

## NUTRITIONAL VALUE OF PRODUCT AND ITS ENRICHMENT USING SUPER SEEDS (PUMPKIN SEEDS, CHIA SEEDS, SUNFLOWER SEEDS AND ALMOND) IN APPLICATION OF READY TO EAT UPMA

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### Abstract

*Due to changing lifestyle of individuals, they don't have time to eat proper diet and the people who are pure vegetarian are unable to get that source of nutrient which is mainly required and beneficial for health. Presently, food sectors, food manufactures and food processing producing "Ready-to-eat-food" products are developing day by day as according to the demand for the public health and their time saver. The study was carried out in Research laboratory of Food Science and Technology, School for Home Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow. Develop the product, with a simple form of semolina upma adding super seeds (pumpkin, chia, sunflower and almonds) and converted into a healthy and therapeutic diet. Pumpkin seeds are rich source of zinc, essential amino acids, minerals and fatty acids. Chia seeds are rich in omega fatty acids and calcium. Sunflower seeds are rich source in magnesium and monounsaturated fats. Almonds are rich in antioxidant, monounsaturated fats, fibres and protein. Product was nutritionally analysis and the result of "Ready to eat super seeds upma" product which has comprised nutrient as per 100 gram, energy (440 Kcal), protein (15.64 g), carbohydrates (70.86 g), fibres (3.45 g), fats (7.14 g), zinc (7.81 mg), magnesium (90.69 mg), calcium (583 mg), and iron (9.76 mg). Nutritional value is compared with simple upma and both products are ready to eat and recommended by all the age group.*

**Keywords:** Ready to eat, super seeds (pumpkin seeds, chia seeds, sunflower seeds and almonds), upma, nutritional analysis

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## 1. INTRODUCTION

The ready to eat products, also called convenience food is fully partially cooked when packed. With ready to eat food, people do not have to skip their meals and compromise with their health. Ready to eat means you don't need to cook food that has already been cooked and it's required only one or two process given on the package to actually cook and bring the dish together. And people do not have to skip their meals and compromise with their health.

Upma is the breakfast meal and very healthy. Mainly it is south Indian dish, popular in Tamil Nadu. Rava upma with super seeds contain roasted semolina, curry leaves, green chilies, mustard seeds, split chickpeas, peanuts, pumpkin seeds, chia seeds, sunflower seeds and almonds which are contain rich source of

fiber, vitamins, minerals, omega fats, protein etc, Ready to eat upma can stored easily in dry and normal palace and there is no additional required for any more cooking. It's contains super seeds which is itself powerhouse and full of complete nutrients package. It is very easy to carry anywhere and can prepared within 2-3 minutes with hot water.

Seeds are full of nutritional powerhouses wrapped in very small packages. They are a great source of fiber, essential fatty acids, proteins, minerals, vitamins and life -enhancing nutrients. Super seeds also are plant-based sources of essential amino acids and minerals, including calcium, zinc, copper ,and magnesium which are significant in vegetarian and vegan diets. Seeds are powerhouse of nutrients and have a countless list of health benefits such as improved digestion, cardiovascular, immune system and bone

health; research suggests regular consumption or intake of seeds may provide to management of blood sugar and appetite as well as bone mineral density and may help lower risk for obesity and certain types of cancers control. They mostly contain healthy monounsaturated fats, polyunsaturated fats and many important vitamins, minerals and antioxidants. They are important additions to our daily food consuming in many forms. Super seeds included number of seeds as examples are hemp seeds, chia seeds, pumpkin seeds, sunflower seeds, poppy seeds, nigella, mustard seeds etc. in this study, for the development of the product taken as pumpkin seeds, chia seeds, sunflower seeds and almonds.

Pumpkin seeds (*Cucurbitaceae*) are inhabitant to the Americas, and this indigenous species are found across South America, North America, and Central America. Pumpkin seeds are a rich source of zinc. It strengthens the immune system and enhances cell growth. It also helps in insulin regulation, diabetes control, and improves skin and eye health. Health benefits of pumpkin seeds are, they are antioxidant support due to highly source of vitamin E and in the form of Alpha-tocopherol, gamma-tocopherol, delta-tocopherol, alpha-tocomonoenol and gamma-tocomonoenol. Antioxidant phytonutrients are like lignans pinoresinol, medioresinol, and lariciresinol are found in pumpkin seeds. "Dried pumpkin seeds contain some trace elements as zinc (Zn), essential amino acids, minerals and fatty acids which are useful nutrients and it is essential for human health benefits." It is analysis and said by Glew, R. H., Glew, R. S., et al (2006).

