

PJN

ISSN 1680-5194

PAKISTAN JOURNAL OF
NUTRITION

ANSI*net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Evaluation of Fat and Vitamin E in Some Cookies Diet

Ali F. Al-Shawabkeh¹ and Ayman S. Mazahreh²

¹Department of Basic Sciences, Faculty of Engineering Technology,
Al-Balqa Applied University, P.O. Box: 15008, Amman 11134, Jordan

²Department of Applied Sciences, Princes Alia University College,
Al-Balqa Applied University, P.O. Box: 941941, Amman 11194, Jordan

Abstract: This study was carried out on 5 different products from 3 different firms: Digestive Biscuit, Biscuit with fiber, Biscuit without Sugar but with fiber, Toast bread, Toast Bread without salt. Vitamin E, moisture and fat was evaluated by analysis. At the beginning of the study the content of vitamin E, in mg/100g dry matter in the five products from three different firms, respectively, were 3.16, 2.86, 2.84 and the average was 2.96. Moisture percentages were: 3.97, 3.70, 3.52 the average was 3.73 and fat% was: 10.96, 11.63, 11.75, the average was 11.45. At the end of the storage period (6 months), the content of vitamin E was 2.30, 1.64, 1.81, the average 1.92. Moisture was 5.52, 5.50 and 5.19. The average was 5.40. It may be concluded that 35.47% of vitamin E were lost during the storage period.

Key words: Vitamin E, cookies diet, nutrition, storage period, antioxidants

Introduction

Demand for ready to eat processed foods with better, shelf life, satisfying taste, easy of portability and with high nutritional quality is throughout the world because of growing urbanization and increasing employment of women industrial and public sector of these products special snack diet are the most important items that can satisfy these requirements (Chavan and Kadam, 1993). Vitamin E (tocopherols and tocotrienols) is essential in human nutrition (Hathcock, 2005; Yusuf, 2000). Because vitamin E is also a potent antioxidant, it has the ability to prevent oxidative damage to cell through inactivation of free radicals and reactive oxygen species (Yusuf, 2000). Production of biscuit was considered as an important Food industry because biscuit have a high nutritive value especially when supplemented with various substances which are rich in fat, vitamin E. and proteins. Biscuits are made from flour with the addition of other ingredients such as salt, fat, sugar and flavoring agents (Tsen, 1976).

A daily intake of 3-15mg of tocopherol is required on a normal diet. Amounts in excess of 15mg are probably needed when large amounts of unsaturated fatty acid are included in the diet (McLaughlin and Weilhrauch, 1979; Lehmann *et al.*, 1986).

Vitamin E serves as an important antioxidant role in cellular membranes by blocking the peroxidation of polyunsaturated fatty acid (PUFA). Clinically, vitamin E deficiency in premature infants may manifest itself as edema and hemolytic anemia, thus, red blood cells lacking this vitamin are vulnerable to hemolysis by hydrogen peroxide (Harris *et al.*, 1980). Consumption of foods rich in vitamin E may reduce the risk for epithelial cancers, heart disease and stork (Gaziano, 1996;

Woodall *et al.*, 1996). Vitamin E has been reported to correct hemolytic anemia in newborn (Kanno *et al.*, 1989). Vitamin E is a powerful antioxidant in our bodies, and in our foods.

Materials and Methods

Determination of vitamin E by Emmerie-Engel reaction (AOAC, 1990). Calorimetric of α -tocopherol done by spectronic 20 calorimeter. Products were collected from 3 different firms at the production days all samples were performed in triplicate, immediately milled and under N₂ gas packaged and stored in the dark 20°C the vitamin E content was analyzed after 6 month of storage at room temperature in wood cupboard, one separate bag was taken out of storage on each occasion. Data were analyzed statistically by One Way Analysis of variance and T-test.

Results and Discussion

Most determination of the total tocopherol content of foods are based upon the Emmerie-Engel reaction, Which involves the reaction of the tocopherols in the extract with ferric chloride to yield ferrous chloride. The ferrous chloride reacts with alpha dipyridy 1 to yield a red complex, Which is measured calorimetrically. In this study Vitamin E was evaluated according to Emmerie-Engel reaction (AOAC, 1990).

As shown, in Table 3 the content of vitamin E , in the 5 products, at the end of storage period was decreased, the average of vitamin E at the beginning was 2.96 and it decreased to 1.91 at the end of the storage period, by calculation there was 35.47% loss (P < 0.05).

