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# Effect of processing on nutritional composition of pumpkin and development of a value added product

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**Abstract**
Pumpkin (Cucurbitaceae) due to its unusual and extravagant characters is considered as the marvels of vegetable world. Among Cucurbitaceae vegetable, pumpkin has been appreciated for high nutritive value. Pumpkin fruit are sweet when ripe with yellow or orange flesh rich in β-carotene, a precursor of vitamin A. It has many health benefits and prevents chronic diseases like atherosclerosis, cancer and diabetes. Pumpkin can profitably be converted into a variety of value added product such as jam, jelly, candy, puree, sauce, chutney, pickle, raita and halva. In the present study an effort has been made to analyze content of pumpkin in raw and blanched form. The estimation of macronutrients (moisture, ash, fat, protein, fibre, carbohydrate) and micronutrients (beta-carotene, vitamin C, calcium, iron, phosphorus, magnesium, potassium) was carried out using standard techniques. The finding of analysis revealed blanching of pumpkin flesh significantly increased at the level of (p value < 0.05). Further, an effort was made to prepare refined wheat flour *nankhatai* by incorporating blanched pumpkin powder in various proportions (5%, 10%, 15%). *Nankhatai* with 10% pumpkin flesh powder revealed maximum acceptability as per 5 point rating scale. Pumpkin powder could be used to supplement cereal flour in bakery products, soup, instant noodles and pre-mixes. Among the various dishes, the refined wheat flour nankhatai proved to be an excellent product to consume. It contained all the essential nutrients like fibre, protein, beta-carotene, calcium and vitamin C in ample amount as well as, was proved a cost effective product.

**Keywords:** Pumpkin, raw, blanched

## Introduction
The pumpkin plant is a rambling vine that is grown for its familiar orange fruit. Pumpkin is a gourd belongs to cucurbetaceae family and is widely grown vegetable all over the world. The name pumpkin originated from from a greek word pepon which means large melon. French converted the Pepon to Pompon and English adapted the word Pompion. In the satges of development, the American colonists replaced the ion with kin giving rise to Pumpkin (Anon, 2008) [11]. Its family Cucurbitaceae consists of about 90 genera and 750 species (Whitaker and Davis, 1962) [8]. The fruits are large, generally 4–8 kg (9–18 pounds) or more, are yellowish to orange in colour, and vary from oblate through globular to oblong and the large varieties of pumpkin are called winter squash, *Cucurbitaceae. maxima*, weigh 34 kg (75 pounds) or more. Pawar *et al*. (1985) has reported that the pumpkin fruit contains 77.5% edible portion. The edible portion in 'Butternut', 'Golden Nugget' and Queensland Blue' varieties of pumpkin has been 86, 70 and 85%, respectively (wills *et al*, 1987). Pumpkin, throughout the world is known as an edible vegetable as well as incorporated in halva, raita, tikkis etc. In India, Pumpkin is an important crop species for Indian agriculture and is grown extensively throughout the year and the principal ingredient of several culinary vegetables (Vasudeva & Lal, 1943). Cucurbits are very sensitive to low temperatures because growth ceases at 6 to 7°C. The plants require high levels of sunlight and a warm climate (Fuchs and Muller, 2004). Pumpkins and squashes grow best at temperatures of 23-29°C (75°F-85°F) day and 15°C-21°C (60°-70°F) night. The most successful production can be obtain in light sandy-loam soil. They also grow well on clay soils, but harvest is difficult when soils are wet and the fruit often become dirty and difficult to clean (Bavecand Bavec, 1998) [1]. Pumpkin fruits are rich in carotenoids, vitamins, minerals, and dietary fibres (Djutin, 1991). The β-carotene content of pumpkin fruits varies from 1.6 to 45.6 mg/100 g (Danilchenko *et al*, 2000) and 2.8 to 3.4 mg/100 g (Will, 1987) has been reported.

Indian cultivars of pumpkin have 132 to 527 mg/100 g (on dry weight basis) of β-carotene content (Gopalakrishnan *et al*, 1980). Pumpkin have may health benefits such as it may cut injection of diabetes, atherosclerosis prevention, keep eyesight sharp, prevent cancers, boost immunity and mood.

