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NUTRITIONAL EVALUATION OF NUTRIENT ENRICHED POWDER FROM KAVUNI RICE AND SOYABEAN

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ABSTRACT

All living organisms require food. Plants can synthesize food for themselves but animals including humans cannot. They get it from plants or animals that eat plants. Thus, humans and animals are directly or indirectly dependent on plants. The nutrients enable living organisms to build their bodies, to grow, to repair damaged parts of their bodies and provide the energy to carry out life processes. Nutrition is the mode of taking food by an organism and its utilization by the body. The aim of the study to screen the nutritional content of formulation of health mix from *Kavuni* rice and *Soyabean*. The results of the present study concluded that the formulation of health mix from *Kavuni* rice and *Soyabean* contain rich source of phytochemicals, proximate composition, vitamins and minerals.

Keywords: Phytochemicals, Proximate composition, Elements, Vitamins, *Kavuni* rice and *Soyabean*

INTRODUCTION

Soya bean is an excellent source of protein (35-40%). The soya bean seed is the richest in food value of all plant foods consumed in the world (Kure *et al*, 1998). Soya bean is a widely used, inexpensive and nutritional source of dietary protein (IITA *et al*, 1990). Its protein content (40%) is higher and more economical than that of beef (19%), chicken (20%), fish (18%) and groundnut (23%) (McArthur *et al*, 1988). Soya bean is also of particular interest as a vegetable protein source because of its cholesterol lowering abilities in patients with type II hypolipoproteinemia (Mitchel, 1988). Soyabean is also rich in minerals and vitamins

such as iron, zinc, copper, thiamine, riboflavin, niacin and pantothenic acid (Mitchel, 1993). Most of these minerals and vitamins are well-known hematonic and are essential in the formation of red blood cells (Singh *et al*, 2000).

Kavuni Rice is packed with health benefits. Kavuni hand pounded black rice has rich in Antioxidants. Organic Traditional karuppu kavuni black rice good source of Fiber. Kavuni black rice helps to preventing from Obesity. Kavuni kaikuthal black rice used to preventing Risk of Diabetes. Karupu kavuni arisi lowers the risk of type 2 Diabetes. Black Kavuni rice also contains Important Antioxidant

Vitamin E, which Helps to maintaining Skin, Eye and immune health. Karuppu Kavuni handpound black rice also called as Emperor Rice. Kavuni Black rice helps to prevent from cancer. Karuppu Kavuni rice helps to Reducing the Risk of Fatty liver Disease. The aim of the study to screen the nutritional content of formulation of health mix from *Kavuni* rice and *Soyabean*.

MATERIALS AND METHODS

Preparation of Nutritional enhanced powder

The *Kavuni rice* and *Soyabean in extract* were purchased in May 2024 from Traditional Medicine Shops in Thanjavur, Tamil Nadu, India. The health *Kavuni rice* and *Soyabean in extract* ,were make a fine powder and used for analysis.

Qualitative Preliminary phytochemical analysis

Preparation of extracts

Aqueous extract of *Kavuni rice* and *Soyabean* extract, Take one gram of plant powder in the extract prepared in 50 ml of aqueous, the extract shake it well for 30 minutes by free hand and wait for 24 hours. After extracts were filtered using whatman filter paper No.1 and filtrate used for further analysis. Preliminary phytochemical screening was carried out by using standard procedure followed by Sofowara (1993), Trease and Evans (1989) and Harborne (1973, 1984).

Qualitative analysis of Inorganic elements

Sample (2gm) was prepared and treated with HNO₃ and HCl (3:1 v/v) for 1 hour. After the filtration, the filtrate was used to perform the following tests (Khandelwal 2006).

Qualitative Analysis of Vitamins

Qualitative analysis of vitamin, (Pearson, 1976; Patel, 2005).

Proximate analysis

Determination of moisture content (Loss on drying). Crude fiber content was determined by following the method of Sadasivam and Manikam (1992). Dry Ashing estimated by the method of Ranganna (1986). Protein estimated by the method of Sadasivam and Manikam (1997). Total fat content of sample determines by the method of Ranganna (1986). Calculation of the total crude carbohydrate content of the sample was done using the formula (Janardhanan and Lakshmanan, 1985). The energy value of the samples was determined by multiplying the

protein content by 4, carbohydrate content by 4 and fat content by 9 (AOAC, 1990).

