1st International Multidisciplinary Conference on Nutraceuticals and Functional Foods
Current Research in Nutrition and Food Science Vol. 4(SI. 2), 32-36 (2016)

Cream Zahter: A Functional Food Some Chemical and Sensory Properties

IBRAHIM HAYOGLU*, BULENT BASYIGIT, GULSEREN HAYOGLU and A.FERIT ATASOY

Faculty of Agriculture, Food Engineering Department, Harran University, Þanlýurfa, Turkey.

http://dx.doi.org/10.12944/CRNFSJ.4.Special-Issue-October.05

(Received: August, 2016; Accepted: September, 2016)

ABSTRACT

Zahter is a traditional product for breakfast containing seeds of watermelon and melon, roasted chickpea, sesame, thyme, cumin, black cumin, fennel, coriander, anise, bulgur, koruk (dried unripe grape), citric acid, sumac, hot red ground pepper and salt although it varies from one factory to another and rely mainly on small scale home productions. All or some of the above mentioned ingredients are mixed and milled at different ratios and served as powder. It is consumed together with natural olive oil making it more attractive with respect to nourishment and health aspects. The objective of this study obtained a functional product which is ready to spread on bread by mixing olive oil, olive oil-turpentine oil and olive oil-turpentine with zahter. There were three products in different ratios. First the ratio of zahter: olive oil in the emulsion was 69:31. Second the ratio of zahter:olive oil, turpentine oil in the emulsion were 69:20:11. Third The ratio of zahter:olive oil, turpentine in the emulsion were 52:17:31. When compared with simple zahter, antioxidant capacity, phenolic compounds of each combination were higher. Furthermore it is thought that these combinations have has the effect of synergy for fat-soluble vitamins (A,D,E,K) because they contain olive oil especially and turpentine oil. According to the results of sensory analysis done, panelists gave the highest score for second emulsion which contained zahter, olive oil and turpentine oil and the lowest score for third emulsion which contained zahter, olive oil and turpentine.

Keywords: Zahter, olive oil, turpentine oil, turpentine oil, phenolic, antioxidant.

INTRODUCTION

Zahter is a traditional product for breakfast and it is made by mixing different ingredients such as salt, hot red ground pepper, sumac, citric acid, bulgur, cumin, dried unripe grape (koruk), anise, coriander, terebinth, sesame, watermelon, melon seeds, roasted chickpea, thyme and fennel. The mixture contains different ratio of each ingredients. While this mixture prepare, milled and processed using different traditional techniques in different parts of the south eastern region of Turkey.

Zahter is usually inedible alone, it is consumed together with olive oil. Zahter mix uses as a medical ingredients as well as cholesterol lowering effect. However information which is about chemical and organoleptic properties of this mixture was limited.

It was Investigated the bioavailability of iron from local plants (black cumin seeds, milk thistle seeds, sesame seeds and thyme leaves). Iron was better utilized from black cumin seeds. However, thyme had the highest iron absorption level but lowest utilization[1]. It was studied clove, bitter cumin, cinnamon and pepper. Bitter cumin showed the highest inhibitory activity, and the level of the antioxidative effect decreased in the order of bitter cumin > cumin > black cumin. It was attributed differences in antioxidative activity to the phenolic content of three cumin varieties[2]. It was found that thyme extract inhibits in vitro growth of *Aspergillus parasiticus NRRL 2999*[3]. It was a great diversity

in composition of zahter samples depending on proportion of ingredients in mixture. It was found that zahter contained: protein 16-19 %, fat 9-19 %, ash 4-7%, cellulose 5-6%, moisture 3-5%. It was stated that because zahter is mainly produced at home or by some small scale enterprises, its formulation, gross composition and taste vary greatly. In addition, lack of a standard for processing also causes diversity in properties of zahter in market [4].

Olive oil is the most consumed edible oil in the Mediterranean region, particularly in Spain, Italy and Greece, the largest olive oil producers. The significance of extra virgin olive oil is not only attributable to its unique sensorial and nutritional benefits but also due to its demonstrated health benefits, such as reduction of cardiovascular diseases, prevention of atherosclerosis or antioxidant properties[5,6]. The health benefits of olive oil can be related with its chemical composition which has effect on olive oil oxidative stability and quality[7]. Olive oil chemical composition consists of TAG (99%) and free fatty acids, mono- and diacylglycerols, and lipids such as hydrocarbons, sterols, aliphatic alcohols, tocopherols, and pigments fatty acid composition of olive oil includes palmitic (C16:0), palmitoleic (C16:1), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3) acids[8]. Olive oil is resistant to oxidation because of its low polyunsaturated fatty acid composition and high contents of a-tocopherol and phenolic contents[9]. Phenolic compounds are the minor compounds in olive oils with high antioxidant activity providing nutritional and sensorial properties. Carotenoids exhibit antioxidant effect on virgin olive oils by quenching singlet oxygen inhibiting photosensitized oxidation[10].

