



FORMULATION AND NUTRITIONAL EVALUATION OF COOKIES SUPPLEMENTED WITH PUMPKIN SEED FLOUR.

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INTRODUCTION:

In recent years, seeds and nuts have received growing attention due to high nutraceutical and therapeutic value of their bioactive components. This is no exception to pumpkin seeds. Pumpkin with oily seeds belongs to the *Cucurbitaceae* family. Although there are various varieties grown throughout the world, the most commercially important species are *Cucurbita pepo* (most common), *C. maxima*, *C. moschata*, *C. mixta*, and *C. stilbo*. Pumpkins are cultivated worldwide for many purposes varying from commercial, decorative to agricultural uses. The popularity of pumpkin in many systems of traditional medication has led researchers turning their attention to this crop. While pumpkin seeds are largely regarded as agro-industrial waste, they serve as powerhouses of nutrients with interesting nutraceutical properties.



Pumpkin Plant with Pumpkin Fruit

Pharmaceutical Name: Semen Cucurbitae moschatae

Common Name: Pumpkin seed and husks.

Botanical Name: Cucurbita moschata Duch.

Family: Cucurbitaceae

Properties Used & Method for preparation: After the pumpkin ripen in summer and autumn, its seeds are removed, cleaned in water, dried in the sun and crushed into powder. Fresh seeds are also used and whole available, they are a better choice.

Properties and taste: Sweet and Neutral.

A Pumpkin seed are also known in North America as a peptia, is edible seed of a Pumpkin or certain other cultivation of squash. The seeds are typically flat and asymmetrically oval, have a white outer husk, and are light green in colour after the husk is removed. Some pumpkin cultivators are huskles, and are grown only for their edible seed. The seeds are nutrient and calorie rich with an especially high content of fat and numerous Micronutrients. Pumpkin seed can refer either to the hulled kernel or unhulled whole seed, and most commonly refers to the roasted end product used as a snack.



Pumpkin seeds before Shelling, Roasting and Salting



Pumpkin seeds after Shelling, Roasting and Salting

HISTORY OF COOKIES:

In America, a cookies id described as a thin, sweet, usually small cake. By definition a cookie can be any variety of hand-held, flour- based sweet cake, either crisp or soft. Each country has its own word for “cookies”. We know as cookies are called biscuits in England and Australia, and in Spain they are galletas. Germans call them keks or Plzchen for Christmas cookies, and in Italy there are several names to identify various forms of cookies including amaretti and biscotti, and so on. Te name cookie is derived from dutch word koekie, meaning small or little cake. Biscuits comes from latin word bis coctum, which means “twice baked”.

According to culinary historian, the first historic record of cookies was their use as test cakes. A small amount of cakes batter was baked to test the oven temperature. The history of biscuits can be traced back to a recipe created by the Roman Chef in which a thick paste of fine wheat flour was boiled and spread out on a plate. When it had dried and hardened it was cut up and then fried until crisp, then severed with honey and pepper.

As people started to explore the globe, cookies became the ideal travelling food since they stayed fresh for longer periods. The seafaring age thus, witnessed the boon od cookies when these were sealed in airtight containers to last for months at a time.

Making good cookies is quite an art and history bears testimony to that, During the 17th centuries in Europe, baking as a carefully controlled profession managed through a series of guilds or professional associations. To become a cookie baker one had to complete years of apprenticeship working through the rank of apprentice, journeyman and finally master baker.

Not only this, the amount and quality of cookies baked were also carefully monitored.

The English, Scottish and Dutch immigrants originally brought the first cookies to the United States and they were called teacakes. They were often flavoured with nothing more than the finest butter, sometimes with addition of a few drops of rose water.

As the time has passed and despite more varieties becoming available, the essential ingredients of cookies haven't changed like soft wheat flour sugar, and fats such as butter and oil. Today, though they are known by different names the world over, the people agree on one thing nothing beats cookies.

SPRING-uhr-lee, have been traditional Christmas Cookies at Australia and Bavaria for centuries. They are made from a simple egg, flour and sugar dough and are usually rectangular shape. These cookies are made with a leavening agent called ammonium carbonate and baking ammonia. The inspiration for fortune cookies dates back to the 12th and 13th Centuries, when Chinese soldiers slipped rice paper message into moon cake to help coordinate their defence against Mongolian invaders.