Functional properties analysis

The bulk density (BD) was determined according to method of Momoh *et al.*, (2012), The water absorption index determine by the method of Suraiya Jamal *et al.*, (2016). The water solubility index of starches was carried out as described by Anderson and Sefa-dede (2001). The method of Okaka and Potter (1977) with some modifications were used for determining the swelling capacity.

Total antioxidant capacity

The antioxidant capacity of sample was evaluated by the phosphomolybdenum method according to the procedure of Prieto *et al.*, (1999).

RESULTS AND DISCUSSION

Phytochemicals qualitative analysis in health mix

Compounds belonging to the respective groups have been reported to impart various medicinal characteristics to the plants. The presence of saponins in plant is very important because of their anticancer, antifungal, antioxidant, antibacterial activity (Lira *et al.*, 2017). Terpenoids were well known for antibacterial, anti-inflammatory and anticancer properties (Chung *et al.*, 1998). Alkaloids were known to be possessing analgesic as well as antibacterial properties (Nassar *et al.*, 2010). Phenolic compounds and phytosterol present in plants are responsible for antimicrobial, antiallergic, antidiabetic, antioxidant, anti-inflammatory, antimutagenic and anticarcinogenic properties (Khan *et al.*, 2015). Glycosides play role in the anticoagulant activity and antitumor activity (Xiao, 2017). Anthocyanin possess anticancer and neuroprotective properties (Chien *et al.*, 2015). Anthraquinones present in plants are responsible for the regulation of immunity and play therapeutic role in autoimmune diabetes (Rastogi *et al.*, 2015). In the present study was carried out on the health mix revealed the presence of medicinally active constituents. The phytochemical characters of the health mix investigated and summarized (Table 1 and plate1). The phytochemical screening health mix showed that the presence of saponins, alkaloids, antroquinones, polyphenol, glycosides and coumarins , flavonoids and steroids while

tannin, and terpenoids, were absent in aqueous extract.

Table 1: Qualitative analysis of Phytochemicals Kavuni rice and Soyabean in extract

S. No	Phytochemicals	Aqueous
1	Tannin	-
2	Saponin	+
3	Flavonoids	+
4	Steroids	+
5	Terpenoids	-
6	Alkaloids	+
7	Anthroquinone	+
8	Polyphenol	++
9	Glycoside	+
10	Coumarins	++

(+) Presence, (++) High concentrations and (-) Absences



(1.Tannin, 2. Saponin, 3. Flavonoids, 4. Steroids, 5. Terpenoids, 6. Alkaloids, 7. Anthroquinone, 8. Polyphenol, 9. Glycoside and 10. Coumarins)

Plate 1: Qualitative analysis of Phytochemicals in Kavuni rice, Soyabean extract

Elemental analysis

Elemental analysis is the qualitative detection and quantitative determination of chemical elements (atoms, ions) in a sample. To detect an element, one should fix an appearance of an analytical signal: the formation of precipitate or characteristic crystals, color change, an isolation of gaseous products, an appearance of a definite lines in spectrum, luminescence, etc. (Oliver et al., 2021). The various elements exhibit essential roles in

Minerals can affect the colonizing microbial communities through accidental release of bio-toxic substances from minerals. The majority of minerals contain metals which are toxic to microbes. In the present study to investigate the elements analysis in nutrient enhance product. *Kavuni* rice, *Soyabean* extract contain calcium, Phosphate, magnesium, potassium, iron, nitrate while sodium, and sulphate while chloride were absent. The *Kavuni*

