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Development and evaluation of nutritionally enhanced potato rice papads (Indian cookie)

Sukhpreet Kaur* and Poonam Aggarwal

Department of Food Science and Technology, Punjab Agricultural University, Ludhiana-141004 (Punjab), INDIA
*Corresponding author. E-mail: sukhpreetnagra1@gmail.com

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Abstract: The present study was carried out to develop *papads* (Indian cookie) from potato (*Solanum tuberosum L.)* and rice (*Oryza sativa*) blends and to analyze them for organoleptic, physicochemical, phytochemical and shelf life quality. Two processing cultivars (Kufri Chipsona-1, Kufri Chandramukhi) and one commonly grown cultivar (Kufri Pukhraj) were evaluated for processing into *papad*. Based on preliminary sensory trails, *papads* with boiled potato mash (60%) and gelatinized rice (30%) level of supplementation were found to be most acceptable and these *papads* were subjected to nutritional evaluation. Results were compared with rice *papads* (control). Protein content and yield was significantly ($p<0.05$) higher in control *papads* compared to potato supplemented *papads*. Oil uptake significantly ($p<0.05$) increased on supplementation with potato. Bioactive compounds including ascorbic acid, total phenolics and total antioxidant activity measured as DPPH radical scavenging activity increased significantly ($p<0.05$) on incorporation of potato. Between the cultivars, *papads* enriched with Kufri Pukhraj, a table variety which is considered unfit for processing, displayed the highest phytochemical content and total antioxidant activity. Sensory evaluation indicated higher overall acceptability scores of potato enriched *papads* compared to control. During storage of *papads* at room temperature for up to 3 months, significant ($p<0.05$) changes in the moisture content, phytochemical content and antioxidant activity were observed. Storage studies showed that the potato supplemented *papads* can be stored safely for 3 months of storage at ambient temperature.

Keywords: Antioxidant activity, Oil uptake, *Papads*, Phytochemicals, Potato

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most widely consumed tubers in many cuisines. Potato is notably recognized as a source of high quality proteins, carbohydrates, vitamin C, vitamin B_6 and certain minerals such as potassium, phosphorous and magnesium (Gumul *et al.,* 2011). Beyond these basic nutrients, potato tubers present a very significant source of antioxidant phytochemicals such as anthocyanins, phenolics and vitamin C which are highly desirable in diet because of their beneficial effect on human health (Lachman and Hamouz, 2005; Ezekiel *et al.,* 2013).

India became the second largest producer of potato in the world with bumper crop of 41.48 million tonnes in the year 2012-13 (Saxena and Mathur, 2013). Potato (*Solanum tuberosum L.)* is one of the commonly used vegetable and is staple diet for a large number of people in the world but main disadvantage of the crop is that it is seasonal and bulky production of crop has short life. Lack of sufficient storage facilities result in crop deterioration as post harvest time advances (Misra and Kulshrestha, 2003).

Dehydration of bumper perishable crop seems to be convenient alternative for long term storage and could serve as means to ensure availability of potatoes in different forms throughout the year. Potato can be processed into an indigenous dehydrated product called *papad* (Indian cookies), which has a promising future due to its long shelf life and diverse uses. *Papad* also known as *Appalam* is a popular snack item in India. A variety of p*apads* are available in India, which are produced from a great diversity of ingredients. Usually, they are made either using only cereal flour or a combination of pulse flour with salt, spices and some additives (Garg and Dahiya, 2003). The demand for *papad* is rising rapidly both in country and abroad. So, there is greater scope for introduction of varieties of *papads* prepared from cost effective raw ingredients.

Since production of potato is abundant, there is a need to find diversified uses in order to maximize their utilization and to cater the fast changing taste of new generation. Potato processing has considerable potential to reduce post-harvest losses and to generate income through the manufacture of value-added food products. Thus, the aim of this work was to develop *papads* enriched with different potato (*S. tuberosum* L.) cultivars and to evaluate the quality characteristics of the developed product in order to assess its physicochemical, phytochemical and shelf life properties.