Nutritional composition of Pumpkin seeds:

Principal fatty acids in pumpkin seed oil (PSO) are linoleic, oleic, stearic and palmitic that cover more than 95% of total fatty acids and about 75% of which are unsaturated fatty acids (UFAs). Small concentrations of arachidic and linolenic acid have also been reported. The unsaturated fatty acids have been extensively studied due to their protective effect against cardiovascular diseases. They are important for healthy growth and development of brain and nervous system respectively, also they are reported to have health benefits in the amelioration of coronary heart diseases, hypertension and arthritis not to mention inflammation, autoimmune-related disorders and cancer. Moreover, only two fatty acids are known to be essential for humans, linoleic and alpha-linolenic acids, because they cannot be synthesized in the human body and must, therefore, be supplied through diet.

Pumpkin seed is high in crude protein, roughly 35%, and this translates to a significant and different amount of Amino Acids. Amino acids play important roles both as building units of proteins and as intermediates in metabolism. The dietary supply of adequate quantity and quality essential amino acids is equally important for physiological functions in human body. Studies show that protein isolates from pumpkin seed resemble those of soybean with high values of bioavailability of amino acids. and Rezig clarified that the globulin's structure of pumpkin seeds' protein is analogous to that of legume seeds. This poses an important note because this nutritional similarity may provide an approval of the pumpkin seed protein as a reliable ingredient in formulating nutritious food recipes, hence ameliorating the damaging effects linked to protein malnutrition facing the susceptible communities. Furthermore, protein isolates of pumpkin seeds have promising antioxidative and chelating properties. The pumpkin seeds possess a significant amount of valuable minerals as well. The seeds are rich in potassium (K) and relatively lower in sodium (Na), high in calcium (Ca), manganese (Mn), phosphorus (P), and magnesium (Mg). Pumpkin seeds are also good source of trace elements such as zinc (Zn), iron (Fe), not to mention copper (Cu). Minerals such as Zn, Cu, Mn, and Fe possess antioxidant potential hence serve as cofactors of vital antioxidant-dependant biocatalyst. Similarly, the low sodium and high potassium contents in the pumpkin seeds translate to a significant clinical implication for improving cardiovascular health. Zinc is essential in male reproduction, structural proteins and cellular protection. These mineral concentrations may therefore, make pumpkin seed a useful ingredient for food fortification, at least for bakery products.

Nutritional value per 100g	
Energy	2.401kJ
Carbohydrates	14.71g
Sugars	1.29g
Dietary Fibers	6.5g
Fat	49.05g
Protein	29.84g
Vitamins	Quantity
Riboflavin (B2)	0.15mg
Niacin (B3)	4.43mg
Pantothenicacid (B5)	0.57mg
Sodium (mg)	1.35mg
Potassium (mg)	2.56mg
Iron (mg)	6.02mg
Calcium (mg)	4.00mg
Zinc (mg)	18.78mg
Phosphorus (mg)	0.74mg
Copper (mg)	0.31mg

Amino acid (g/100 g) profiles in pumpkin seeds.

<i>Amino acid in g/100 g</i>	<i>Nutritional Value</i>
Alanine	0.74 — 6.9
Arginine	1.70 — 23.10
Aspartic acid	2.05 — 2.70
Cystine	0.40 — 6.40
Glutamic acid	3.50 — 3.73
Glycine	1.50 — 6.80
Histidine	0.80 — 3.00
Isoleucine	0.81 — 4.90
Leucine	2.30 — 12.20
Lysine	1.50 — 4.00
Methionine	0.30 — 2.10
Phenylalanine	1.30 — 8.20
Proline	1.70 — 5.00
Serine	0.64 — 7.40
Threonine	0.83 — 3.40
Tryptophan	0.60
Tyrosine	0.83 — 4.30
Valine	1.36 — 6.70

Pharmacology Activity of Pumpkin Seeds:

- **Antioxidant Activity**
- **Anticancer Activity**
- **Anti-Inflammatory Activity**
- **Anti-Obesity**
- **Anti-Diabetes**
- **Anti-Microbial Activity**
- **Anti-Malarial Activity**
- **Analgesic Activity ➤ Diuretic Activity**

Phytonutrients in Pumpkin Seeds:

Phytosterol, Saponins, Phenolics and soluble Fibers are present in pumpkin seeds. Phytosterols have the Hormone mocking property. They are also used in hypertrophic prostate disease in which they stop testosterone to convert into di-hydroxytestosterone. Pumpkin seeds also have carotenoids which are very beneficial for eye diseases, heart diseases and cancer. In addition Pumpkin seeds contain phenolic acids hydroxybenzoic, caffeic, coumaric, ferulic, sinapic, protocatechuic, vanillic, and syringic acid. Lignans pinoresinol, medioresinol and lariciresinol. Some supportive phytosterols such as beta-sitosterol, sitostanol and avenasterol are also present in pumpkin seeds. Minerals like phosphorous, magnesium, manganese and copper are present in rich amount. Others minerals like zinc and iron are also present. Pumpkin seeds are very good source of protein. Widely covered nutrients in pumpkin seeds are phytoestrogens, topocpherol and fatty acids. All these nutrients have ample amount of health benefits on the body.

PLAN OF WORK:

Introduction

The enrichment of food products is a consequential idea to treat explicit nutritional insufficiencies. Food enrichment also elevates healthiness in humanity and avert chronic diseases. The identification and evolution of fortifying agents that would guarantee good product quality and maximize the bioavailability of essential nutrients create technical and scientific challenges for the nutritionists. Significant consideration has been given to enrich wheat flour products with high protein oilseed flour and for this, baked products are considered best due to worldwide consumption. Pumpkin belongs to the family *Cucurbitaceae*. It is a plant that has been traditionally used as a medicine in developing countries and obtained revival of use in the United States and Europe. Edible parts of the plant include the flowers, fruit, leaves, root and seeds. Pumpkin seeds are loaded with nutrients and medicinal properties due to which these seeds are used for remedial purposes all over the world. Pumpkin seeds are often eaten as snack after roasting and salting in Arab countries. The addition of these seeds can be considered a good substitute for nutritional enhancement of food Products. Pumpkin seeds are rich natural source of protein with the range of 25 to 37% and oil with the range of 37 to 45% and are renowned as valuable oil seeds loaded with protein for human consumption. These seeds are also a good source of Fibers. They contain 31.48 % crude Fiber. Moreover, pumpkin seeds are loaded with amino acids like tryptophan, lysine, methionine, tyrosine and also rich in iron, therefore these seeds are beneficial to adolescents to cure anaemia caused due to iron deficiency. Pumpkin seeds can be used as whole or in the form of flour to supplement the food products. Considering, the nutritional deficiencies and health problems among people in developing countries, the current study is designed to develop widely consumed food product i.e. cookies with incorporation of pumpkin seeds for nutritional enhancement and to evaluate the chemical composition and sensory parameters of supplemented cookies.

Material and Methods

Procurement of pumpkin seeds and preparation of flour

Pumpkin seeds were procured from pumpkin fruit. seeds were collected from ripened fruit then were dried in sun and after drying the shells were removed of the seeds. Wheat flour and other ingredients like Dates and dried figs, Ghee were bought from local market of Ahemdagar.

Preparation of flour:**Roasted flour:**

Selection of Pumpkin seeds



Cleaning of Pumpkin seeds



Sun Drying

Roasted for for 15-20 mins at 75⁰ C

Powdered



Flour

Ingredients and method used tp prepare cookies:

Product	Control sample	Supplemented sample	Method
COOKIES	Refined wheat flour (120 g)	Refined wheat flour (66 g)	Fat was rubbed on a clean surface till it become light.
	Dates and Dried figs (60 g)	Dates and Dried figs (60 g)	Sweetner was added to fat and rubbed again.
	Ghee (70 g)	Ghee (70 g)	Flour was sifted and baking powder was added gradually.
	Baking powder (1.25 g)	Baking powder (1.25 g)	Smooth dough was made by using water.
		Roasted Pumpkin Flour (54 g)	Dough was rolled to ¼ inch thickness.
			Round shapes were cut and baked at 150 ⁰ C for 20 min.

