J Hum Ecol, 32(2): 97-99 (2010)
PRINT: ISSN 0970-9274 ONLINE: 2456-6608
DOI: 10.31901/24566608.2010/32.02.04

Butylated Hydroxyanisole (BHA) to Maximize the Oxidative Stability of Snacks: A Case Study with *Sev* and *Boondi*

K. Waghray and S. Gulla*

Department of Food Technology, University College of Technology, Osmania University, Hyderabad, Andhra Pradesh, India
Phone: 91-98491-73781, *91-98485-97984; Fax: 91-40-27098472;
E-mail: <kavitagl@rediffmail.com>, *<srideviprakash@hotmail.com>

KEYWORDS Antioxidant. Butylated Hydroxyanisole (BHA). Snacks

ABSTRACT Deep fat fried traditional food products form an important item of food in the daily diet of people not only in India but all over the world. The present study was undertaken to extend the shelf life of traditional snack foods such as *Sev* and *khara boondi* using butylated hydroxy anisole as an antioxidant at 0.1% level. The samples were prepared using Bengal gram flour and packed in polypropylene cover and stored for a period of 4 months. The products were examined for their physico chemical and organoleptic changes during the storage period for 120 days. There was an increase in the moisture content in *Sev* (2.2% to 3.7%), and in *boondi* (3.3% to 4.1%). Peroxide value of *Sev* (6.6 to 32.7 meq) and *boondi* (8.5 to 33.2 meq) also increased during storage. The increase in *Sev* and *Boondi* during storage was similar in control and treated samples. The products were found acceptable only upto 90 days of storage at room temperature and subsequently they became rancid. The study demonstrates that the shelf life of traditional snacks can be extended for 60 days to 90 days if treated with BHA.

INTRODUCTION

During the last two decades, traditional food products market has witnessed a very rapid growth not only in India but all over the world. In India, traditional foods are prepared at homes and commercial establishments using a cereal, pulses and vegetable combination. Several studies have been conducted on the preparation and storage of these traditional snacks and sweets in various packaging materials like glass containers, polyethylene covers etc. by various workers (Bhat et al. 1982; Pruthi et al. 1983; Beerh and Coworkers 1985; Saxena and Coworkers 1986; Kalra et al. 1987; Thakur and Arya 1990; Saxena et al. 1991; Sen and Sen 1993; Sandhu and Bawa 1993; Kulkarni and Coworkers 1994; Sharma et al. 1996; Saxena et al. 1996; Kalra et al. 1998 a and b; and Jonnalgadda 2001).

Their results revealed that very few studies have been conducted with traditional food like *Sev* and *Boondi*. Most of the studies are on potato chips, traditional sweets, fried dals and corn blended snacks. Shelf life of the products ranged between 2 to 3 months. Deteriorative changes like loss of flavor, development of rancidity and soft texture in these traditional products are mainly due to exposure to atmosphere and light. These undesirable changes could be delayed by the use of antioxidants and appropriate packaging material. Hence, the present study was undertaken with the objective to extend the shelf life of traditional foods like *Sev* and *Boondi* using Butylated Hydroxy Anisole.

MATERIAL AND METHODS

The Bengal gram flour (besan) and groundnut oil used in the preparation of *Boondi* and *Sev* was obtained from a super market. The antioxidant, Butylated hydroxy anisole was obtained from Sagar chemical from Mumbai. The chemicals used in the analysis were of analytical grade and were obtained from Hy-glass and chemicals. The packaging material Polypropylene 200 mm gauge was obtained from Vishnu enterprises. The recipes of the traditional foods, *Boondi* and *Sev* were standardized and then prepared. The antioxidant was added to the Bengal gram flour at 0.1 gm of BHA per kg and dough was passed through moulds and deep-fried in groundnut oil. After the preparation, products were cooled and packed in polypropylene covers, and sealed using sealing machine and then stored for a period of 4 months. Similarly, control samples of *Sev* and *Boondi* were prepared without adding any antioxidant and packed and stored at room temperature for a period of 4 months.

The samples were collected by quartering procedure and analysed for various changes with respect to Moisture (air oven method), Fat

(soxhlet method) and Rancidity parameters (free fatty acids, acid value and peroxide value using standard AOCS procedures). The samples were analysed at 0 day and monthly for 3 months and then once in 15 days till the samples were acceptable. Sensory evaluation of the *Sev* and *Boondi* in respect to colour, texture, taste, and flavour was done by a trained panel on a 5 point hedonic rating test (Ranganna 1992).

RESULTS AND DISCUSSION

The results are displayed in tables 1 and 2. The moisture content of the samples increased throughout the storage period. It ranged from 2.2 to 3.7% for treated *Sev*, 2.8 to 4.6 % for control *Sev*, 3.3 to 4.1% treated *Boondi* and 4.92-5.07% for control *Boondi*. The fat content ranged between 41.1 to 43.8 % (treated *Sev*) 40.4 to 41.5% and 46.27 to 47.9 %for treated *Boondi* and 41.1 to 43.8 % for control *Boondi*.