MATERIALS AND METHODS

Raw materials: Two potato cultivars known for better quality characteristics (Kufri Chipsona-1, Kufri

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Chandramukhi) and one commonly cultivated variety (Kufri Pukhraj) were procured from Vegetable Crops Department of the Punjab Agricultural University and were used for production of *papads*. Rice flour from broken kernels, salt, sodium bicarbonate (papad *khar*) and spices (cumin seeds, carom seeds, black pepper) were purchased locally. Frying was done with refined soybean oil and was purchased locally.

Preparation of raw materials

Boiled potato mash: Fresh potato tubers (1 kg) of each cultivar were washed, peeled, cut into four quarters and pressure cooked in water (1 L) for 5 min. The boiled potatoes were cooled and mashed.

Gelatinized rice flour: Rice flour (500 g) from broken kernels was sieved and then poured to boiling water (1L) containing 0.5% *papad khar* and cooked for 3-5 minutes for complete gelatinization and then cooled to room temperature.

Formulation of potato rice *papad*: Potato rice *papads* were formulated by incorporating potato in different proportions. Proportions of ingredients which were liked best sensorily were selected for the development of final product. Potato mash was blended with gelatinized rice flour in the ratio 0:100 (control), 20:80, 40:60, 60:40 and 80:20. Based on preliminary sensory trials, substitution of up to 60% of potato produced significant desirable changes in the sensory characteristics of fried *papads*. So, this level was used for the preparation of the final product.

Processing method: For making *papad*, freshly prepared potato mash (60g) was blended thoroughly with gelatinized rice flour (40g), cumin (0.3g), black pepper (0.1g), carom seeds (0.2g) and salt (2g) and kneaded uniformly to prepare soft dough. Dough was divided into small balls (20 g each). The dough balls were put on oil smeared polythene sheets and were pressed into thin (1 mm thick) *papad* sheets using a manual *papad* making machine. These papad sheets were then dried in hot air cabinet dryer at 40±5^{o}C for 8 hours.

Physicochemical analysis: The moisture, protein and ash contents of the raw materials and powdered *papad* samples were determined by official methods (AOAC, 2005). Reducing sugars of raw potato tubers were determined by the Nelson Somogyi method (Pearson, 1976). Oil uptake of fried *papads* was measured using soxhlet extraction method (Ranganna, 2004). Yield was calculated after frying the *papads.*

Phytochemical analysis : In the raw material and prepared *papads*, the ascorbic acid content, total phenolic content and antioxidant activity as DPPH radical scavenging activity was also determined.

The ascorbic acid content was determined by visual titration method using 2, 4-Dichlorophenol-Indophenol dye method (Ranganna, 2004). The results were expressed as milligram of ascorbic acid/100 g dw. Phenolic compounds were extracted from sample (5 g fresh tissue; 1 g dry ingredient) according to Velioglu *et al.* (2009) with 50 ml of 80% (v/v) aqueous methanol for 3 hours at 40^{o}C with refluxing. The content of total phenolic compounds in extract was determined using the Folin-Ciocalteu's colorimetric method (Velioglu *et al.*, 2009). The absorbance at 765 nm was measured after 30 min and the results were expressed as gallic acid equivalents (mg GAE/100 g dw).

The antioxidant activity of aqueous extracts of raw materials and *papads* was determined using 1,1 -diphenyl-2-picrylhydrazyl (DPPH) radical. The ability of the prepared extracts to scavenge the stable free radical was estimated using the method of Yamaguchi *et al.* (1998). Methanolic extract of sample was taken for antioxidant activity and calculated according to the following formula. BHT was taken as a standard at a fixed concentration of 5 mg/ml.

Radical scavenging activity (%) = Absorbance of control (0 minute) – Absorbance of sample (30 minute)
Absorbance of control (0 minute) x 100

Texture Analysis of fried *papads*: Hardness of fried *papads* was determined by the texture analyzer (LLOYD texture instrument LR 5K, England) with an aluminium circular probe of 70 mm of diameter and a test speed of 1 mm/s. The thresholds of force and distance were 1g and 1mm, respectively. Ten measurements were taken. *Papads* were placed on the crisp fracture support rig (code TA-101) and the circular probe was allowed to penetrate the snacks. Hardness (g) was recorded as the maximum force required for breaking the *papad* into two pieces.

