Nutrition & Food Science
International Journal
ISSN 2474-767X

Juniper Publishers
key to the Researchers

Research Article
Volume 6 Issue 4 - May 2018
DOI: 10.19080/NFSIJ.2018.06.555693

Nutri Food Sci Int J

The Effect of Walnut Addition on Chemical and Sensory Properties of Cheese Halva

Binnur Kaptan* and Sefik Kurultay

Department of Food Engineering, Namik Kemal University, Turkey

Submission: February 15, 2018; **Published:** May 09, 2018

***Corresponding author:** Binnur Kaptan, Department of Food Engineering, Namik Kemal University, Tekirdag, Turkey, Email: bkaptan@nku.edu.tr

Abstract

Cheese halva, which is produced in several regions of Turkey with different names, is one of the popular milk desserts. This dessert is made from fresh unsalted cheese and called "Cheese Halva" or cheese dessert. Sugar, flour and sometimes egg yolk are added to unsalted ewe's or goat milk cheese according to season changes in cheese halva production. Cheese halva is sweetened by adding refined sugar or honey into the fresh unsalted cheese.

In this research, the effects of walnut addition at different proportions of ground and crushed walnut on some physicochemical properties of cheese halva were determined. Ground and crushed walnuts were added and mixed at three different ratios 5%, 10% or 15%, respectively.

Keywords: Cheese halva; Walnut; Quality characteristics; Cheese dessert; Dietary; Fiber

Introduction

Walnut is one of the significant fruit species that are gaining importance nowadays in terms of dietary fiber source, its nutrient elements and benefits for human health. Walnut, mostly consumed as snack, is the primary functional foodstuff due to its fat composition (generally oleic acid), protein, carbohydrate, fiber, vitamins (vitamin E), minerals, phytocetiroles (β-cytositerol) and antioxidant phenolic compounds. It is rich in vitamins containing thiamin, vitamin B6, folacin and iron, zinc, copper, magnesium, phosphorus and potassium [1]. Walnut does not contain cholesterol and it is very rich in polyunsaturated fatty acids such as alphalinolenic and linoleic acid that are very important for human health [2]. Linolenic acid inhibits inflammation, hardening and embolism of arteries by decreasing the blood pressure [3]. It protects the body against cardiovascular diseases and diabetes by reducing cholesterol [4-8]. Walnut protects the body against some types of cancer [9,10]. Moreover, it eliminates eczema, heals wounds, protects stomach and intestine from diseases, and assists losing weight in a healthy way [11,12]. Walnut can be consumed directly as dried and is also used in the production of pastry, cake, confectionery, dessert and various dairy products (cheese, ice cream, milk puddings) to improve flavor and taste, and to enrich foods by using its flavor enhancer properties [13].

Cheese halva is a milk dessert. Unsalted fresh cheese obtained from ewe's or cow's milk is used for production of cheese halva with the addition of sugar, flour and sometimes egg yolk [14]. It is a delicious traditional dessert, rich in protein, fat, minerals and vitamins and also it is a nutritious milk product. It is important to enrich flavor and aroma with different dried fruits used in the production of sugary deserts in terms of increasing the diversity of the product and bringing a new feature to the product. Furthermore, the enrichment of products with various mouth-pleasing dried fruits in the production of cheese halva and creating a new formula are important for the future value of this dessert. The most of the manufacturers have produced the Cheese halva as plain form, currently. On the other hand; walnut with a high nutritious characteristics and functional properties because of its dietary fiber source is added into the cheese halva to provide flavor diversity and functionality to the final product.

Material and Methods

Materials

Milk used in the production of cheese halva was obtained from Namik Kemal University Zootechnics Dairy Plant. Calcium chloride (Merck), starter culture (Chr. Hansen, Denmark) and rennet used in the production of curd were commercially obtained. Sugar, flour, eggs and walnuts were supplied from local markets.

Curd production (Fresh cheese): For the curd production, milk was pasteurized at 70 °C for

15 seconds and then cooled to the fermentation temperature (30 °C). After that, liquid rennet (1/10,000 strength) was added to milk by diluting 1:10 ratio and hold for 90 minutes to complete coagulation. The resulting coagulum was broken and then whey was filtered. The obtained curd was divided into seven equal parts at determined ratios, one being control part, for the production of cheese halva.