Al-Shawabkeh and Mazahreh: Evaluation of Fat and Vitamin E in Some Cookies Diet

Table 1: The Amount of Vitamin E in Some Special Snack Diet of Three Firms (mg/100g dry matter).

Kind of product	Sample No.	Firm A		Firm B		Firm C	
		Beginning g	End of Storage	Beginning g	End of Storage	Beginning g	End of Storage
Digestive Biscuit $p=0.000$	1	4.65	3.21	4.11	2.12	3.35	2.7
	2	4.73	3.18	3.96	2.05	3.22	2.77
	3	4.85	2.96	4.08	2.09	3.14	2.58
	4	4.9	2.87	3.78	1.95	3.24	2.68
	5	4.76	2.91	3.83	1.83	3.41	2.7
	Mean	4.75	3.03	3.95	2.01	3.27	2.69
	S.D.	0.978	0.153	0.146	0.118	0.108	0.68
Biscuit with fiber $p=0.000$	1	3.85	3.01	3.91	2.03	4.36	3.15
	2	3.76	3.16	3.85	2.17	3.96	2.66
	3	3.94	2.99	3.76	2.11	4.2	2.5
	4	4.01	2.81	3.81	2.08	4.07	2.77
	5	3.65	2.91	3.65	2.01	3.91	2.61
	Mean	3.84	2.98	3.8	2.08	4.1	2.74
	S.D.	0.143	0.129	0.298	0.264	0.18	0.25
Biscuit without sugar with fiber $p=0.006$	1	2.74	1.94	2.33	1.95	2.61	1.3
	2	2.83	1.98	2.57	2.05	2.54	1.28
	3	2.65	2.12	2.45	2	2.38	1.14
	4	2.59	2.25	2.61	2.02	2.51	1.25
	5	2.91	2.31	2.59	2.05	2.5	1.19
	Mean	2.74	2.12	2.51	2.01	2.51	1.23
	S.D.	0.13	0.16	0.12	0.42	0.83	0.66
Toast bread $p=0.003$	1	2.41	1.65	2.25	1.24	2.31	1.28
	2	2.26	1.72	1.99	1.19	2.14	1.01
	3	2.18	1.76	2.12	1.22	2.09	1.12
	4	2.37	1.68	2.3	1.31	2.36	1.2
	5	2.1	1.56	2.19	1.09	2.17	1.09
	Mean	2.26	1.67	2.17	1.21	2.21	1.14
	S.D.	0.129	0.76	0.12	0.8	0.11	0.11
Toast Bread without salt $p=0.000$	1	2.21	1.79	1.89	0.87	2.03	1.31
	2	2.25	1.71	1.98	0.96	2.09	1.29
	3	2.18	1.75	1.94	0.86	2.16	1.26
	4	2.11	1.62	1.81	0.84	2.13	1.19
	5	2.01	1.6	1.79	0.8	2.19	1.1
	Mean	2.17	1.69	1.88	0.87	2.12	1.23
	S.D.	0.7	0.82	0.82	0.59	0.62	0.85

$P > 0.05$ The difference is not significant. S.D. = Standard Deviation

As shown, in Table 3 the moisture percent in the 5 products, at the end of storage period was increased, the average of the moisture at the beginning was 3.73 and it increased to 5.40 in the end of the storage period, by calculation there was 44.77% increase ($P < 0.05$).

Storage of spray-dried whole-egg Powders at ambient temperature from 1-18 months resulted in gradual losses of Vitamin E. With the greatest losses occurring in those powder with the highest initial content (Whale *et al.*, 1993). In our study there is a significant relationship between the initial content of Vitamin E and the losses of Vitamin E after 6 months of storage ($P < 0.05$).

In the production of white wheat flour from whole grain wheat, the vitamin E content is reduced by about 50% due to the removal of bran and germ, this reduction of vitamin E content is not usually compensated for by fortification, as in the case of some of the B-vitamin the

susceptibility of vitamin E to oxidation is another important cause of losses during processing and storage in its function as natural antioxidant, the oxidation of vitamin E prevents lipid oxidation especially of polyunsaturated fatty acids (Wennermark and Jagerstad, 1992).