It is observed from the tables 1 and 2 that there is no significant difference between the peroxide value of control and treated samples during storage upto first 2 months. However, there was an increase in the peroxide value with the increase in storage period. The values varied from 6.6-32.57 meq/kg in treated *Sev* and 6.9-54.0 meq/kg in control Sev, 8.47-33.21 meq/kg in treated *Boondi* and 9.7 to 42.3 meq/kg in control *Boondi* sample. Similarly, there was no significant difference in acid value between the control and treated samples of *Sev* and *Boondi* upto 2 months. Later it increased with increase in length of storage time. The values ranged from 2.47 to 3.61 mg of KOH treated *Sev*, 2.95 to 4.54 mg of KOH in control *Sev* and 2.55 to 3.12 mg of KOH in treated *Boondi* and 2.62 to 3.31 mg of KOH in control *Boondi*.

The free fatty acid content ranged from 1.2 to 1.8 and 1.48 to 2.31 in treated and control *Sev* and 1.28 to 1.59 and 1.32 to 1.64 in treated and control *Boondi*. The sensory evaluation scores for the *Boondi* (treated) (Figs. 1 and 2) revealed that the scores are similar for control and treated samples. There was a consistent decrease in texture, colour, flavour and overall acceptability of products as the storage period increased. Physico chemical

Table 1: Changes during storage of *khara Boondi* samples packed in polypropylene bags and stored at room temperature (13 - 38°C)

Storage months	*Moisture %*	*Peroxide value meq. O2/ kg*	*Acid value*	*FFA (% oleic acid)*
		Control (C)		
0	4.9 ± 0.29	9.7 ± 0.31	2.6 ± 0.09	1.3 ± 0.03
1	4.9 ± 0.36	17.1 ± 0.61	2.9 ± 0.26	1.4 ± 0.05
2	4.9 ± 0.00	23.3 ± 0.49	3.0 ± 0.78	1.5 ± 0.06
3	5.0 ± 0.10	33.8 ± 0.31	3.3 ± 0.98	1.6 ± 0.56
3.5	5.0 ± 0.12	47.2 ± 0.38	3.3 ± 0.55	1.7 ± 0.13
		Treated (T)		
0	3.34 ± 0.24	8.5 ± 0.67	2.6 ± 0.76	1.3 ± 0.04
1	3.50 ± 0.03	15.7 ± 0.26	2.6 ± 0.49	1.3 ± 0.02
2	3.71 ± 0.17	20.1 ± 0.08	2.7 ± 0.66	1.5 ± 0.05
3	3.78 ± 0.25	23.5 ± 0.24	3.0 ± 0.36	1.5 ± 0.1
3.5	4.10 ± 0.08	33.2 ± 0.09	3.1 ± 1.24	1.6 ± 0.04

Mean±S.D

Table 2: Changes during storage of *Sev* samples packed in polypropylene bags and stored at room temperature (13-38°C).

Storage months	*Moisture %*	*Peroxide value meq. O2/ kg*	*Acid value*	*FFA (% oleic acid)*
		Control (C)		
0	2.8 ± 0.11	6.9 ± 1.25	2.9 ± 1.03	1.5 ± 0.92
1	3.4 ± 0.24	16.4 ± 0.67	3.0 ± 0.13	1.5 ± 0.87
2	3.8 ± 0.95	29.8 ± 0.57	3.7 ± 0.25	1.6 ± 0.93
3	4.0 ± 0.91	39.1 ± 0.13	4.5 ± 0.99	2.2 ± 0.67
3.5	4.6 ± 0.09	54.9 ± 19	4.5 ± 1.22	2.3 ± 0.63
		Treated (T)		
0	2.2 ± 0.30	6.6 ± 0.02	2.5 ± 1.20	1.2 ± 0.87
1	2.6 ± 0.17	15.6 ± 0.04	2.8 ± 0.19	1.3 ± 0.65
2	2.8 ± 0.13	20.9 ± 0.39	2.9 ± 0.22	1.5 ± 0.94
3	3.6 ± 0.13	28.9 ± 0.30	3.1 ± 0.02	1.6 ± 0.32
3.5	3.7 ± 0.01	32.5 ± 0.26	3.6 ± 0.98	1.8 ± 0.54