Cheese halva production: For the production of cheese halva, 1kg of curd and one egg yolk were mixed occasionally and melted at a medium temperature. Then, 150g flour was added and cooked for 10-15minutes until a consistent texture was obtained. Then, 600g sugar was added to the mixture and cooked (3-5min). Ground and crushed walnuts were added at 5%, 10% or 15% ratios and mixed when the mixture was allowed to cool to the room temperature. The resulting mixture was packaged in plastics packets as 100grams portions and then stored at +4 °C until chemical and organoleptic analyses.

Analyses

Analyses for walnut: Dry matter was analyzed by gravimetric method [15], fat analysis wascarried out by Soxhelet extraction [16] and the amount of protein was determined by Kjeldahl method [16].

Analyses for cheese halva: Dry matter was analyzed by gravimetric method [17]. Soxhelet extraction was applied for analysis of fat content [17]. Total sugar content was determined by Luff-Schoorl method [18]. For ash analysis, the AOAC method was followed [16]. The protein content of cheese helva was calculated by Kjeldahl method [19]. The appearance, color, aroma and flavor characteristics of the samples were evaluated by seven panelists based on a total of 25 points with each characteristic being 5 points [19].

Statistical analysis: Simple variance analysis was performed using SPSS statistical softwareand the Duncan test was applied to determine whether the differences between the groups were significant.

Results and Discussion

The results of chemical analysis for walnut used in the production of walnut cheese halva are given as mean values in Table 1.

Table 1: Mean and standard deviation values of the composition of walnut used in cheese halva production (n=3).

	Mean ± Std. D.
Dry Matter (%)	97.12±0.32
Protein (%	18.71±0.07
Fat (%)	76.79±0.19
Ash (%)	1.613±0.06
K (mg/kg)	3146±23.2
Ca (mg/kg)	770.7±10.1
Mg (mg/kg)	1367±43.0
P (mg/kg)	2848±17.6
Cu (mg/kg)	10.66±0.47
Mn (mg/kg)	21.27±0.13
Fe (mg/kg)	31.66±0.28
Zn (mg/kg)	22.43±0.12

It was determined that the results of chemical analysis of walnut were consistent with those reported in the literature. The dry matter values were found between 93.3% and 97.51% [20,21], protein between 12.48% and 19.6% [22,23] and fat between 59.18% and 71.43% [22,23] in earlier researches.

Chemical properties

The results of seven cheese halva samples including one control prepared by adding ground and crushed walnuts at different ratios (5%, 10%, and 15%) are shown in Table 2.

Table 2: Mean and standard deviation values of the chemical characteristics of cheese halva samples prepared by adding ground and crushed walnuts at different ratios (n=3)

	Crushed Walnut added Cheese Halva				Ground Walnut added Cheese Halva		
Proximate Composition (%)	Control	5(%)	10 (%)	15 (%)	5 (%)	10 (%)	15 (%)
Dry Matter	72.92±0.22^{a}	75.37±0.17^{b}	77.77±0.07^{c}	80.37±0.15^{d}	73.68±0.18^{b}	75.04±0.14^{c}	77.75±0.15^{d}
Protein	8,35±0.04^{a}	9.28±0.03^{b}	10.11±0.08^{c}	11.15±0.04^{d}	8.96±0.04^{b}	9.64±0.01^{c}	10.66±0.05^{d}
Fat	16.55±0.05^{a}	20.35±0.03^{b}	24.17±0.09^{c}	28.02±0.01^{d}	19±0.03^{b}	21.97±0.05^{c}	25.94±0.04^{d}

How to cite this article: Binnur K , Sefik K. The Effect of Walnut Addition on Chemical and Sensory Properties of Cheese Halva. Nutri Food Sci Int J. 2018; 6(4): 555693. DOI: 10.19080/NFSIJ.2018.06.555693.

Ash	1.04±0.01[a]	1.12±0.01[b]	1.21±0.04[c]	1.27±0.02[d]	1.09±0.01[b]	1.15±0.01[c]	1.22±0.02[d]
Starch	5.43±0.05[d]	5.16±0.04[c]	4.89±0.04[b]	4.62±0.04[a]	5.16±0.04[c]	4.89±0.04[b]	4.62±0.04[a]
Total Sugar	41.54±0.11[d]	39.47±0.11[c]	37.39±0.1[b]	35.31±0.1[a]	39.47±0.00[c]	37.39±0.00[b]	35.3±1.00[a]

For each column, different letters mean that values are statistically different (P<0.01).