The snack food manufacturer uses a wide range of ingredients of which the oils fats offer the highest potential risk of rancidity in the autoxidation of fats, unsaturated fatty acids are oxidized to hydro peroxides which on subsequent decomposition yield a number of saturated and unsaturated aldehydes and ketones (WHO, 1972) Bakery products prepared with fat stabilized with various concentration of tocopherol are appreciably more resistant, to rancidity than samples (WHO, 1972). The oxidation of fat-containing food is a serious problem in the food industry. Besides resulting in the

Al-Shawabkeh and Mazahreh: Evaluation of Fat and Vitamin E in Some Cookies Diet

Table 2: Moisture % and Fat % in Some Special Snack Diet in Three Firms

Kind of Product	No.	Firm A		Firm B			Firm C			
		Moisture*		Fat*		Moisture	Fat	Moisture	Fat	
		Begin-ning	End of storage	Begin-ning	End of storage					Begin-ning
Digestive Biscuit P = 0.000	1	3.30	4.67	17.21	2.81	4.22	18.93	2.31	3.48	19.26
	2	3.46	4.42	17.54	2.92	4.30	18.95	2.29	3.67	18.76
	3	3.52	4.39	16.89	2.98	4.19	19.12	2.08	3.47	18.81
	4	3.61	4.36	18.02	2.86	4.20	19.23	2.13	3.41	19.12
	5	3.41	4.70	17.89	2.83	4.25	19.19	2.21	3.53	19.28
	Mean	3.46	4.51	17.51	2.88	4.23	19.11	2.20	3.51	19.06
S.D.	0.12	0.16	0.64	0.69	0.44	0.82	0.98	0.98	0.84	
Biscuit with fiber P = 0.003	1	3.62	4.58	20.18	2.62	4.14	20.39	3.65	4.36	22.02
	2	3.57	4.69	20.23	2.74	4.18	21.07	3.64	4.28	22.13
	3	3.68	4.82	20.67	2.69	4.13	21.92	3.49	4.12	21.75
	4	3.74	4.79	20.43	2.73	4.16	21.65	3.38	4.23	21.67
	5	3.49	4.63	20.51	2.89	4.76	20.86	3.51	4.21	22.10
	Mean	3.62	4.70	20.40	2.73	4.27	21.18	3.53	4.24	21.93
S.D.	0.97	0.10	0.87	0.99	0.27	0.93	0.11	0.89	0.88	
Biscuit without sugar with fiber P = 0.000	1	3.65	4.33	11.47	4.02	5.03	12.25	3.72	4.45	11.87
	2	3.61	4.53	10.94	3.89	5.09	12.29	3.68	4.49	11.76
	3	3.66	4.82	10.92	3.92	4.98	12.30	3.62	4.56	12.21
	4	3.59	4.55	11.32	3.95	4.95	11.95	3.75	4.51	12.13
	5	3.63	4.66	11.37	3.86	5.01	11.91	3.71	4.57	12.06
	Mean	3.63	4.58	11.20	3.93	5.01	12.14	3.70	4.52	12.01
S.D.	0.29	0.18	0.92	0.61	0.53	0.89	0.49	0.49	0.67	
Toast Bread P = 0.000	1	3.48	6.62	2.62	3.39	6.81	2.38	3.37	6.56	2.41
	2	3.33	6.59	2.59	3.42	6.71	2.26	3.43	6.52	2.38
	3	3.53	6.37	2.42	3.46	6.42	2.41	3.49	6.50	2.37
	4	3.66	7.17	2.43	3.40	6.91	2.30	3.35	6.62	2.36
	5	3.76	6.72	2.54	3.45	6.82	2.35	3.44	6.63	2.33
	Mean	3.55	6.69	2.52	3.42	6.73	2.34	3.42	6.57	2.37
S.D.	0.17	0.29	0.35	0.30	0.19	0.28	0.56	0.58	0.31	
Toast Bread without Salt P = 0.001	1	5.82	7.01	3.34	5.46	7.13	3.42	4.82	7.02	3.40
	2	5.22	6.89	2.96	5.35	7.22	3.39	4.76	7.08	3.49
	3	5.61	7.26	3.06	5.63	7.27	3.32	4.72	7.12	3.38
	4	5.73	7.32	3.12	5.66	7.30	3.40	4.65	7.23	3.39
	5	5.53	6.95	3.25	5.52	7.41	3.46	4.69	7.19	3.32
	Mean	5.58	7.09	3.15	5.52	7.27	3.40	4.73	7.13	3.40
S.D.	0.23	0.19	0.36	0.13	0.10	0.42	0.65	0.84	0.35	

*P > 0.05 The different is not significant important.

