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PREPARATION OF ANTIDIABETIC POWDER AND EVALUATION OF NUTRITIONAL CONTENT FROM CHIA SEED POONGAR RICE

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ABSTRACT

Every 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 saliva *Chia seed* and *Poongar* rice. The results of the present study concluded that the formulation of health mix from saliva *Chia seed* and *Poongar* rice contain rich source of phytochemicals, proximate composition, vitamins and minerals.

Keywords: Phytochemicals, Proximate composition, Elements, Vitamins, saliva *Chia seed* and *Poongar* rice

INTRODUCTION

More than half of the world's population constantly includes rice in their diet, and about 2808 calories are provided by rice per person per day (Jiang et al., 2012). Rainfed rice has been gaining popularity, because current high-yielding varieties have led to an increase in genetic vulnerability, a scarcity of water for irrigation, and a breakdown of resistance genes against emerging races of pathogens due to intensive cultivation. It is important in cropping systems, because of the lack of irrigation facilities and lower cost of production (Fageria et al., 2014) Poongar is one of the landraces growing in southern Tamil Nadu and it is early maturing and drought tolerant cultivar widely used in crossing programme in a view to develop early duration drought tolerant genotypes. They have been valued in high rank due to their superior nutritional properties such as lipid content, polyphenols and high fibers (Zettel & Hitzmann, 2018). Chia seeds are among the nutritional dense foods containing

superior quality of omega-3 fatty acids, gluten-free protein and high content of anti-oxidants protecting seeds against microbial and chemical degradations (Ullah et al., 2016) Chia seed is an oilseed containing proteins (15-24%), lipids (40%) with 60% omega-3 fatty acids, dietary fibers (18-30%), carbohydrates (26- 41%) and appreciable amount of vitamins and minerals (Otondi et al., 2020). Thus, the knowledge on the morphology and size distribution of chia seeds is essential for an adequate design of the equipment for cleaning, grading and separation, moisture content for the development of the drying process, gravimetric properties for the design of equipment related to aeration, drying, storage and transport (Kachru et al., 1994). Furthermore, genetically modified foods are prepared with the addition of vitamins, minerals, probiotic microflora, and fiber. Fortified juices, fortified dairy products are the best examples of these products and easy available in the local markets (Gupta, 2014) Chia seed oil's linoleic acid concentration varied between 19.21% (900W) and 21.17% (control) when cooked in a microwave (p0.05). Chia seed oils that had been heated ranged in linolenic acid concentration from 66.84% (900W) to 68.71% (control). The concentrations of the chia oil samples of -tocopherol and -tocopherol ranged from 47.71 mg/100 g (900W) and 51.17 mg/100 g (control) to 62.58 mg/100 g (900W) and 67.81 mg/100 g (control), respectively reported by Özcan et al. (2019a).

MATERIALS AND METHODS

Preparation of nutritional enhanced powder

The *Saliva Chia seed* and *Poongar* rice in extract were purchased in May 2024 from Traditional Medicine Shops in Thanjavur, Tamil Nadu, India. The health *saliva Chia seed , and poongar* rice ,were make a fine powder and used for analysis.

Qualitative Preliminary

Preparation of extracts

Aqueous extract of *Chia seed , and poongar* rice 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 HNO_3 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-dedeh (2001). The method of Okaka and Potter (1977) with some modifications were used for determining the swelling capacity.

RESULTS AND DISCUSSION

Phytochemicals qualitative analysis in health mix

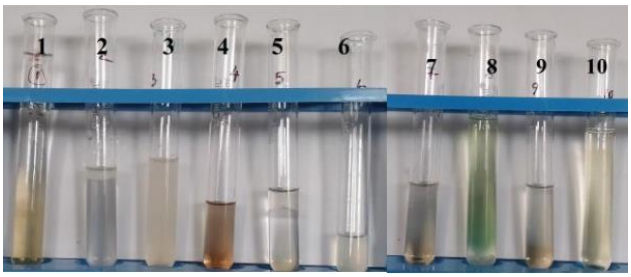
Compounds belonging to the respective groups have been reported to impart various medicinal characteristics to the plants. The presence of saponins in plant is very important because of their anticancer, antifungal, antioxidant, antibacterial activity (Lira *et al.*, 2017). Terpenoids were well known 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 tannin, saponin, flavonoids,steroids,.terpeniods,anthroquinone,polyphenol,glycoside,coumarins, while alkaloids, were absent in aqueous extract.

Table 1: Qualitative analysis of Phytochemicals *saliva Chia seed* , and *Poongar* rice extract

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

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



Aqueousextract

(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 *saliva Chia seed,poongar* rice 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 biochemical processes in human bodies, whose distribution and quantification in

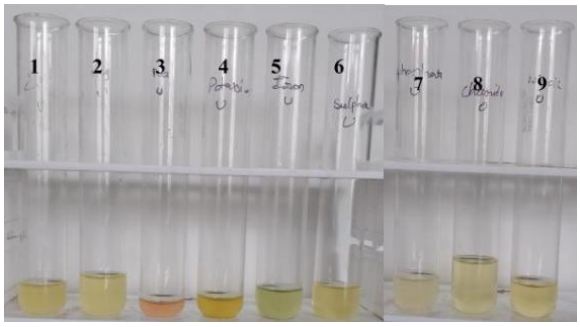
biological fluids, tissues, and organs as diagnosed biomarkers have been progressively significant pieces of information in life sciences and medicine. Minerals have a unique ability to interact with viruses, microbes and macro-biomolecules through multipoint ionic and/or non-covalent contacts, with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

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. *saliva Chia seed and poongar rice* extract contain calcium, Phosphate, magnesium, potassium, iron, nitrate while sodium, sulphate and chloride . The saliva Chia seed and poongar rice extract calcium, magnesium, sodium, sulphate, potassium, phosphate, iron, nitrate and chloride (Table 2 and Plate 2).