As shown in Table 2, the dry matter contents of the samples prepared with 15% crushed and ground walnuts addition were found between 77.75% and 80.37%. As can be accepted that the addition of walnuts at two different forms and three different ratios made a significant difference in the dry matter contents of samples (p<0.01).

The lowest protein content (8.964%) was found in the 5% crushed walnut added cheese halva while the highest protein content (11.15%) was determined in the 5% ground walnut added cheese halva. Addition of walnut to cheese halva to enhance flavor was an effective process changing the protein contents at significant level (p <0.01). Significant increase was determined in the fat content of test samples compared to that of the control sample (p <0.01). The decreasing particle size and increasing the surface area of walnut by grinding may have been effective in increasing the fat content of samples. When the test samples were compared with respect to the ash content, the control cheese halva had 1.0367% ash, while it was 1.2743% in the 15% ground walnut added sample. The walnut addition affected the ash contents of samples significantly (p <0.01). The apparent decrease in starch and total sugar content of the cheese halva samples was observed for the walnut added samples compared with control group. The decreases in these characteristics were found statistically significant with increasing walnut ratios (p <0.01).

Sensory properties

The sensory analyses carried out with seven member panelists group for color, appearance, texture, consistency, flavor and aroma and overall points characteristics are shown as mean values in Table 3. The perfect point was 5 points for each determined parameters and also 25 points totally.

Table 3: Mean results of sensory characteristics of cheese halva samples prepared by adding ground and crushed walnuts at different ratios.

		Color	Appearance	Structure and Consistency	Taste	Aroma	Overall Acceptability
	Control	4.52	4.49	4.61	4.33	4.67	22.62
Crushed	**5 (%)**	4.36	4.33	4.31	3.33	4.55	20.88
Walnut	**10 (%)**	4.33	4.27	4.37	3.42	4.58	20.97
Cheese Halva	**15 (%)**	4.21	4.21	4.41	3.47	4.69	20.99
Ground	**5 (%)**	4.17	4.27	4.41	4.47	4.65	21.97
Walnut	**10 (%)**	3.96	4.32	4.42	4.57	4.69	21.96
Cheese Halva	**15 (%)**	3.73	4.43	4.52	4.61	4.71	22

While the samples prepared with crushed walnut had lower sensory points, cheese halva samples prepared with ground walnuts obtained higher scores from panelists and found to have a pleasant flavor. Especially in the taste points, crushed walnut added samples had the lowest points because of the high level of fat oxidation of the crushed walnut as a result of higher surface exposure to oxygen.

Conclusion

In conclusion, traditional tastes like as Cheese Halva have been consumed for ages in Turkey with different names and processing technics. In this study, addition of crushed or ground walnut may be thought as an alternative product for manufacturers for serving to consumers. It increases nutritional quality of the product and gives a stronger aroma, which makes the product commercially attractive for consumers.

References

1. Lavedrine F, Ravel A, Villet A, Ducros V, Alary J (2000) Mineral composition of two walnut cultivars originating in France and California. Food Chemistry 68(3): 347-351.
2. Amaral JS, Casal S, Pereira JA, Seabra RM, Oliveira BP (2003) Determination of sterol and fatty acid compositions, oxidative stability, and nutritional value of six walnut (*Juglans regia L.*) cultivars grown in Portugal. J Agric Food Chem 51(26): 7698-7702.
3. Tapsell LC, Gillen LJ, Patch CS, Batterham M, Owen A, et al. (2004) Including walnuts in a low-fat/modified-fat diet improves HDL cholesterol-to-total cholesterol ratios in patients with type 2 diabetes. Diabetes Care 27(12): 2777-2783.
4. Rajaram S, Haddad EH, Mejia A, Sabate J (2009) Walnuts and fatty fish influence different serum lipid fractions in normal to mildly hyperlipidemic individuals: a randomized controlled study. Am J Clin Nutr 89(5): 1657S-1663S.
5. Delgado-Lista J, Perez-Martinez P, Lopez-Miranda J, Perez-Jimenez F (2012) Long chain omega-3 fatty acids and cardiovascular disease: a systematic review. Br J Nutr 107(Suppl 2): S201-S213.