Chia seeds (*Salvia hispanica*), originate in Central America, or related golden chia (*Salvia columbariae*) native in southwestern United States. It is really having lots of nutrition in small comprise amount of calories. This seeds is also known as powerhouse of nutrients and having amazing functional food. It is rich in omega fatty acids (both omega 3 and omega 6), dietary fibers, calcium, antioxidants, iron, potassium and as well as protein. Health benefits of chia seeds are aids in reducing inflammation, promotes proper digestion,

balances blood sugar levels, aids in weight-loss, balances cholesterol levels, supports healthy bones, lowers cardiovascular disease risks and enhances detoxification. The use of interbreeding and genome modified of the chia seeds compounds, improved the technologies to obtain better nutraceutical attributes for food industry. Chia can be cultivated as new golden and super seeds with multiple benefits for human health. It is describe by Orona-Tamayo, D., et.al (2017)

Sunflower seeds (*Helianthus annuus*) are gift of sunflower plant and originated in Mexico and Peru, and they are one of the first plants to at any time be present cultivated in the United States. Sunflower seeds help maintain healthy cholesterol levels and act as a careful antioxidant to prevent cancer. It contain plant compound and nutrients such as monounsaturated fats, vitamin E and magnesium help in reducing inflammation, heart disease, blood sugar and type 2 diabetes. It content magnesium which is in help in proper functioning of the skeletal and muscular system. Rich in selenium, it helps in proper thyroid function. "Sunflower seeds are therapeutic potential and credited to the presence of phytosterols, unsaturated fatty acids, proteins, variety of vitamins and minerals." Therapeutic use of sunflower seeds in multiple potential role in chronic inflammatory conditions, bacterial and fungal infections, cardiovascular diseases, skin diseases and even cancers. It is study by Nandha, R., Singh, H., et al (2014).

Almonds (*Prunus dulcis*) are an ancient food that have been known and written about in historical texts, including the Bible. It was originated in regions in western Asia and North Africa. Almond nuts are rich sources of vitamins, and minerals and packed full of health promoting phytochemicals. Almonds are highly nutritious and healthy fats. It is rich in antioxidant, vitamins and minerals. It is also contain monounsaturated fats, fibres and protein. It helps prevent from harmful oxidation of LDL cholesterol. It significantly increased the amount of antioxidants in the bloodstream, reduced blood pressure, and

improved blood flow. “Almonds have their own health benefits.” And almond nuts as “heart-health”. Several health benefits such as antioxidants, hypocholesterolemic, cardio protective, anticancer, anti-inflammation, and anti-diabetic and among others functional properties. It is good source of essential minerals. It is describe by Vadivel, V., Kunyanga, et al (2014).

**Objective**

- ❖ To standardize and develop the upma using super seeds (pumpkin, chia, sunflower and almond).
- ❖ Analyse the nutritional value of both product and compare.

**2. MATERIALS AND METHODS**

The experiment was carried out in Research Laboratory of Department of Food Science and Nutrition, School for Home Science, BBAU, Lucknow. The required sample for developed product are presented in Fig 1. and Fig 2.

Allow both the products to cool down and stored in air tight containers untill evaluation.

During packaging no any preservative are added and both the products is separately packed in 50 gm of pouches and sealed.

Accurate information of Ingredients in grams is mention above Fig 1. and Fig 2.