Sensory quality evaluation: *Papads* (after frying at 175^{0}C for 30 sec) were evaluated by a panel of 10 judges using 9-point Hedonic scale for their sensory characteristics like appearance, flavor, texture and overall acceptability. The scores were assigned from extremely liked (9) to disliked extremely (1).

Storage studies: *Papads* were packed in 200 gauge polythene bags and sealed in tight air containers. The packed *papads* were exposed to room temperature (26-38^{o}C/RH 35-87%) for a period of 3 months. Storage stability of the product was assessed by determining the changes in moisture, bioactive composition and antioxidant activity. Sensorial analysis of the stored *papads* was done by a semi trained panel of 10 judges using 9-point Hedonic scale.

Statistical analysis: All the experiments were carried out in triplicate. One-way analysis of variance was performed using the SPSS version 20.0 (Statistical Package for Social Sciences). Significant differences ($p<0.05$) were determined by Tukey's.

RESULTS AND DISCUSSION

Quality characteristics of fresh *papads*

Physicochemical attributes: The physicochemical characteristics of control *papads* and potato incorporated *papads* are summarized in table 2. Significant ($p < 0.05$) differences were found in the moisture content of control and supplemented *papads*. The moisture content of control *papads* was 8.34% and that of

Table 1. Physicochemical and phytochemical traits of raw ingredients used in development of *papad*.

Raw ingredients	Moisture* (%)	Reducing sugars* (%)	Protein (%)	Ash (%)	Ascorbic acid (mg/100g)	Total phenols (mg GAE/100 g)	Scavenging activity* (%)
Cultivars							
K.Chipsona-1	75.69±0.10^{b}	0.08±0.05^{c}	21.40±0.62^{b}	4.03±0.15^{c}	75.76±0.30^{c}	165.4 ± 0.21^{c}	38.10±0.25^{c}
K.Chandramukhi	75.70±0.50^{b}	0.18±0.05^{b}	18.75±0.55^{c}	4.92±0.12^{b}	80.92±0.30^{b}	224.2 ± 0.60^{b}	53.20±0.50^{b}
K.Pukhraj	84.69±0.51^{a}	0.30±0.03^{a}	23.05±0.60^{a}	6.85±0.18^{a}	107.83±0.55^{a}	419.9±0.65^{a}	63.50±0.30^{a}
Rice flour	9.10±0.18^{c}	ND	7.93±0.22^{d}	3.41±0.20^{d}	10.56±0.15^{d}	52.81±0.12^{d}	28.10 ± 0.20^{d}
Spice mix	3.10±0.11^{d}	ND	0.11±0.04^{e}	3.31±0.18^{d}	ND	ND	ND

*g/100g wet basis; ND – not detected; Values within a column with different letters are significantly ($p < 0.05$) different; Mean values ± SD (*n*=3)

Table 2. Quality characteristics of fresh *papads*.

Products	Physicochemical properties					Phytochemical properties		Antioxidant properties	Textural properties
	Moisture (%)	Ash (%)	Protein (%)	Oil uptake (%)	Yield (%)	Ascorbic acid (mg/100g)	Total phenols (mg GAE/100g)	Scavenging activity (%)	Hardness (g)
Control (without potato)	8.34±0.11^{a}	4.15±0.11^{a}	7.04±0.25^{a}	10.44±0.12^{c}	41.28±0.18^{d}	8.67±0.11^{c}	59.59±0.25^{d}	60.99±0.30^{d}	186.89± 0.23^{d}
Papads supplemented with different potato cultivars									
K.Chipsona-1	5.40±0.11^{b}	3.93±0.08^{ab}	5.43±0.22^{b}	11.38±0.42^{b}	28.77±0.11^{c}	15.84±0.25^{b}	67.65±0.24^{c}	61.32± 0.25^{c}	936.23± 0.40^{a}
K. Chandramukhi	5.49±0.09^{b}	3.36±0.10^{c}	5.38±0.20^{b}	11.56±0.40^{b}	27.84±0.12^{b}	15.76±0.05^{b}	83.77±0.34^{b}	61.76± 0.28^{b}	372.90± 0.23^{b}
K.Pukhraj	5.53±0.20^{b}	3.71±0.20^{b}	5.37±0.15^{b}	12.77±0.31^{a}	25.22±0.11^{a}	16.67±0.26^{a}	99.28±0.40^{a}	73.96 ± 0.21^{a}	222.85± 0.21^{c}