Mean±S.D

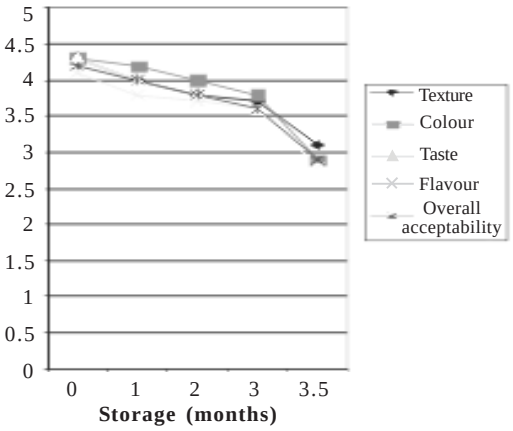

Fig. 1. Mean scores of sensory evaluation of *Boondi* samples during storage

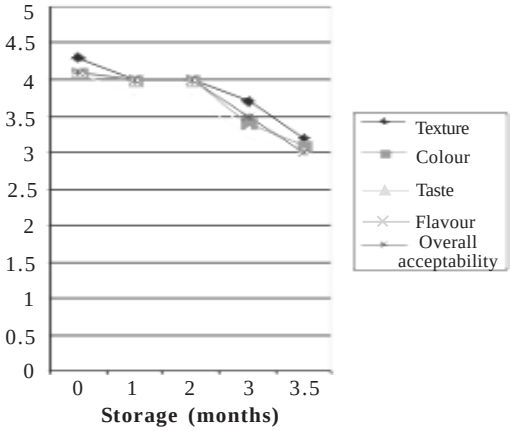

Fig. 2. Mean scores of sensory evaluation of *Sev* samples during storage

analysis showed that the control samples for both *Sev* and *Boondi* were acceptable only for one month, and acceptability of treated samples for *Boondi* and *Sev* was 2 months. The control samples of *Boondi* and *Sev* were acceptable upto 3 months beyond which they became rancid and bitter to taste and soft texured. The study reveals that incorporating the antioxidant led to a retardation in physic-chemical changes. However sensory evaluation of control and treated samples did not differ significantly.

ACKNOWLEDGEMENTS

The first author is grateful to University Grants Commission, New Delhi for the award of Minor Research Grant under which this project was completed..

REFERENCES

AOCS 1990. *The Official Methods and Recommended Practices of the American Oil Chemists Society.* 4th Edition. Champaign Illinois: American Oil Chemists Society.

Beerh OP, Saxena AK, Teotia MS 1985. Use of maize flour in the preparation of salted *sewain. Indian Food Packer,* 39: 34-39.

Bhat KK, Mahaderaiah B, Anantha Krishna SM, Mahadevaiah M, Dhanaraj S, Govind Rajan VS, Anandaswamy B, Prabhakar JV, Sen DP 1982. Studies on packaging and storage of fried mung (phaseolus aureus) dhal. *Journal of Food Science and Technology,* 19: 197-203.

Jonnalagadda PR, Bhat RV, Sudershan RV, Naidu AN 2001. Suitability of chemical parameter in setting quality standards for deep fried snacks. *Food Quality and Preference,* 12: 223-228.

Kalra CL, Sukhvir Kaur, Sharma TC, Kulkarni SC, Berry SK 1987. Studies on the preparation, packaging and storage of potato snacks from cold stored potatoes Indian *Food Packer,* 41: 30-39.

Kalra CL, Sehgal RC, Nagender A, Mohan Lal, Berry SK 1998. Preparation and quality standards and storage of Mathi - A traditional savoury product. *J Food Sci Technol,* 35; 25-29.

Khader V, Patel HG 1982. Chemical Analysis of deep fat fried snacks (chavda and yanthia) commonly consumed in Gujarat. *Indian Journal of Nutrition and Dietetics,* 19: 87-95.

Kulkarni SG, Manan JK, Shukla IC 1994. Studies on deep fat fried sevian made from rice flour and colocasia. *Journal of Food Science and Technology,* 31: 207-210.

Pruthi JS, Manan JK, Kalra CL, Raina BL 1983. Studies on the manufacture, packaging and storage of traditional savoury foods part-I Black gram (Urad) and green gram (Mung) Wadian. *Indian Food Packer,* 37: 61-71.

Ranganna S 1992. *Hand Book of Analysis and Quality Control of Fruits and Vegetable Products.* 2nd Edition. New Delhi: Tata Macgraw Hill Publisher Ltd.

Sandhu KS, Bawa AS 1993. Requirements for Quality Potato chips an over view. *Indian Food Industry,* 12: 47-50.

Saxena AK, Kulkarni SG, Manan JK, Berry SK, Beerh OP 1991. Studies on the preparation, packaging and storage of an Indian Traditional Sweet. *Journal of Food Science and Technology,* 28: 352-355.

Saxena AK, Teotia MS, Beerh OP 1986. Food uses of maize: Preparation, packaging and storage of deep fat fried salted boondi. *Indian Food Packer,* 40: 53-58.

Sen S, Sen DP 1993. Oxidised fatty acid content of heat damaged frying oils and Indian bottomless fat fried products. *Journal of Oil Technologists Association of India,* 25: 89-91.

Sharma GK, Semwal AD, Arya SS. 1996. Development and storage stability of Instant Vegetable Wadi. A Traditional Indian Savoury Product. *J Food Sci Technol,* 27: 76-81.

Thakur BR, Arya SS 1990. Packaging Requirement and stability of fried wheat snacks. *Journal Food Science and Technology,* 27: 76-81.