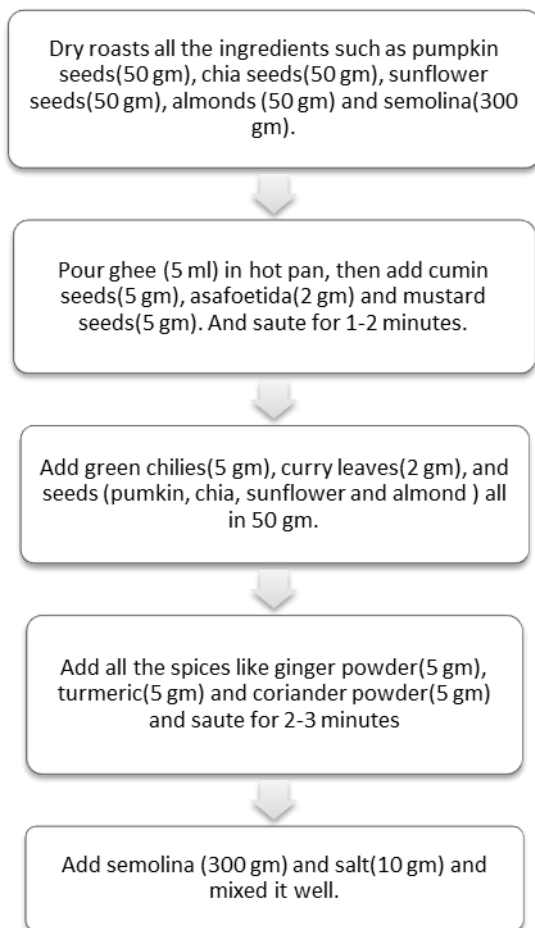


Fig 1. Preparation of Super Seeds Upma (Ready to eat) B1.

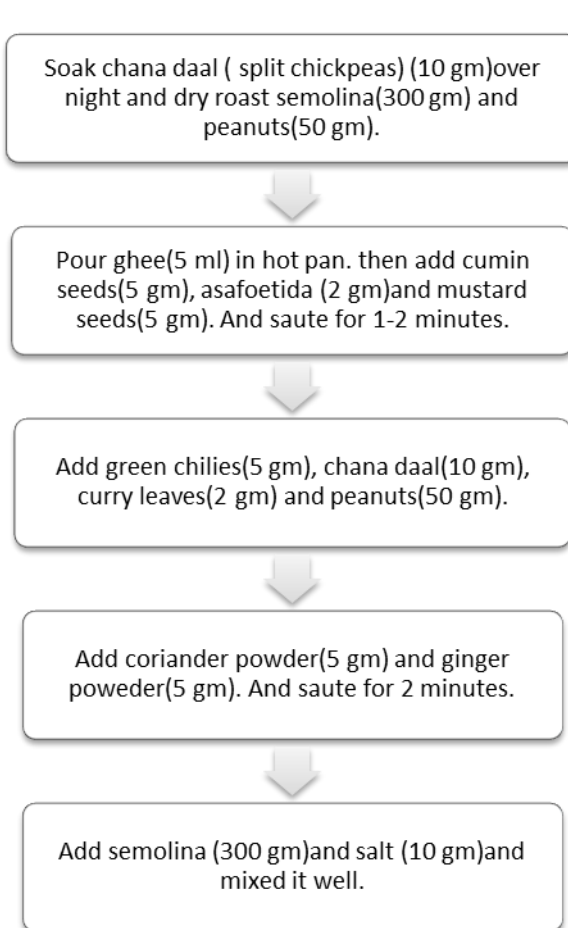


Fig 2. Preparation of common or Simple upma (Ready to eat) B2.

### Nutritional analysis

The test was experimentally analysis in RFRAC (Regional Food Research Analysis Centre) Lucknow.

Determination of ash content: Weigh accurately about 5 gm of the prepared sample in a Tared, clean and dry silica dish difference. Ignite the material in the dish with the flame of a suitable burner for about one hour. Complete the ignition by keeping in, a muffle furnace at 550<sup>0</sup>C until grey ash results. Cool in desiccators and weigh. Record the observation.

Calculation:

Total ash content (on dry basis), percentage by mass =  $(M_2 - M) \times 100 / M_1 - M$

M<sub>2</sub> : Mass in gm of the crucible with the ash

M : Mass in gm of the empty crucible

M<sub>1</sub> : Mass in g of the dish with the material taken for the test.

The carbohydrate content was determined by SP:18 test method.