*Results expressed on dry weight basis. Values within a column with different letters are significantly ($p < 0.05$) different. Mean values ± SD (*n*=3)

Table 3. Effect of frying on phytochemical content and antioxidant activity of raw *papads.*

Product	Ascorbic acid		Total phenolic content		Antioxidant activity	
	Raw	fried	Raw	fried	Raw	fried
Control (without potato)	8.67±0.11[c]	6.31±0.10[c]	59.59±0.25[d]	53.41±0.29[c]	57.01±0.30[d]	55.27±0.21[b]
Papads supplemented with different potato cultivars						
K.Chipsona-1	15.84±0.25[b]	13.35±0.11[a]	67.65±0.24[c]	51.33±0.28[d]	57.82± 0.25[c]	55.0±0.30[c]
K. Chandra-mukhi	15.76±0.05[b]	12.11±0.15[b]	83.77±0.34[b]	79.21±0.30[b]	58.13± 0.28[b]	54.14±0.20[d]
K.Pukhraj	16.67±0.26[a]	12.26±0.11[b]	99.28±0.40[a]	95.42±0.45[a]	70.12 ± 0.21[a]	65.0±0.28[a]

*Results expressed on dry weight basis. Values within a column with different letters are significantly ($p < 0.05$) different. Mean values ± SD (*n*=3).

supplemented ones in the range of 5.40-5.53%. The ash content of control *papads* was 4.15% and it ranged from 3.36 to 3.93% in potato supplemented *papads* (Table 2). This might be due to their compositional differences. In control *papads*, protein content was 7.04% that was found to be significantly ($p < 0.05$) higher than that of potato supplemented *papads* (5.37 -5.43%) (Table 2). There was a wide variation in the oil absorption and yield of fried *papads*. Oil uptake of potato incorporated *papads* (11.38-12.77%) was found to be significantly ($p < 0.05$) higher than that of control *papads* (10.44%) (Table 2). Yield was significantly higher in control *papads* compared to potato incorporated *papads*. Between the cultivars studied, *papads* supplemented with K.Pukhraj showed higher absorption of oil and lower yield compared to K.Chipsona-1 and K. Chandramukhi supplemented *papads.* This might be due to differences in their dry matter content. The dry matter content in fresh tubers of cultivars K. Chipsona-1, K.Chandramukhi and K.Pukhraj was 24.31, 24.30 and 15.31 per cent, respectively. K.Pukhraj with its lower dry matter content can be expected to show higher oil uptake and lower yield while K.Chipsona-1 and K.Chandramukhi with higher dry matter content showed lower oil uptake and higher yield. Tuber dry matter content is known to be positively correlated with mealiness and higher yield (Ramezani and Aminlari, 2004) and negatively correlated with oil uptake in fried potato products (Kaur *et al.,* 2009; Marwaha *et al.,* 2010).

Phytochemical attributes: Phytochemical attributes i.e. ascorbic acid and total phenolic content and antioxidant activities measured as DPPH radical scavenging activities of fresh *papads* significantly ($p<0.05$) increased on supplementation with potato as compared to control *papads* (Table 2). It might be due to a larger amount of phytochemical content in potato in comparison to rice flour (Table 1). Between the cultivars studied, *papads* supplemented with K.Pukhraj had the highest bioactive content and antioxidant activity while lowest was observed in K.Chipsona-1 *papads* (Table 2). The higher concentration of these phytochemicals in K. Pukhraj at initial level (Table 1) might have contributed towards their higher retention in the prepared product.

Textural attributes: As for texture, it was found that hardness of *papads* supplemented with K.Chipsona-1 and K.Chandramukhi was significantly ($p < 0.05$) higher than that prepared from K.Pukhraj (Table 3). *Papads* prepared from K.Pukhraj was comparatively soft and crisp whereas those prepared from K.Chipsona-1 were less crispy and hard in texture. This might be due to high dry matter and low moisture content in 'K.Chipsona-1'.