Table 2: Qualitative analysis of elements in saliva Chia seed and poongar rice Extract

S. No	Inorganic elements	*saliva Chia seed* , *poongar rice* 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)

Table 2: **Qualitative analysis** of elements in saliva Chia seed and Poongar rice 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 *saliva hispanic , poongar* rice 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 *saliva Hispanic , poongar* rice extract

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

(+) Presence, (++) and High concentration

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

Plate 3: Qualitative analysis of vitamins saliva *Chia seed*,*poongar* rice 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%,and0.30%,(Table4).

Table 4: Proximate composition analysis in health mix

S. No	Analysis	Health mix
1	Moisture content (%)	8
2	Total Ash (%)	38.0
3	Fiber (%)	2
4	Protein (mg/g)	522
5	Lipid(gm)	0
6	Carbohydrates (mg/g)	8.62
7	Amino acid(mg/g)	0.39

This indicates the rich source of nutrient present inhealth 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.*, 200

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 5).

Table 5: Functional properties analysis in health mix

S. No	Analysis	Health mix
1	Bulk density (g/ml)	0.5
2	Water solubility (%)	0.01
3	Water adsorption (g/g)	1.08
4	Swelling capacity (g/ml)	3.8

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).

Table 6: *In vitro* anti-diabetic activity (Alpha amylase) of saliva Chia seed, poongar rice Extract

Concentration (µg/ml)	% of inhibitions	
	saliva Chia seed, Poongar rice Extract	Std. (Acarbose)
100	12.3±0.86	18.17±1.27
200	45.4±3.17	39.04±2.73
300	56.1±3.92	64.12±4.48
400	75.6±5.29	78.07±5.46
500	91.6±6.41	94.32±6.60

Value were expressed as Mean ± SD for triplicate

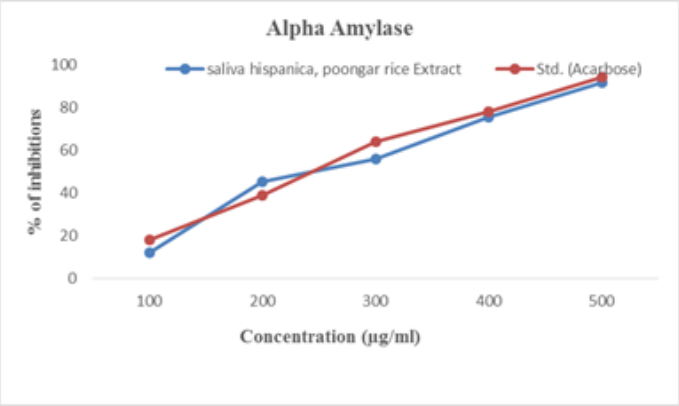


Table 7: *In vitro* anti-diabetic activity (Alpha-glucosidase) of *Saliva Chia seed* and Poongar rice Extract

Concentration (µg/ml)	% of inhibitions	
	Saliva Chia seed, poongar rice Extract	Std. (Acarbose)
100	15.7±1.09	17.32±1.21
200	24.7±1.72	32.16±2.25
300	49.8 ±3.48	54.75±3.83
400	73.6±5.15	76.94±5.38
500	81.8±5.72	89.60±6.27

Value were expressed as Mean ± SD for triplicate

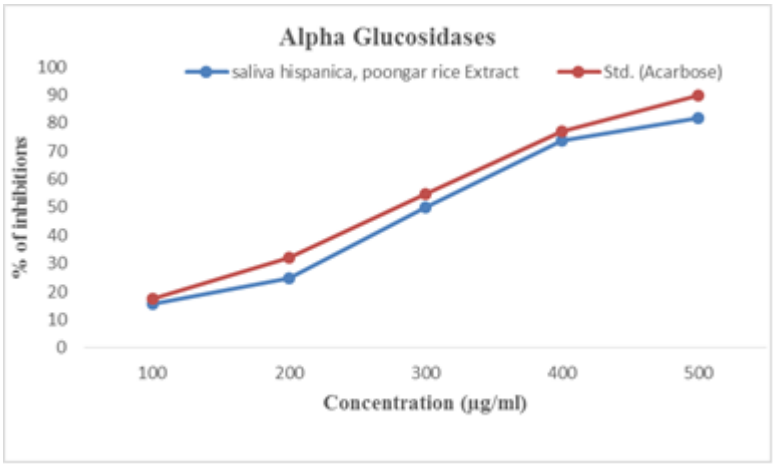


Table 8: Organoleptic test in *Kavuri rice* and *Rhizoctonia solani* extract

S.no	Analysis	Result
1.	State	Powder
2.	Colour	Dark brown or peanut brown
3.	Texture	Semi solid
4.	Taste	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 Chia seed and Poongar contain rich source of phytochemicals, proximate composition, vitamins and minerals.

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