**Objectives:** To estimate nutrient content of fresh and processed pumpkin samples. To formulate the product/s by incorporating pumpkin in dry powder form. To assess the nutritional composition of the formulated product/s.

## Material and Method

The study was carried out in the Department of Home Science, The IIS University, Jaipur, Rajasthan, India for a period of six months. For the present study the pumpkin was procured from the local vegetable vendor of Jaipur, Rajasthan, India as per requirement for the estimation of nutrient content and preparation of value added product.

Before analysis the Pumpkin was weighed and washed thoroughly under running tap water, thereafter it was sliced to make it easy to handle, peeled and seeds were removed with a sharp knife. Spoiled or immature parts were discarded.

**Procedures for nutrient analysis:** The study was undertaken to analyze the nutritional quality of raw and processed pumpkin flesh powder based product. For the formulation of pumpkin flesh powder, the sliced pumpkin was grated and subjected to drying by using microwave at 100ºC, 1.5kg for 80 minutes and further in hot air oven at 180ºC for the period until the constant weight reached. Once the flesh fully dried it was ground finely by using grinder and shifted through a sieve. The powder was packed in airtight container and stored at ambient room temperature.

For the processed pumpkin, the slices of pumpkin were first blanched. Blanching was carried out by immersing the pumpkin flesh for 1 min in boiling water and then immediately into cold water for 10 seconds. Further process was similar as raw pumpkin flesh. Estimation of macronutrients was carried out using standard techniques in triplicates. The recommended methods by Indian Council OF Medical Research (ICMR, 1989) were used for the estimation of the nutrients. The moisture content was determined by drying the flesh in microwave at 100℃ to a constant weight. Crude protein was calculated from the nitrogen content measured by Micro-Kjeldahl method. Fat was estimated as crude ether extract of the dry material and the method used for estimation was Ether - extractive Method using a Soxhlet apparatus. Ash was determined by incinerating the sample at 600 ℃ in a muffle furnace. The method used for estimation of crude fibre was Acid – Alkali method. Total carbohydrate was obtained by subtracting (crude protein + crude fat + ash + crude fibre + moisture) from 100.

The Micronutrients, β-carotene was measured using standard curve of Spectrophotometer Method. Iron was determined using Wong's Method making use of the fact that ferric iron gives a blood red colour with potassium thiocyanate. Titration method was used to determine calcium as calcium is precipitated as oxalate and is titrated with standard potassium permanganate. Magnesium is converted to magnesium pyrophosphate which was estimated gravimetrically using the titration method. The phosphorus content of the sample was estimated using Colorimetric method.

The macronutrients were measured in g/100g, whereas the micronutrients were measured in mg/100g and for beta carotene it was measured in micro g/100 g.

**Product development**

Recipe selected for product development was wheat flour refined nankhatai. Value addition was done by adding blanched pumpkin powder to the recipe which was added in different proportions (5%, 10%, 15%). For assessing the acceptability of formulated/developed wheat flour and pumpkin, 5 point rating scale was used and various sensory attributes assessed were colour, texture, appearance, flavour, taste and overall acceptability. Further nutrient composition of the most acceptable product was also calculated wherein, the values of pumpkin evaluated by the investigator, were taken and for other ingredients, values given by ICMR (1989) were considered. Cost of the refined wheat flour pumpkin flesh nankhatai was calculated according to the market rate of the ingredients, at the time of the study.

**Statistical analysis**

Data obtained was analysed and tested for significance by student's t-test.

## Result

The pumpkin were analyzed for their nutrient components both macronutrients and micronutrients.

**Table 1:** Mean Macronutrient contents of raw and Blanched pumpkin flesh

| Macro nutrients | Raw pumpkin flesh | Blanched pumpkin flesh |
|---|---|---|
| Moisture (g/100g) | 93.50±0.5040$^{b}$ | 93.67±1.446$^{b}$ |
| Protein (g/100g) | 1.316±0.104$^{b}$ | 1.36±0.052$^{b}$ |
| Fat (g/100g) | 0.079±0.054$^{b}$ | 0.021±0.003$^{b}$ |
| Fibre (g/100g) | 0.66±0.052$^{b}$ | 0.75±0.05$^{b}$ |
| Ash (g/100g) | 0.493±0.133$^{b}$ | 0.787±0.611$^{b}$ |
| Carbohydrates (g/100g) | 3.952$^{b}$ | 3.412$^{b}$ |

± Standard Deviation

a=Significant (p value<0.05), b= not significant

Each observation is a mean and standard deviation of three replication.

