good diet for diabetes since it slows down the release of glucose into the blood and aids with blood pressure, heart difficulties, and asthma. It also helps with other medical conditions. In addition to assisting in the battle against degenerative diseases and malnutrition, finger millet also raises hemoglobin levels.

According to Shweta (2015), pearl millet contains magnesium, which aids asthmatic patients' breathing issues and lessens the effects of migraines. Gall stone incidence is decreased by the fiber content of pearl millet. Because gallstones are caused by an excess of bile in the body, the insoluble fiber found in pearl millet aids in lowering this level.

Coral SD (2012) Research has shown that proso millet can help prevent Pellagra, a disorder brought on by the vitamin B3 niacin. Niacin concentration is high in proso millet. Pellagra is a skin condition that leaves the skin rough, scaly, and dry. Niacin (Vitamin B3) and protein make up proso millet. It has historically been used as healing food, particularly after childbirth or illness.

Reddy, O.S.K. (2017) According to research, millet, although little in size, has a significant nutritious value despite being tiny. It is a good source of minerals, including calcium, iron, zinc, and potassium, as well as B vitamins. Additionally, it gives the body the necessary fats

that aid in weight loss. Another is its high fiber content.

CONCLSION

It has been discovered that millet flour has pharmacological activity against cancer, diabetes, hypertension, and tumors. It may have beneficial effects on heart disease parameters because of its high fiber content and antioxidant activity. In conclusion, consuming millet flour on a regular basis can help prevent or treat a variety of illnesses due to its extensive nutritional and therapeutic applications.

It is found that millet flour is rich in phytochemical nutrition that are very active in exerting various health advantages from several infections and disorders. This could be explained by the fact that the sample had high levels of iron, protein, carbs, fiber, vitamin E, and other nutrients.

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