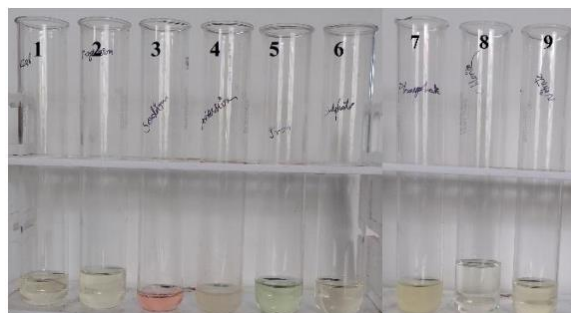
biochemical processes in human bodies, whose distribution and quantification in biological fluids, tissues, and organs as diagnosed biomarkers have been progressively significant pieces of information in life sciences and medicine. Minerals have a unique ability to interact with viruses, microbes and macro-biomolecules through multipoint ionic and/or non-covalent contacts, with potential for novel applications in therapy (Brooks et al., 2020).

rice and *Soyabean* extract extract calcium, magnesium, sodium, sulphate, potassium, phosphate, iron, and nitrate while chloride were absent (Table 2 and Plate 2).

Table 2: Qualitative analysis of elements in *Kavuni rice* and *Soyabean extract*

S. No	Inorganic elements	Kavuni rice, Soyabean extract
1	Calcium	++
2	Magnesium	++
3	Sodium	+
4	Potassium	+
5	Iron	+
6	Sulphate	+
7	Phosphate	+
8	Chloride	-
9	Nitrate	++

+: Present, -: Absent



(Calcium, Magnesium, Sodium, Potassium, Iron, Sulphate, Phosphate, Chloride, Nitrate)

Plate 2: Qualitative analysis of elements in *Kavuni rice*, *Soyabean extract*

Vitamins

There are many other food components which have vitamin activity but these are not true vitamins. There are wide range of dietary sources including both plant and animal sources for these vitamins. Vitamins are groups of highly complex compounds, organic in nature, present in foodstuffs in traces, essential for normal metabolism and absence of these nutrients cause disorders whereas, resupply of these nutrients can cure the deficiency symptoms (Marshall, 1986). The present study showed the presence of Vitamin C, Vitamin E, while Vitamin A, and Vitamin D, were absent (Table 3 and Plate 3). Nutrient enhances

products *kattuyanam rice*, *vigna radiata L extract*

Vitamins are diverse in nature relative to fats, carbohydrates and proteins. Vitamins are differentiated from other groups by their organic nature and their classification depends on chemical nature and function. Very trace amounts of vitamins are needed for growth, development, health and reproduction. Some vitamins are deviants from usual definition and not always needed to be part of food stuff i.e. ascorbic acid, vitamin D and niacin. Therefore, specific species and under certain conditions vitamin D, ascorbic acid and niacin does not fit in the definition of vitamins (McDowell, 2000).

Table 3: Qualitative analysis of vitamins in *Kavuni rice* and *Soyabean extract*

Vitamins	Results
Vitamin A	-
Vitamin C	+
Vitamin D	-
Vitamin E	++

(+) Presence, (++) High concentrations



(Vitamin A, Vitamin C, Vitamin D, Vitamin E)

Plate 3: Qualitative analysis of vitamins in Kavuni rice and Soyabean extract

Proximate Analysis of health mix

Proximate composition of the Instant health mix was analysed according to the AOAC (1980) method. The present study was analysed the proximate composition and represent in table1. The moisture, Total ash, fiber, protein,

lipid, carbohydrate and Amino acid content of health mix was 14%, 0%, 4%, 171%, 120%, 4%, and 0.30%, (Table4 and Table5).

Table 4: Proximate composition analysis in health mix

S. No	Analysis	Health mix
1	Moisture content (%)	46.0
2	Total Ash (%)	4
3	Fiber (%)	6
4	Protein (mg/g)	179
5	Lipid(gm)	0
6	Carbohydrates (mg/g)	6.58
7	Amino acid(mg/g)	0.17mg/g

This indicates the rich source of nutrient present in health mix. The results were not different from that obtained from literatures (Weiss, 2000; Potter and Hotchkiss, 2006). The chemical composition of the composite flours

has been shown to affect both physico-chemical properties and nutritional quality of their products (Dhingra and Jood, 2001; Akhtar *et al.*, 2008; Mashayekh *et al.*, 2008).