The formulation of cookies type of biscuits:

Three types of cookies by modification of standard formulation were confectioned, with partial substitution of the starch sweet by the pumpkin seed flour (PSF) and flour in 10%. The cookies produced were named A and B respectively. A basic formulation was prepared without the flour addition, called pattern (P). They were roasted for 7-10 minutes and three minutes, respectively, to obtain the golden colour. Afterwards the seeds were crushed in a blender and sieved for further use in the formulation. The dry ingredients were mixed and margarine gradually added until obtaining a homogeneous mass. Then, the cookies were molded with the aid of shapes and baked at a moderate temperature of 150-180°C oven for 15 minutes. The cookies were cooled to room temperature for the physical, physicochemical and chemical analysis.

Physical characterization of the cookies:

To determine weight, thickness, length and width before and after cooking. The cookies were weighed in digital balance. Analyzes were conducted with ten cookies from the same batch, randomly sampled, after they were cooled to room temperature. The cookies thickness, length and width were determined by a millimeter scale ruler. The specific volume was determined by the displacement method of millet seeds, followed by three repetitions for each formulation. The specific volume was calculated according to equation 1 below:

$$\text{Specific volume (cm}^3\text{/g)} = \text{Cookie volume (cm}^3\text{)}/\text{cookie weight (g)}$$

$$\text{Cookie volume} = \text{Volume without cookie (cm}^3\text{)} - \text{Volume with cookie}$$

From the weight of pre-cooking and post-cooking cookies the product yield was also calculated (after cooking), as per equation 2:

$$\left(\frac{\text{Weight after cooking}}{\text{Weight before cooking}} \right) \times 100$$

and the thermal factor according to equation 3

$$\frac{\text{Weight after cooking}}{\text{Weight before cooking}}$$

Cookies chemical and physicochemical analysis

The chemical and physicochemical characteristics were determined by the following procedures: moisture at 105 °C until constant weight, ash by incineration at 550 °C; lipids by the solvent extraction method (Soxhlet method). The moisture, titratable acidity and pH determination analysis were performed in triplicate, and the remaining ones, in duplicate.



Weighing Before Baking



Weight after Baking

Physical assessments average of cookies preparation:

Cookies

Determination	Control	A	B
Weight before cooking (g) After Cooking	5.91 ⁰ 5.4 ⁰	6.07 ⁰ 5.75 ⁰	7.02 ⁰ 6.74 ⁰
Height before cooking(cm) After cooking	0.63 ⁰ 0.69 ⁰	0.66 ⁰ 0.79 ⁰	0.73 ⁰ 0.88 ⁰
Length before cooking(cm) After Cooking	2.71 ⁰ 2.66 ⁰	2.68 ⁰ 2.69 ⁰	2.76 ⁰ 2.83 ⁰
Width before cooking (cm) After Cooking	2.71 ⁰ 2.63 ⁰	2.67 ⁰ 2.69 ⁰	2.73 ⁰ 2.79 ⁰
Thermal Factor Yield (°C)	0.91 ⁰ 91.4 ⁰	0.93 ⁰ 94.7 ⁰	0.96 ⁰ 96.3 ⁰

Sensory Analysis

Tasters profile

Figure 4 states that 74.19% of the evaluators are female and 25.80% male, predominantly adult, aged between 18-25 years. The dominant level of education was higher education.

Regarding the frequency of food taken the attributes “never”, “daily”, “weekly” and “monthly” were considered. In this group, the weekly consumption frequency prevailed for both the cookie and the other industrial products surveyed (soda and cake).

Therefore, the results indicate that these products are often present in the tasters’ diet. However, for the fruit consumption the frequency of daily consumption prevailed.



FORMULATED COOKIES WITH PUMPKIN FLOUR

Nutrients Present in Cookies:

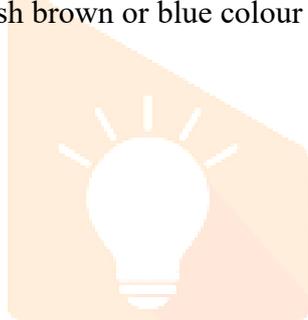
Biuret test:

Take 3ml test solution, add 4% NaOH and few drops of 1% CuSO₄.
Development of Violet or Pink Colour determines the Presence of Protein.