Calculation:

Carbohydrate percentage = 100 - (% Moisture content + %Fat content + % Ash content + % Protein content)

Protein content was determined by Automated Biokjgel (Protein estimation Machine) (IS: 7219:1973 RA 2005). Weigh 0.5 to 1.000 gm test portion into, digestion tube. Add 30 gm potassium sulphate. 0.5 gm anhydrous cupric sulphate Add 10 ml Concentrated H<sub>2</sub>SO<sub>4</sub>.

**Digestion:** Place the tube with-rack in digestion unit and lock the tube with bioscrub fume neutralizer. Select the programme 01 and click to start. Adjust the temperature 250<sup>0</sup>C - 10 min, 300<sup>0</sup>C - 10 min , 350<sup>0</sup>C - 10 min , 420<sup>0</sup>C - 75 min. After Completion of digestion, cool the tube at room temperature.

**Automatic Distillation :** Place the tube into automatic digestion unit add 40% NaOH 40 ml in tube and 4% Boric acid 25 ml in receiver by machine. Select the programme 01 and distillation will complete in 9 minutes.

**Titration (Manually):** Remove the receiver flask add the mix indicator 2-3 drop and titrate

with 0.1 N HCl /0.1 N H<sub>2</sub>SO<sub>4</sub> end point shows pink colour.

It is proceed by kjeldahl's method. Take 2gm of sample in a kjeldahl's flask. Add 1-2gm of catalyst mixture. Now keep the flask in protein digester. In this digester chamber, add 5.8ml hydrogen peroxide and 12ml concentrated sulphuric acid. Heat till mixture boils briskly at moderate rate at temperature of 420<sup>0</sup>C and colour changes to pale blue. Transfer the content to 100ml flask and place it automatic protein distillation unit. It has mixture of 35% NaOH, 25ml H<sub>2</sub>O and 4% boric acid. When flask is placed under the condenser of the distillation unit, nitrogen ids obtained as small droplets another conical flask which is collected. Titrate it with 0.2N HCL till faint pink colour is appeared, using methyl red as indicator. Note down the titration value.

Calculation:

$$\text{Protein content} = \frac{\text{titration value} \times \text{normality of HCL} \times 6.25 \times 2.809 \times 100}{\text{Sample weight} \times 0.2 \times 1000}$$

Crude fibre was determined by gravimetrically after chemical digestion and solubilization of other materials present. The fiber residue weight is then corrected for ash content after ignition IS: 1155: 1968.

% Crude Fiber (dry basis) =  $\frac{\text{Dry Residue Wt. (g)} - \text{Ignited Residue Wt. (g)} - \text{Blank Wt. Loss (g)}}{\text{Sample Wt. (g)} \times \text{Sample Moisture, (\%)}} \times 100 \times 100$

Fat was determined by Soxhlet Extration apparatus (IS:12711:1989:RA 2005). Weigh accurately about 5 to 10 g of the dried material sufficient to give about 1.0 g of fat in the suitable thimble and dry for 2 hours at 100 ± 5<sup>0</sup>C. Place the thimble in the Soxhlet extraction apparatus and extract with the solvent for about 16 hours. Dry the extract contained in the Soxhlet flask, the empty mass of which has been previously determined by taring at 95<sup>0</sup> to 100<sup>0</sup> C for an hour. Cool in desiccators and weigh. Record the weigh.

Calculation:

$$\text{Fat content by mass} = \frac{100 \times (M_1 - M_2)}{M}$$

M<sub>1</sub> - Mass in gm of the flower flask with the extracted fat.

M<sub>2</sub> - Mass in gm of the empty Flower flask clean and dry.

M - Mass in gm of the material taken for the test.

Calcium, iron, magnesium and zinc were determined by standard method using Atomic Absorption Spectrometry (AAS).

Test portions are dried and then ashed at 450°C under a gradual increase (about 50°C/hr) in temperature, 6 N HCl (1+1) is added and the solution is evaporated to dryness. The residue is dissolved in 0.1N HNO<sub>3</sub> and the analytes are determined. Reagents: (a) Water – redistilled or deionized. (b) Hydrochloric acid A.R (6N) – Dilute 500 ml HCl to 1 litre with water (c) Nitric Acid A.R 0.1M – dilute 7 ml conc. acid to 1 litre. (d) Nitric acid concentrated (Sp. Grade 1.40) (e) Standard solutions of calcium,iron, magnesium and zinc prepared as 1mg / ml. Dissolve 1.000 gm calcium/iron/magnesium/ zinc in 14 ml water + 7 ml conc HNO<sub>3</sub> in 1 litre volumetric flask and dilute to volume with water. Working Standard solution – For graphite furnace analysis dilute standard solutions with 0.1 M HNO<sub>3</sub> to a range of standards that cover the linear range of the elements to be determined. For Flame analysis dilute standard solutions with 0. 1 M HNO<sub>3</sub> to