How to cite this article: Binnur K , Sefik K. The Effect of Walnut Addition on Chemical and Sensory Properties of Cheese Halva. Nutri Food Sci Int J. 2018; 6(4): 555693. DOI: 10.19080/NFSIJ.2018.06.555693.

6. Li TY, Brennan AM, Wedick NM, Mantzoros C, Rifai N, et al. (2009) Regular Consumption of Nuts Is Associated with a Lower Risk of Cardiovascular Disease in Women with Type 2 Diabetes. The Journal of Nutrition 139(7): 1333-1338.
7. Kendall CW, Esfahani A, Josse AR, Augustin LS, Vidgen E, et al. (2011) The glycemic effect of nut-enriched meals in healthy and diabetic subjects. Nutr Metab Cardiovasc Dis 21(Suppl 1): S34-S39.
8. Reiter RJ, Tan DX (2003) Melatonin: a novel protective agent against oxidative injury of the ischemic/reperfused heart. Cardiovascular Research 58(1): 10-19.
9. Hardman WE, Ion G (2008) Suppression of implanted MDA-MB 231 human breast cancer growth in nude mice by dietary walnut. Nutr Cancer 60(5): 666-674.
10. Carvalho M, Ferreira PJ, Mendes VS, Silva R, Pereira JA, et al. (2010) Human cancer cell antiproliferative and antioxidant activities of Juglans regia L. Food Chem Toxicol 48(1): 441-447.
11. Martinez-Gonzalez MA, Bes-Rastrollo M (2011) Nut consumption, weight gain and obesity: Epidemiological evidence. Nutr Metab Cardiovasc Dis 21(Suppl 1): S40-S45.
12. Bes-Rastrollo M, Sabate J, Gomez-Gracia E, Alonso A, Martinez JA, et al. (2007) Nut consumption and weight gain in a Mediterranean cohort: The SUN study. Obesity 15(1): 107-116.
13. Matta Z, Chambers E, Naughton G (2005) Consumer and Descriptive Sensory Analysis of Black Walnut Syrup. Journal of Food Science 70(9): S610-S613.
14. Kurultay Ş, Öksüz Ö, Kaptan B (2009) Proving of the cheese Halva (Höşmerim) manufacturing process . International Journal of Dairy Technology 62(1): 63-67.
15. Anonymous (1991) Walnut standard (Standard No: TS 1276). TSE, Ankara, Turkey.
16. AOAC (2000) Official methods of analysis (17th edn) Association of Official Analytical Chemists, Washington, DC, USA.
17. Anonymous (2015) Turkish Food Codex Communiqué on "Tahin Halva", Turkey.
18. Matissek R, Schnepel FM, Steiner G (1992) Lebensmittelanalytik: Grundzüge Methoden-Anwendungen, (2nd Edn), Springer-Verlag Berlin, Germany.
19. Anonymous (1988) Food Inspection and Analysis Methods. Ministry of Agriculture, Forestry and Rural Affairs, General Directorate of Protection and Control, Bursa, Turkey.
20. Al-Bachir M (2004) Effect of gamma irradiation on fungal load, chemical and sensory characteristics of walnuts *(Juglans regia L.)*. Journal of Stored Products Research 40(4): 355-362.
21. Savage GP (2001) Chemical composition of walnuts *(Juglans regia L.)* grown in New Zealand. Plant Foods Hum Nutr 56(1): 75-82.
22. Garcia JM, Agar IT, Streif J (1994) Lipid characterization in kernel from different walnut cultivars. Turk J Agric For 18: 195-198.
23. Zwarts L, Savage GP, McNeil DL (1999) Fatty acid content of New Zealand-grown walnuts *(Juglans regia L.)*. Int J Food Sci Nutr 50(3): 189-194.

DOI: 10.19080/NFSIJ.2018.06.555693

How to cite this article: Binnur K , Sefik K. The Effect of Walnut Addition on Chemical and Sensory Properties of Cheese Halva. Nutri Food Sci Int J. 2018; 6(4): 555693. DOI: 10.19080/NFSIJ.2018.06.555693.