Table 5: Proximate composition analysis in health mix

S. No	Analysis	Kavuni rice	Soyabean
1	Fiber (%)	30.5	49
2	Protein (mg/g)	12.26	166.4
3	Lipid(gm)	0.03	0.04
4	Carbohydrates (mg/g)	3.843	3.396
5	Amino acid(mg/g)	0.21	0.39

Water Absorption Capacity (WAI)

Water absorption capacity of health mix flour of showed in Table 3. The present findings revealed that Absorption Capacity of flour was 0.29%. Water absorption is the ability of flour to associate with water under specific conditions where water is limited (Adebayo *et al.*, 2013; Jamal *et al.*, 2016). The composition of flour such as carbohydrate, fiber, protein and amylose content are the major factors influencing water absorption index. Particle size of flour is another important factor which effect water absorption capacity. Flour with smaller particle size has higher surface area for flour hydration

(Chaiwanichsiri *et al.*, 2012). The WAI is also dependent upon pore size, capillary and protein charges. This is due to strong correlation of extent of protein hydration with polar constituents along with the interaction of hydrophilic components by hydrogen bonding. The higher protein content lead to strong hydrogen bond, which subsequently increase the water absorption capacity of rice flour. The difference in variety and starch granule structure significantly influence the hydration capacity of the flour (Adeyeye and Aye, 1998). (Table 6)

Table 6: Functional properties analysis in health mix

S. No	Analysis	Health mix
1	Bulk density (g/ml)	0.62
2	Water solubility (%)	0.04
3	Water adsorption (g/g)	0.96
4	Swelling capacity (g/ml)	1.8

Water Solubility Index (WSI)

Water solubility index of health mix flour represent in Table 3. The present findings revealed that solubility of health mix flour was 12%. The WSI of flour depends on the temperature and amylose content of rice flour. However, relationship of solubility with temperature was directly related, while amylose content has inverse relation to solubility of rice flour (Wadchararat *et al.*, 2006). Other factors

which affected water solubility are the presence of protein and starch lipids complex, which reduces solubility (Chaiwanichsiri *et al.*, 2012). One of the major factors effecting water solubility is the methods of milling and damaged starch content (Heo *et al.*, 2013). The degradation of starch granules led to higher water solubility.

Swelling capacity (SC)

The present findings revealed that Swelling Power of health mix flour was 1.20%.. The SC of health mix flour might be affected by amylose and protein content, which inhibit the granular swelling due to disulphide and intermolecular bonding in protein that result in extensive and strong network (Fari *et al.*, 2014; Likitwattanasade, 2009) Protein is one of the most important macronutrient, which has the ability to bind starch and form starch granules,

which affect the pasting properties of rice flour. The protein and starch content in rice flour are embedded tightly in the lipid matrix and form an amylose lipid complex that influences the pasting properties (Rosniyana and Hazila, 2013). Similarly, the ratio of amylopectin and amylose as well as their structural confirmation in a starch granule substantially effect flour swelling power (Tester and Debon, 2000).

Total antioxidant capacity (TAC) of health mix

The results indicate higher TAC of the health mix. It was, however, observed that the extract possesses significant total antioxidant capacity of health mix was equivalent to 267.40 μ g/g of ascorbic acid per gram of dry weight.(Table7).

Table 7: The total antioxidant capacity (TAC) of health mix

Sample	TAC (μg ascorbic acid equivalents /g. dw)
Kattuyanam rice	198.857
Soyabean	1498.857
Combined	913.142

Table 8: Organoleptic test in Kavuni rice and Soyabean extract

S.no	Analysis	Result
1.	State	Powder
2.	Colour	Ceder brown
3.	Texture	Semi solid
4.	Taste	Mild,Sourness
5.	odour	Sour Smell

CONCLUSION

Food is a primary want of humans that offers nutrients for growth and health. The concept of food as medicine emphasizes that nutrition has been an integral component in many typical forms of medicine. The results of the present study concluded that the formulation of health mix from *Kavuni* rice and *Soyabean* contain rich source of phytochemicals, proximate composition, vitamins and minerals.

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