a range of standards that covers the concentration of the elements to be determined. Moisture content of the sample was determined by standard method described as

$$\text{Moisture percent by mass} = \frac{100 \times (M_1 - M_2)}{M_1 - M}$$

M<sub>1</sub> - Mass in gm, of the dish with the material before drying.

M<sub>2</sub> - Mass in gm of the dish with the material after drying.

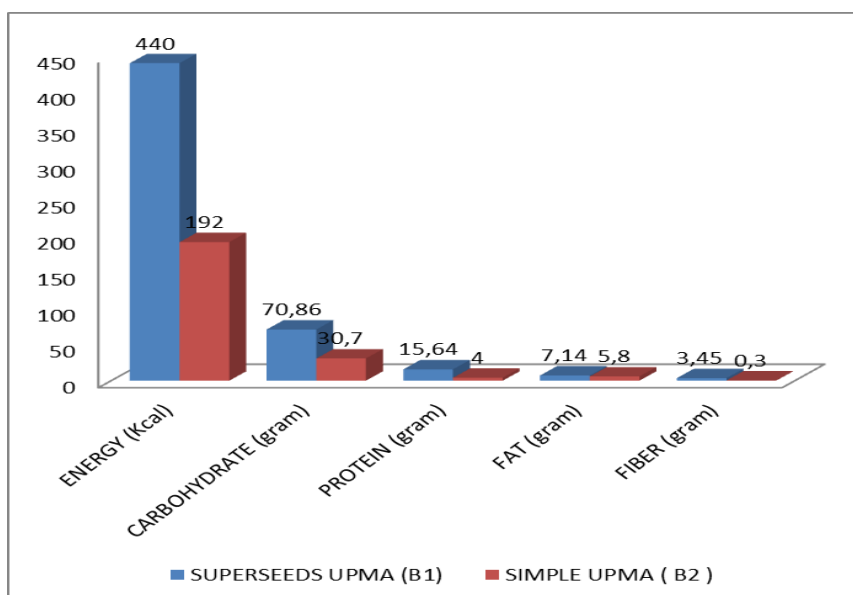
M - Mass in gm of the empty dish.

### 3. RESULTS AND DISCUSSION

The nutritive value of both super seeds upma and simple upma shown in the result are as below:

**Table 1: Nutritional value of super seeds upma (B1) and simple upma (B2) as per 100 gram (Proximate analysis)**

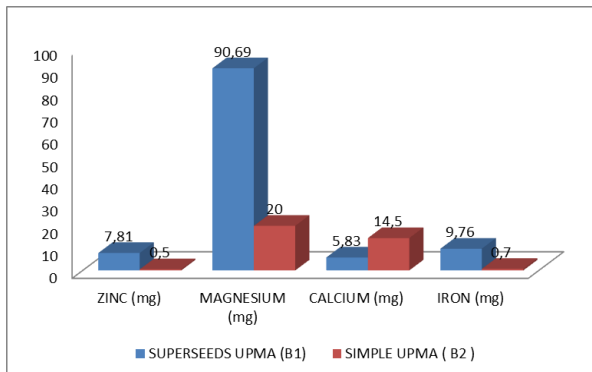
| Proximate Analysis  | Super seeds Upma (B1) | Simple Upma(B2) |
|---------------------|-----------------------|-----------------|
| Energy (Kcal)       | 440                   | 192             |
| Carbohydrate (gram) | 70.86                 | 30.7            |
| Protein (gram)      | 15.64                 | 4               |
| Fat (gram)          | 7.14                  | 5.8             |
| Fiber (gram)        | 3.45                  | 0.3             |



**Fig 1: Graphical representation of nutrition value ( Energy, carbohydrate, protein, fat and fiber) of both B1 & B2 and differences**