**Table 2:** Mean Micronutrient content of raw and Blanched pumpkin flesh

| Micronutrients | Raw pumpkin flesh | Blanched pumpkin flesh |
|---|---|---|
| Calcium (mg/100g) | 11.53±0.503$^{b}$ | 10.866±0.8412$^{b}$ |
| Iron (mg/100g) | 0.733±0.057$^{b}$ | 0.77±0.045$^{b}$ |
| Phosphorus(mg/100g) | 29.646±1.335$^{a}$ | 41.466±0.416$^{b}$ |
| Magnesium(mg/100g) | 39.1±1.330$^{a}$ | 10.416±0.160$^{b}$ |
| Beta Carotene(g/100g) | 1156.667±7.3711$^{b}$ | 1163.563±1.397$^{b}$ |
| Potassium(g/100g) | 139.636±0.553$^{b}$ | 141.216±1.065$^{b}$ |
| Vita C(g/100g) | 3±0.3$^{b}$ | 3.1533±0.9383$^{b}$ |

± Standard Deviation

a=Significant (p value<0.05), b= not significant

Each observation is a mean and standard deviation of three replication.

The nutrient analysis of blanched pumpkin flesh was carried out using same standard techniques used for raw pumpkin flesh samples. The estimated values of raw and blanched samples were then compared. T test was used for the comparison of the samples. The findings revealed that all the macronutrients (moisture ranged from 93.50g/100g to 93.67 g/100g, fat 0.733 g/100g to 0.77 g/100g, fibre 0.66 g/100g to 0.75 g/100g, carbohydrate 3.952 g/100g to 3.412 g/100g, protein 1.316 g/100g to 1.36 g/100g, ash 0.49 g/100g to 0.78 g/100g) and micronutrients (beta-carotene 1156.667µg/100g to 1163.563µg/100g, vitamin C 3mg/100g to 3.153 mg/100g,

potassium 139.636 mg/100g to 141.26 mg/100g, iron 0.733 mg/100g to 0.77 mg/100g, calcium 11.53 mg/100g to 10.86 mg/100g 6) are significantly decreased at the level of (p value < 0.05). Whereas, magnesium which ranged from 39.1 mg/100g to 10.416 mg/100g and phosphorus from 29.646 mg/100g to 41.466 mg/100g are significantly increased at the level of (p value < 0.05).

**Table 3:** Macronutrients of Raw and Blanched pumpkin flesh powder

| Macronutrients | Blanched pumpkin powder |
|---|---|
| Moisture (g/100g) | 6.33 |
| Protein(g/100g) | 21.484 |
| Ash content(g/100g) | 12.322 |
| Crude fibre(g/100g) | 11.84 |
| Fat(g/100g) | 0.33 |
| Carbohydrate(g/100g) | 53.90 |

**Table 4:** Micro nutrient composition of Blanched pumpkin flesh powder

| Micronutrients | Blanched pumpkin powder |
|---|---|
| Calcium (mg/100g) | 171.658 |
| Iron (mg/100g) | 12.164 |
| Phosphorus(mg/100g) | 655.071 |
| Magnesium(mg/100g) | 164.549 |
| Beta Carotene(µg/100g) | 18372.827 |
| Potassium(mg/100g) | 2230.900 |
| Vitamin C(mg/100g) | 49.763 |

The dried powder has been determined amazing nutrients composition. Due to the elimination of moisture all the nutrients whether it is macronutrients or micronutrients remarkably rise.

As compared to the 100g pumpkin flesh the nutrient composition of 100g powder are spanking. It is found to be very beneficial to incorporate 2 table spoon of pumpkin powder in any food product.