Storage studies

Moisture content: Since papads are dehydrated products, there preservation depends upon their moisture content, which should be low enough to prevent the growth of microorganisms. In the present study, there was a gradual increase ($p< 0.05$) in the moisture content of potato supplemented *papads* during storage, irrespective of cultivars (Fig. 1). The average moisture content of *papads* increased from 5.45 to 6.14% during 3 months of storage. This might be due to variation in atmospheric relative humidity (RH), which ranged from 35-85% during the storage period. Similar behaviour was also observed in cereal based *papads* (Puyed and Prakash, 2008; Veena *et al.,* 2012) and in dehydrated jackfruit *papads* (Jagadeesh *et al.,* 2007) stored at room temperature for 180 days.

Phytochemical content and antioxidant activity: The plant foods are known for their phytochemical content and antioxidant characteristics; therefore, it is essential to investigate the influence of storage and processing on these bioactive food components.

During storage, the mean ascorbic acid content of potato supplemented *papads* was found to be decreased from original value, regardless of the cultivars (Fig. 2a). The initial mean ascorbic acid content of potato rice *papads* was 16.09 mg/100 g dw, which decreased ($p<0.05$) consistently to 13.30 mg/100 g dw, after 3 months of storage. This might be due to oxidation of the thermoliabile ascorbic acid into dehydroascorbic acid upon storage

Table 4. Effect of storage on sensory quality of *papads.*

Product	Duration of storage (months)			
	0	1	2	3
Appearance				
Control (without potato)	7.53 ± 0.03^{cA}	7.50 ± 0.03^{dA}	7.55 ± 0.03^{bA}	7.50± 0.03^{bB}
Papads supplemented with different potato cultivars				
K.Chipsona-1	8.25 ± 0.01^{aA}	8.20± 0.05^{aB}	8.21± 0.05^{bB}	8.25 ± 0.03^{aA}
K. Chandramukhi	8.23 ± 0.04^{aA}	8.13 ± 0.02^{bA}	8.20 ± 0.02^{aB}	8.24 ± 0.05 ^{aA}
K.Pukhraj	7.62± 0.03^{bA}	7.60± 0.03^{cA}	7.55± 0.02^{aC}	7.50± 0.01^{bD}
Flavor				
Control (without potato)	7.16 ± 0.03^{cA}	7.18 ± 0.03^{bA}	7.10 ± 0.03^{bB}	7.10 ± 0.05^{cB}
Papads supplemented with different potato cultivars				
K.Chipsona-1	8.16 ± 0.01^{aA}	8.10± 0.05^{aB}	8.15 ± 0.05^{aA}	8.17 ± 0.03^{aA}
K. Chandramukhi	8.10 ± 0.04^{bC}	8.11±0.02^{aBC}	8.15 ± 0.02 ^{aA}	8.13± 0.05^{bAB}
K.Pukhraj	8.16± 0.02^{aA}	8.12± 0.03^{aB}	8.13± 0.01 ^{aB}	8.17± 0.01^{aA}
Texture				
Control (without potato)	8.00 ± 0.03^{cB}	8.00 ± 0.03^{bB}	8.03 ± 0.03^{cA}	8.08 ± 0.05^{cA}
Papads supplemented with different potato cultivars				
K.Chipsona-1	7.65 ± 0.01^{dA}	7.60±0.05^{cBC}	7.59 ± 0.05^{dC}	7.62 ± 0.03^{dB}
K. Chandramukhi	8.30 ±0.04 ^{bAB}	8.31 ± 0.02^{aA}	8.28 ± 0.02^{bB}	8.25 ± 0.05^{bC}
K.Pukhraj	8.35± 0.01^{aB}	8.30± 0.04^{aC}	8.35± 0.01^{aB}	8.39± 0.02^{aA}
Overall acceptability				
Control (without potato)	7.56± 0.01^{cA}	7.50± 0.01^{bA}	7.53± 0.04^{cA}	7.50± 0.01^{cA}
Papads supplemented with different potato cultivars				
K.Chipsona-1	8.11± 0.02^{abA}	8.10±0.03^{aA}	8.11± 0.01^{abA}	8.00± 0.04^{aA}
K. Chandramukhi	8.21± 0.03^{aA}	8.18± 0.05^{aA}	8.20± 0.03^{aA}	8.12± 0.05^{aA}
K.Pukhraj	7.94± 0.01^{bA}	7.96± 0.01^{aA}	7.92± 0.01^{bA}	7.90± 0.04^{aA}