**Million Test:**

Take 3ml test solution, add 5ml Million reagent.

Development of Reddish to Reddish brown or blue colour indicates the presence of Protein.

**Xanthoprotetic Test:**

Test solution is treated with HNO_3 which on boiling produces yellow colour.

**Sakaguchi's Test:**

2ml protein sol + 1ml 10% NaOH +5 drops of Alpha Naphthol in alcohol +10 drops fresh bromine water.

Intense Red colour Indicates the presence of Arginine and Valine.

Aldehyde Test:

2ml O.S + 5 drops of Million's Reagent+ 5 drops of Formalin mix+2ml Con.H₂SO₄ from side of the test tube. Violet Ring at the Junction Indicates the presence of Tryptophan.

Million's test:

2ml O. S+2ml of Million's reagent, boil cool, add few drops of NaNO₂ sol. Brick red colour determines the Tyrosine id present.

Sodium Nitroprusside Test:

2ml O. S+1ml dil. NaOH+ 1ml Sodium Nitroprusside sol.
Presence of Red colour indicates the Cystein and Methionin are present.

Quality Control Parameters of Cookies:**Moisture Content:**

Moisture content should be less than 1.8%, for the longer shelf life of the cookies.

Extracted Fat:

It should is minimum 12.2%.
It indicates the Integrity of Formulation.

Acidity of Extracted Fat:

Add 50ml neutralizes alcohol to the extracted fat. Put the sample in Flask and titrate against 0.05N NaOH.Weight of sample should be less than 1.3%.

Ash Value:

Take the sample Burn it keep it in muffle furnace it should be Not more than 1.6%.
It indicates the total contamination.

Hardness:

Cookies should not be too hard and too soggy to eat.

Crunchiness:

Cookies should be Crunchy to eat.

Cracking:

Cookies should not be cracked while baking.

Aroma:

Cookies should leave a sweet and Plesant Aroma.

CONCLUSION

From the above results, it was observed that pumpkin seed flour supplementation whether in raw or roasted form in worldwide favourite bakery product i.e cookies is highly acceptable than the control samples. Supplementation of pumpkin seed flour upto 30% level is maximum acceptable. Protein, fat, ash, iron, zinc, total carotenoid content, antioxidant activity was increased in the cookies supplemented with raw or roasted pumpkin seed flour than the control samples. Peroxide value was lower in supplemented cookies. Thus, it can be concluded that the consumption of pumpkin seed flour supplemented products should be encouraged in routine diet so as to improve the nutritional status of the individuals. Value added products using raw or roasted pumpkin seed flour can be supplemented to children and women to eradicate malnutrition. Cookies can also become a part of the supplementary feeding programmes.

FUTURE-SCOPE :-

- According to research and study there is a bright future for a gluten free and Food with lots of Nutrients food products industry in upcoming days.
- According to market comprehensive study and investigation, researchers found that, now a days, peoples like to eat more and more Nutritious food products.
- This is the age of Nutritious and healthy food products. People prefer medicinal plants than laboratory made artificial chemicals or synthetic products.
- The present generation, being studious, prefers the right product by comparative study of products.
- Currently, using ayurvedic food products and herbal food products is a new trend.
- Now a days Ayurveda is becoming popular for its high benefits.
- Different global companies are making different types of Nutritious food in market.
- According to research food industry is leading in this competition.
- Looking at the graph over the last five years, there has been a significant increase in the production and sales of nutritious food products rather than synthetic food products.
- Many new companies like “Herbalife Nutrition”, “Amway”, “Natureshine” Products’, “Nutrillite” & “Pure Farms” etc., are entering the market with their new products. - Also, the current research has revealed many new formulas and ingredients for nutritious powders and they are very useful to use as a food product.
- Therefore, from all this research and the information obtained, it is clear that, the time to come is very golden for nutritious products and for who make products.

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