Table 3: The Average of Moisture % and Fat % and Vitamin E for the Five Products in Three Firms

	Firm A	Firm B	Firm C	Mean	S.D.
Moisture % Beginning * P = 0.21	3.97	3.70	3.52	3.73	0.91
Moisture % at the end ** P = 0.62	5.52	5.50	5.19	5.40	1.30
Fat % *** P = 0.928	10.96	11.63	11.75	11.45	7.73
Vitamin E % Beginning **** P = 0.383	3.16	2.86	2.84	2.96	0.89
Vitamin E % at the end ***** P = 0.001	2.30	1.64	1.81	1.92	0.69

*P > 0.05, **P > 0.05, ***P > 0.05, ****P > 0.05, *****P < 0.05

development of off-flavors, Oxidation of lipids causes other undesirable effects such as discoloration and nutritional losses especially losses of E vitamin, in this study vitamin E content of the snack food was significantly decreased after the storage period (P < 0.05). Tocopherols are quite commonly used for the stabilization of fats and fatty products against oxidation (Matz, 1993). A natural Tocopherols, a material derived from vegetable oil distillate additives increases the vitamin content of finished products, which may-be an added incentive to snack diet provide a natural source of

vitamin E and protect freshness of the Snack diet. We find a significant. Relationship between the decrease of vitamin E content and with the fat% in the snack diet (P > 0.05) and with the increase of moisture% in the snack diet.

Conclusion: The result of this study showed that loss of Vitamin E during the storage of special snack diet for 6 months in average 35.47% and with increase of moisture percentage in products during storage period. Specified amount of Vitamin E is recommended to be

Al-Shawabkeh and Mazahreh: Evaluation of Fat and Vitamin E in Some Cookies Diet

added to offset the effects off losses during storage, if Fatty-Diets is packed in opaque containers, it will retain its freshness and precious store of antioxidants for many years. Vitamin E is powerful antioxidant in our bodies and in our foods specially in fat and fatty foods.

References

- AOAC, 1990. Official methods and recommended practices of the americal oil chemists society (4th ed.), firestone d. American oil chemists society, champaign il, USA, method Ca 5a-40, Cd 8-53.
- Whale, K.W., P.P. Hoppe and G. McIntosh, 1993. Effects of storage and various intrinsic vitamin E. Concentrations on lipids oxidation in dried egg powders. *J. Sci. Food Agric.*, 61: 463-469.
- Chavan, J.K. and S.S. Kadam, 1993. Nutritional enrichment of bakery products by supplementation with nonwhite flours, *Cr. Rev. in Food Sci. and Nutr.*, 33: 189-226 .
- Gaziano, J.M., 1996. Antioxidants in cardiovascular disease: Randomized Trials; *Nutr. Rev.*, 54: 175-177.
- Harris, R.E., L.A. Boxer and R.L. Baehner, 1980. Consequences of vitamin E deficiency on the phagocytic and oxidative function of the rat polymorphnuclear leukocyte blood, 55: 338-343.
- Hathcock, J.N., 2005. Vitamins E and C are safe across a broad range of intakes, *Am. G. Nutr.*, 81: 736-745.
- Kanno, C., H. Kobayashi and K. Yamavchi, 1989. Transfer of orally administered α -tocopherol into human milk. *J. Nutr. Sci.*, 35: 649-653.
- Lehmann, J., M.S. Martin and H.L. Lashley, 1986. Vitamin E in foods from high and low linoleic acid. *Diets J. Am. Diet. Ass.*, 86: 1208-1216.
- Matz, S.A., 1993. *Snack food technology*, 3rd Ed., vanno strand rein bold/AV, New York, U.S.A, pp: 116-172.
- McLaughlin, P.J. and J.L. Weilhrauch, 1979. Vitamin E content of foods. *J. Am. Dietetic Ass.*, 75: 647-665.
- Tsen, C.C., 1976. Regular and protein fortified cookies from composite flours. *Cereal Foods World*, 21: 633-640.
- Wennermark, B.H. and M. Jagerstad, 1992. Bread making and storage of various wheat fractions affect vitamin E. *J. Food. Sci.*, 57: 1205-1209.
- WHO, 1972. A review of the technological efficiency of some antioxidants and synergists, WHO Food additives series, No. 3. Geneva.
- Woodall, A.A., G. Britton and M.J. Jackson, 1996. Dietary supplementation with carotenoids: effects on- α tocopherol levels and susceptibility of tissues to oxidative stress. *Br. J. Nutr.*, 76: 307-317.
- Yusuf, S., 2000. Vitamins E. supplementation and cardiovascular events in high-risk patients. *The New Eng. J. Med.*, 20: 154-159.