Pistacia terebinthus, a member of the family *Anacardiaceae*, is a perennial plant which widely grows in the southern and western regions of Turkey, and is called “menengic” in Turkish. Its small fruits are globular nuttlets which are dark greenish when riped[11]. In various regions of the world, different organs of turpentine tree are collected for several purposes. Its fresh shoots and fruits are used for human nutrition. The fruits have been regarded as an appetizer in Southern Turkey for several thousand years. The fruits are also used in the baking of a special village bread and as a coffee substituent. Also, the fruits of turpentine are used in folk medicine for gastralgia (internally), rheumatism and cough (externally) and as stimulant, diuretic and antitussive[12,13,14,15].

The essential oil of turpentine is liquid with yellowish colour and characteristic smell. In previous studies, the characteristic compounds of Chios turpentine resin were a-pinene, b-pinene, sabinene and terpinen-4-ol[16]. In another work, it was studied the turpentine tree (P. terebinthus) as an essential oil plant [17].

The objective of this study obtained a functional product which is ready to spread on bread by mixing olive oil, olive oil-turpentine oil and olive oil-turpentine with zahter. There were three products in different ratios.

MATERIALS AND METHODS

In this research, three different formulations were employed for zahter production.

As can be seen in Figure 1, ingredients used in zahter formulation were selected and washed. Some ingredients such as melon, watermelon were washed especially because of impurities and they should be suitable humidity for roasting. All ingredients except salt, red pepper, unripe grape and citric acid were roasted separately. Because product has to gain characteristic taste, aroma and also when milled, it should be available structure. All roasted ingredients were cooled except sesame seed. And then they were mixed with each other in a cap. After mixing, salt, pepper were added and then milled. After rough part was removed by eliminating, sesame was added and mixed. The products were packaged in 250 g polyethylene pouches. After prepared zahter, olive oil, turpentine oil and turpentine were added different ratios into zahter. There were three products in different ratios. First the ratio of zahter: olive oil in the emulsion was 69:31. Second the ratio of zahter:olive oil, turpentine oil in the emulsion were 69:20:11. Third The ratio of zahter:olive oil, turpentine in the emulsion were 52:17:31. The products were analyzed for moisture, crude cellulose and ash[18], fat and protein[19], The total phenolic content of products extracts (80% methanolic of extracts of zahter) was estimated using the Folin–Ciocalteu method described by

Thippeswamy and Naidu[20] and Taga et al,[21] and results were expressed as mg per gram dry weight of gallic acid equivalents (GAE), antioxidant activity of products extracts was estimated using the DPPH (2,2-difenil-1-pikrilhidrazil) radical scavenging method described by Thippeswamy and Naidu [20] and Shimada et al, [22], and results are expressed as IC50 (half maximal inhibitory concentration) values, Cu, Mn, Fe, Zn, P, K, and Na contents were determined using nitric acid:perchloric acid (4:1(v/v)) digestion procedure on the hot plate. The digested sample was diluted with HPLC grade water and filtered through ashless filter paper (Whatman 42), the minerals were determined by measuring their absorbance values with atomic absorption spectrometer (Varian Spectra A-220 FS)[23].

These products were organoleptically evaluated with respect to color, smell, taste and overall, by thirty students of Food Engineering