Values within a column with different superscript lower case letters are significantly ($p < 0.05$) different between cultivars. Values within a row with different superscript capital letters are significantly ($p < 0.05$) different between storage duration. Mean values ± SD (n=3)

(Kaur *et al.,* 2012; Selvamuthukumaran and Khanum, 2014). The ascorbic acid loss accounted to 17.30% after 3 months of storage period. Abong *et al.,* (2011) and Wills and Silalahi, (1990) observed similar losses in ascorbic acid content during storage of potato crisps. During storage, a significant ($p < 0.05$) decrease in total phenolic content was observed in all the potato supplemented *papads*, irrespective of the cultivars (Fig. 2b). The mean content of total phenolics of potato added *papads* was estimated to be 83.57mg GAE/100g initially and this was found to decrease significantly ($p < 0.05$) to 73.31 mg GAE/100g after 3 months of storage at room temperature (28-35^{o}C) (Fig. 2b). This decrease in phenolics might be due to degradation from the effect of heat, which increases with increase in storage temperature (Ezekiel *et al.,* 2013). The change in mean total phenolics content of *papads* during the entire storage period from the initial values was 12.27%. Selvamuthukumaran and Khanum, (2014) reported 36% losses in total phenolics of buckwheat jam stored at 37^{o}C for 8 months. Oliveira *et al.,* (2012) also noticed higher reductions in total phenolics in pasteurized peach stored at 22^{o}C for 90 days. According to Gitanjali *et al.* (2004), the level of phenols present in fruits and vegetables can be influenced by growing conditions, harvest conditions, species, processing methods and storage conditions.

As for processing, frying of control and potato added *papads* resulted in significant ($p<0.05$) losses in ascorbic acid and total phenolic content (Table 3). This might be due to thermoliabile nature of these compounds which resulted in their loss during frying. Similar reductions in bioactive compounds were noticed during shallow frying of raw potatoes (Gitanjali *et al.,* 2004).

The antioxidant activities for potato enriched *papads* as determined by scavenging DPPH radical are presented in Fig. 2c. There was slight but significant ($p<0.05$) decrease in the mean radical scavenging activities of *papads* during storage, regardless of cultivars (Fig. 2c). The mean radical scavenging activities of *papad* extracts was estimated to be 65.43% initially and this was found to decline significantly to 51.94% after 3 months of storage (Fig. 2c). The decrease in the total antioxidant

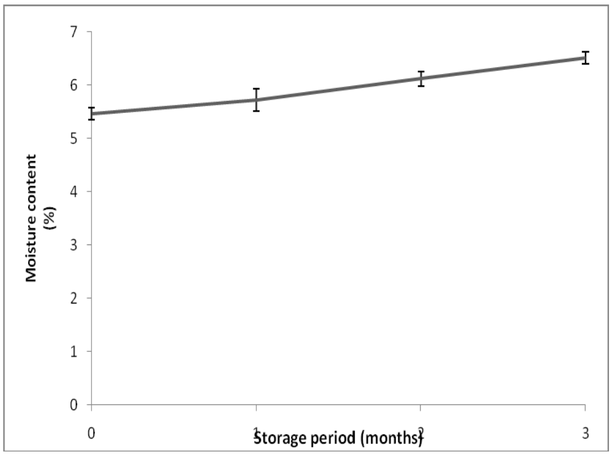


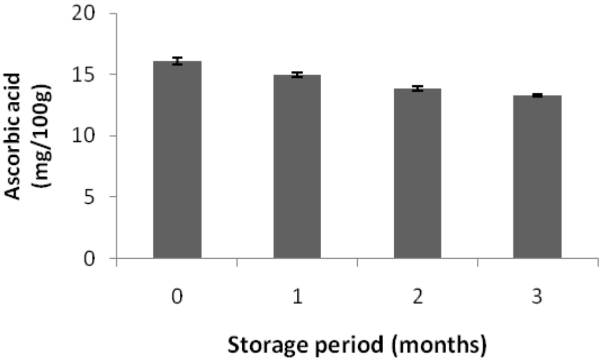
Fig. 1. *Effect of storage on moisture content of potato rice papads. Mean values ± SD (n=3). Error bars represents SD of the mean.*

activity may be linked to decrease in the content of phytonutrients such as total phenolics and ascorbic acid. The correlation between bioactive concentration and antioxidant activity of plant foods is well established (Reyes *et al.,* 2005; Ezekiel *et al.,* 2013). Kapoor and Aggarwal (2014) reported significant losses (43.40%) of total antioxidant activity in carrot juice stored at room temperature for 6 months. In our study, the loss in total antioxidant capacity as radical scavenging activity accounted for 20.62% after 3 months of storage.