**Table 2: Nutritional content in super seeds upma (B1) and simple upma (B2) as per 100 gram (Mineral analysis)**

| Minerals Analysis | Super seeds Upma (B1) | Simple Upma (B2) |
|-------------------|-----------------------|------------------|
| Zinc (mg)         | 7.81                  | 0.5              |
| Magnesium(mg)     | 90.69                 | 20               |
| Calcium (mg)      | 583                   | 14.5             |
| Iron (mg)         | 9.76                  | 0.7              |

**Fig 2: Graphical representation of nutrition value (Zinc, magnesium, calcium and iron) and differences of both B1 & B2**

Both the graphs are showing, comparison between both the upma B1 and B2. There is no any T1,T2 & T3 products during experiments because experiment is based on enrich of super seeds (pumpkin, chia, sunflower and almonds) in upma and comparison the nutrients of both the products. One is upma with super seeds (B1) and another is without super seeds upma (B2).

#### 4. CONCLUSIONS

Developed the product, with simple form of upma adding super seeds and converted into healthy and therapeutic diet as compared to simple form of upma which is origin and available in the market and the concept of getting micronutrient rich product. Rava upma with superseeds contains roasted semolina, curry leaves, green chillies, mustard seeds, split chickpeas, peanuts, pumpkin seeds, chia seeds, sunflower seeds and almonds which is contain rich source of fiber, vitamins, minerals, omega fats, protein etc. As comparing with simple Rava upma and super seeds content upma which is highly enhance rich source of zinc,

magnesium, calcium, iron and fatty acids. It can be consumed by all the age group because it is work as therapeutic diet for their nutrition and fulfilling the body requirement. Ready to eat upma can stored easily in dry and normal palace and there is no additional required for any more cooking. Containing of super seeds which is itself powerhouse and full of complete nutrients package. And the way of packaging process to increase the shelf life of product. So people can easily store, carry and consume.

#### 5. ACKNOWLEDGEMENT

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#### 6. REFERENCES

- [1]. Shaivya, M., & Sunita, M. Nutritional analysis of value-added product by using pearl millet, quinoa and prepare ready-to-use upma mixes.
- [2]. Glew, R. H., Glew, R. S., Chuang, L. T., Huang, Y. S., Millson, M., Constans, D., & Vanderjagt, D. J. (2006). Amino acid, mineral and fatty acid content of pumpkin seeds (*Cucurbita* spp) and *Cyperus esculentus* nuts in the Republic of Niger. *Plant foods for human nutrition*, 61(2), 49-54.
- [3]. Lestari, B., & Meiyanto, E. (2018). A Review: The Emerging Nutraceutical Potential of Pumpkin Seeds. *Indonesian Journal of Cancer Chemoprevention*, 9(2), 92-101.
- [4]. Ullah, R., Nadeem, M., Khalique, A., Imran, M., Mehmood, S., Javid, A., & Hussain, J. (2016). Nutritional and therapeutic perspectives of Chia (*Salvia hispanica* L.): a review. *Journal of food science and technology*, 53(4), 1750-1758.
- [5]. Orón-Tamayo, D., Valverde, M. E., & Paredes-López, O. (2017). Chia—The New Golden Seed for the 21st Century: Nutraceutical Properties and Technological Uses. In *Sustainable protein sources* (pp. 265-281). Academic Press.
- [6]. Nandha, R., Singh, H., Garg, K., & Rani, S. (2014). Therapeutic potential of sunflower seeds: An overview. *International Journal of Research and Development in Pharmacy and Life Sciences*, 3(3), 967-972.

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- [7]. **At the forefront** of the 2015-2020 *Dietary Guidelines for Americans* <http://www.whfoods.com/genpage.php?tname=foodspice&dbid=82>
- [8]. Applequist WL, Avula B, Schaneberg BT et al. Comparative fatty acid content of seeds of four Cucurbita species grown in a common (shared) garden. *Journal of Food Composition and Analysis*, Volume 19, Issues 6—7, September—November 2006, Pages 606-611.
- [9]. Vadivel, V., Kuyanga, C. N., & Biesalski, H. K. (2012). Health benefits of nut consumption with special reference to body weight control. *Nutrition*, 28(11-12), 1089-1097.