**Mean sensory Product Development**

The refined wheat flour pumpkin flesh bread was assessed for sensory attributes such as appearance, color, taste, after taste and overall acceptability. The refined wheat flour pumpkin flesh nankhatai was given 4 different codes for sensory evaluation as follows-

WF = 100% refined wheat flour

WFPS1 = 95% refined wheat flour + 5% Blanched pumpkin flesh powder

WFPS2 = 90% whole wheat flour + 10% Blanched pumpkin flesh powder

WFPS3 =85% whole wheat flour + 15% Blanched pumpkin flesh powder

**Table 5:** Mean sensory score of standard pumpkin cookies obtained by five point hedonic scale

| Code | Appearance | Color | Taste | After-Taste | Overall Acceptability | Overall mean Score |
|---|---|---|---|---|---|---|
| C1 | 4.6±0.47 | 4.6±0.47 | 4.3±0.74 | 4.5±0.76 | 4.6±0.47 | 4.56±0.13 |
| C2 | 4.16±1.06 | 4±1.15 | 3.5±0.95 | 3.6±0.94 | 3.8±0.89 | 3.83±0.23 |
| C3 | 4±0 | 4±0 | 4.1±0.37 | 4±0 | 4±0 | 4.03±0.06 |
| C4 | 4±0.81 | 4±0.81 | 3.6±0.47 | 3.6±0.47 | 3.6±0.47 | 3.8±0.16 |

**Table 6:** Cost of product using standard market rates

| Ingredients | Quantity | Standard rate (rs) | Cost of product (rs) | Cost of per product (rs) |
|---|---|---|---|---|
| Refined wheat flour | 100gm | 30/kg | 3 | 0.15 |
| Ghee | 50 mg | 400/kg | 20 | 1 |
| Sugar | 50 gm | 35/kg | 1.75 | 0.08 |
| Pumpkin powder | 10 gm | 15/kg | 0.15 | 7.5 |
| Total | 200 | | 24.9 | 1.24 |

**Discussion**

The influence of the nutrient composition of raw and blanched flesh reveals that blanching has an advantageous effect on the nutrient contents of the pumpkin flesh. Blanching is beneficial in the way it retains the content of the raw pumpkin flesh to make it in order to add value in other products, more suitable. Thus, standardization of the recipe and engulfing the blanched pumpkin flesh led to the development of refined wheat flour. The blanched refined wheat flour pumpkin flesh nankhatai was found to be bright in nutrient corporation of very much lucrative as far as cost is concerned.

**Conclusion**

The present study demonstrated that the pumpkin are good source of nutrients. After blanching its nutrients get increased. The other nutrient value of pumpkin increased due to elimination of moisture, as it found pumpkin powder composed of high amount of protein, fibre and ample amount of beta-carotene, potassium and potassium. Most of the people specially are not found of pumpkin but in the powder form it can be incorporated in any dish as per acceptability, it can be easily consumed by all the age groups. Thus in the present study, pumpkin are found to be a good source of nutrients and its powder nankhatai was very acceptable productand cost effective too.

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**Reference**

1. Bavec F, Bavec M. Evaluation of target value of nitrogen fertilizing on the basis soil N min in pumpkins (*Cucurbita pepo* L.). Cong. Eur. Soc. Agron. Short Commun, Nitra, Slovakia. 1998; 2:80.
2. Garber L. Health benefits of pumpkin- weight loss, healthy vision, 2012. Retrieved from http://naturalsociety.com/health-benefits-of pumpkins/#ixzz2j2fbr4nu@naturalsociety
3. Health benefits of pumpkin. (n.d.). Retrieved from http://www.thv11.com/news/article/230058/2/6-health-benefits-of-pumpkins Hooda RP. Statistics for business and economics. 2013; 5:673.
4. Lerner R. Plant. Purdue University, 2000.
5. Sahelian, MD. Pumpkin extract and vegetable health benefit, 2014. Retrived from http://www.raysahelian.com/pumpkin.html
6. Srilakshmi B. Blanching. New Age International publishlishers, 2003.

7. Whitaker, Davis. Biotechnology in Agriculture and Forestry 2, 1986, 371-386.
8. Yada M. Medicinal and biological potential of pumpkin: an updated review. Nutrition Research Reviews. 2010; 23:184-190.
9. Zhang F, Sun D, Li M. Preparation of Astraglus polysaccharide and its therapeutic effect on hepatitis. Journal of Chin Pharm Biotechnology. 1995; 2:26-28.
10. Anon. Pumpkin, 2008. Retrived from htpp://en.wikipedia/pumpkin (Accession date 24.06.2008)