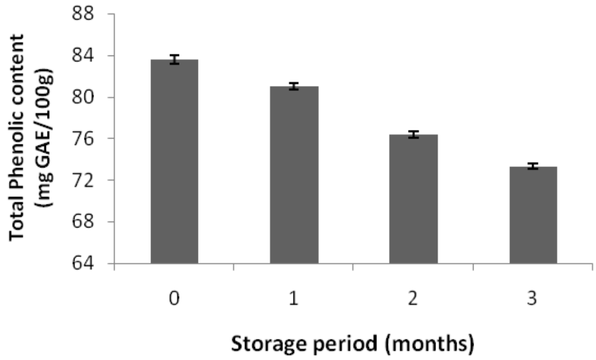
A significant ($p< 0.05$) decrease in antioxidant activity was found after frying of *papads* (Table 3). This could be attributed to decrease in total phenolic content, as described by Gitanjali *et al.* (2004).

Sensory quality evaluation of *papads*

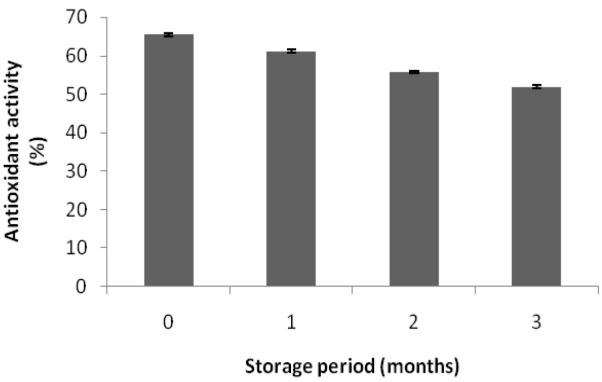
It is clear from table 4 potato supplemented *papads* had better acceptability scores as compared to control (without potato) *papads*. Within the cultivars studied, color, flavor, texture and overall acceptability scores for *papads* supplemented with K.Chipsona-1 and K. Chandramukhi appeared to be higher than for K.Pukhraj (Table 4). Compared to K.Chipsona-1 and K.Chandramukhi *papads*, *papads* supplemented with K.Pukhraj were slightly darker in color. The lowest rating for color in K.Pukhraj conformed to high reducing sugars in this cultivar (Table 1). Color of fried potato products is the most significant visual quality criterion, which is dependent on the amount of reducing sugars in raw tubers because they induce a non enzymatic Millard reaction with free amino acids, forming unacceptable brown to black pigmented products (Ramezani and Aminlari, 2004; Kaur *et al.*, 2012). The range of color in potato products made from K.Chipsona-1, K.Chandramukhi and K.Pukhraj agrees with that reported by Marwaha and Sandhu, (2006) and Kaur *et al.* (2012). Potato *papads* prepared from all the three cultivars were found to be highly desirable up to 3 months of storage. Also, *papads* supplemented with K.Pukhraj, an unmarketable cultivar, displayed excellent keeping quality during the entire storage period (Table 4).



(a)



(b)



(c)

Fig. 2. *Effect of storage on (a) ascorbic acid (b) total phenolic content (c) antioxidant activity of potato rice papads. Mean values ± SD (n=3). Error bars represents SD of the mean*

Conclusion

It can be concluded that nutritionally enriched *papads* (Indian cookie) can be prepared from both medium and high sugar potato (*Solanum tuberosum L.)* cultivars which provided significantly more bioactive compounds including ascorbic acid, total phenolics and antioxidant activity and high acceptability ratings. Incorporation of such potato cultivars into low-cost value added products such as *papads* could serve as an excellent vehicle for enhancing the utilization of this resourceful food crop.

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