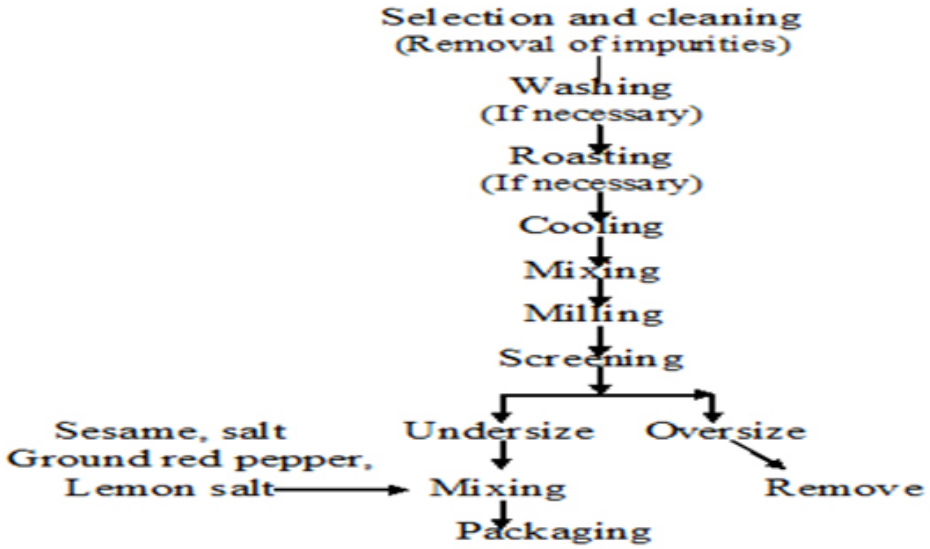

Fig. 1: A schematic production flow chart for zahter

Table 1: Results of Some Chemical Analyses in Samples

Analyses	The lowest value	The highest values
Moisture (%)	4,50±0,51	4,75±0,52
Protein (%)	16,53±0,29	19,30±0,30
Fat (%)	13,15±0,08	19,97±0,11
Cellulose (%)	5,94±0,13	9,46±0,15
Total Phenolic Content (mg GA g^{-1})	24,14±0,33	33,16±0,10
IC50 Values (mg dry weight)	0,037±0,01	0,058±0,03
Ash (%)	4,80±0,43	6,63±0,39
Cu (mg $100g^{-1}$)	3,25±0,21	13,63±0,64
Mn (mg $100g^{-1}$)	13,10±0,48	23,10±0,49
Fe (mg $100g^{-1}$)	40,83±0,34	64,73±0,27
Zn (mg $100g^{-1}$)	34,90±0,25	55,73±0,16
P (mg $100g^{-1}$)	2090,02±0,32	3996,72±0,36
K (mg $100g^{-1}$)	2632,5±0,36	6825,0±0,39
Na (mg $100g^{-1}$)	3450,0±0,39	7590,0±0,36

Department, Agricultural Faculty of Harran University, Turkey. The data were reported as means ± standard deviation of means.

RESULTS AND DISCUSSIONS

Standard deviations of some chemical properties of samples are shown in Table 1. Moisture content of zahter changed between 4.50 and 4.75 % this ratio is rather low. So when these products keep good condition, they have long storage period. Protein content of zahter samples ranged between 16 and 19 % which is rather high. The maximum ash content of zahter was determined as 6.63%. Variation in the fat content could be attributed to proportion of sesame, olive oil, turpentine oil and turpentine in the formulation. In parallel to these ingredients, the fat contents varied. Fat content of samples ranged between 13 and 19%. zahter is consumed together with olive oil containing monounsaturated and polyunsaturated fatty acids that are important for human health and also when it is consumed with other ingredients which are turpentine oil, turpentine.

Cellulose ranged between 13 and 19% in samples. Cellulose content plays important role for body because it adjusts functions of digestion system. So the more it is the beter. As can be seen from the Table 1, IC50 Values were change 0.037 and 0.058 mg g^{-1} dry matter by depending on ingredients. There is an inverse proportionality between IC50 and antioxidant effect. Total phenolic content of samples were change 24,14 and 33,16 mg GA g^{-1} . it was thought that this change occurred ingredients which was added to zahter. Moreover we found a significant ($p<0.05$) correlation between phenolic components and antioxidant capacity.

When zahter which contains melon an watermelon seeds, sesame, terebinth and sumac mixed with olive oil, turpentine oil and turpentine, these samples contained high levels of minerals because of both zahter content and ingredients. Additionally, chemical structure of zahter was affected because of not only process but also ingredients. Furthermore it was thought that these combinations had the effect of synergy for fat-soluble vitamins (A,D,E,K) because they contain olive oil especially and turpentine oil.

According to the results of sensory analysis, panelists gave the highest score for second emulsion which contained zahter, olive oil and turpentine oil and the lowest score for third emulsion which contained zahter, olive oil and turpentine, because of texture of emulsion.

CONCLUSIONS

It was found that zahter contains unsaturated fatty acid and minerals. Zahter can consume alone but when it mixe with olive oil, turpentine oil and turpentine, its fucntional properties which are total phenolic contents, antioxidant capacity. Additionally, in parallel to antioxidant capacity, phenolic contents change.

In recent years, Zahter consumption increase continuously so this functional product which is ready to spread on bread by mixing olive oil, olive oil-turpentine oil and olive oil-turpentine with zahter may be suggested as a side dish for breakfast with its unique sensory characteristics.

REFERENCES

1. Abu Jadayil, S., Tukan, S.K. and Takruri, H.R. Plant Foods for Human Nutrition. *Formerly Qualitas Plantarum,* **54**(4) 285 – 294 (1999).
2. Thippeswamy, N.B. and Naidu, K.A. Antioxidant potency of cumin varieties- cumin, black cumin and bitter cumin-on antioxidant systems. *European Food Research and Technology.* **220**(5-6) 472-476 (2005).
3. Ozcan, M. Effect of essential oils of some plants used as thyme on the growth of Aspergillus parasiticus NRRL 2999 Strain. *Journal of Essential Oil-Bearing Plants.* **6**(1)55-59 (2003).
4. Hayoglu, I. and Soydinc, H. A traditional product for breakfast: Zahter. GAP III.

Agricultural Congress, 02-03 October 2003, Saliurfa, Turkey (2003).

5. R. Ghanbari, F. Anwar, K.M. Alkharfy, A.H. Gilani, N. Saari, Valuable nutrients and functional bioactives in different parts of olive (Olea europaea L.)—a review, *Int. J. Mol. Sci.* **13**(3); (2012) 1291–1340.
6. S. Poole, M. Blades, The Mediterranean diet – a review of evidence relevant to the food and drink industry, *Nutr. Food Sci.* **43**(1); 7–16 (2013).
7. Bendini, A., Cerretani, L., Carrasco-Pancorbo, A., Go'mez-Caravaca, A. M., SeguraCarretero, A., Fernández-Gutiérrez, A., & Lercker, G. Phenolic molecules in virgin olive oils: A survey of their sensory properties, health effects, antioxidant activity and analytical methods. An overview of the last decade. *Molecules,* **12**, 1679–1719 (2007).
8. Boskou, G., Salta, F. N., Chrysostomou, S., Mylona, A., Chiou, A., & Andrikopoulos, N. K. Antioxidant capacity and phenolic profile of table olives from the Greek market. *Food Chemistry,* **94**, 558–564 (2006).
9. Sevim, D., Tuncay, O., & Köseog¢lu, O. The effect of olive leaf addition on antioxidant content and antioxidant activity of "Memecik" olive oils at two maturity stages. *Journal of American Oil Chemistry Society,* **90**(9), 1359–1369 (2013a).
10. Beltran, G., Aguilera, M. P., Del Rio, C., Sanchez, S., & Martinez, L. Influence of fruit ripening process on the natural antioxidant content of Hojiblanca virgin olive oils. *Food Chemistry,* **89**, 207–215 (2005).
11. Davis, P. H. (1967). Flora of Turkey and the East Aegean Islands (Vol. 2). Edinburgh: Edinburgh University Press.
12. Baytop, T. (1984). Treatment with plants in Turkey (_ Istanbul University Publication No. 3255). Istanbul University, Istanbul (in Turkish).
13. Matthaus, B., & Özcan, M. M. Quantification of fatty acids, sterols and tocopherols turpentine (Pistacia terebinthus Chia) wild growing in Turkey. *Journal of Agriculture and Food Chemistry,* **54**, 7667–7671 (2006).
14. Ozcan, M. Characteristics of fruit and oil of terebinth (Pistacia terebinthus L.) growing wild in Turkey. *Journal of the Science of Food and Agriculture,* **84**, 517–520 (2004).
15. Walheim, L. Western fruit and nuts. HP Books, p. 166 (1981).
16. Papageorgiou, V., Assimoulou, A. N., & Yannovits-Argiriadis, N. Chemical composition of the essential oil of Chios turpentine. *Journal of Essential Oil Research,* **11**, 367–368 (1999).
17. Robeva, P., Genav, K., & Stoyanova, M. Study on the turpentine tree (Pistacia terebinthus) as an essential oil plant. Nauka-zo-Gorata, **27**, 38–46 (1990).
18. Elgun, A., Certel, M., Ertugay, Z. and Kotancilar, H.G. (1998) The Analytical Quality Controls and Laboratory Application Manuals for Agricultural Products. Atatürk Univ. Faculty of Agriculture. Erzurum, p.56.
19. AOAC (1990) Official methods of analysis. 15th edn, Association of Official Analytical Chemists, Washington D.C.
20. Thippeswamy, N.B. and Naidu, K.A. ntioxidant potency of cumin varieties- cumin, black cumin and bitter cumin-on antioxidant systems. *European Food Research and Technology*. **220**(5-6) 472-476 (2005).
21. Taga, M.S., Miller, E.E. and Pratt, D.E. Chia seeds as a source of natural lipid antioxidants. *Journal of the American Oil. Chemists Society,* **61**, 928–993 (1984).
22. Shimada, K., Fujikawa, K., Yahara, K. and Nakamura, T. Antioxidative properties of xanthan on the anti-oxidation of soybean oil in cyclodextrin emulsion. *Journal of Agricultural and Food Chemistry,* , 945–948 (1992).
23. Kacar, B. (1972) Chemical Analyzes for Soil and Plant. Ankara Uni. Fac.of Agriculture. Ankara, No : 453.