EVALUATION AND COMPARISON THE PHYSICOCHEMICAL PROPERTIES OF PASTEURIZED KASHK (TRADITIONAL IRANIAN DAIRY PRODUCT)

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ABSTRACT

Kashk is a whitish thick semi solid or liquid containing the whole milk proteins, used in some traditional Iranian food. In this investigation, it was aimed to measure the physicochemical and sensorial characteristics of 4 different pasteurized kashk. In this samples, mean value for pH, acidity, fat, protein, salt, ash, moisture, calcium and phosphorus content was 4.00, 0.87, 2.01 ,10.95 , 0.57, 1.03 , 74.20, 0.61 and 0.15%, respectively.

Key words: Traditionally fermented Iranian dairy products, Kashk.

INTRODUCTION

Cultural resources of traditionalism are in the sense the outcome from limitations of people's adaptation to environment. Both developed and developing societies need to focus on indigenous and tradition knowledge beside the academic science. Studying on local knowledge offers a valuable opportunity not only for the healthy development of the societies but also for the people-friendly development of knowledge and science from a global point of view (Çakır *et al.,* 2009). So, the scientist should follow the guide to learn from the shepherd's people before they try to teach them (Barani, 2007). In Iran, a different of traditional dairy products are produced such as Doogh, Kashk, Ghara –Ghooroot, Cheese, etc. (Azadnia *et al.*, 2011). The residual liquid of cheese making called whey that is dried by sunlight and called Kashk, a kind of Iranian dried dry dairy product. Also Kashk obtained from yogurt after removal of butter and drying. Kashk is a whitish thick semi solid or liquid containing the whole milk proteins, used in some traditional Iranian food. This method aids pastoralists to convert the milk into new products which contain low level of water and can be stored for a long time with little risk of spoilage. This products are easy to carry because of small volume, low weight which eases their transport to the socioeconomic centers .These products have a negligible fat level due to the removal of fat from the yogurt as butter, so they are nutritionally valuable and healthful and they could be suitable alternatives for other high fat content food stuff (Barani, 2007). Also fermented dairy product is suitable sours of probiotic that has good effect on human health (Tajabadi Ebrahimi *et al*., 2012). Ferdosi (famous Persian poet) in the 10th-century mentioned the Kashk in Shahnameh (Persian book of poetry). This word must have come from Khushk (Persian word that meaning drying) which indicates that this product is prepared through drying process. This product used in traditional Iranian /Persian cuisine, like Kashk O Bademjan, Ash Reshteh, Kale Joosh. It is available as a dried or liquid form. Dried product which needs to be soaked before it can be used in cooking. The shape of the product is conic or cubic balls and sold in sacks in Bazaars in Iran. It is the main protein source of nomad people in Iran (Çakır *et al.*, 2009). In addition to traditional preparing of Kashk, these products are produced commercially and according to high production of this product, studied about its properties is interested. Therefore the aim of this study was compare of the physicochemical characteristics properties of some industrial Iranian Kashk.

MATERIALS AND METHODS

Samples

Four pasteurized kashk randomly selected from local store in Tehran and named A, B, C and D. Sampling of each product was done according to institute of standards and industrial research of Iran number 326.

Methods

The pH value of samples was measured using pH meter. The pH and titratable acidity was measured according to institute of standards and industrial research of Iran number 2852. Moisture, protein and ash were measured

according to the method of institute of standards and industrial research of Iran number 637, 639 and 1755, respectively. Salt content was measured according to the method of institute of standards and industrial research of Iran number 1809. Calcium and phosphors were measured according to institute of standards and industrial research of Iran number 1989.

Data Analysis

Data collected from the aforementioned study samples were analyzed based on 0.05% coefficient of error by a software program. The data analysis was performed using MINITAB statistical software, release 14.2 (MINITAB Inc., state college, PA and USA). At first such software program proved samples normal conditions and then the significant difference among data was precisely studied via One-Way ANOVA and post hoc.

Sensory Analysis

A five-point hedonic scale (1= lowest desirability, 5= highest desirability) was designed to evaluate the sensory characteristics by using 20 trained panelists including overall acceptability, texture, aroma and flavor properties. Water was provided to wash the mouth between two oral tests.

RESULTS AND DISCUSSION

Table 1 shows physicochemical properties of pasteurized kashk. Moisture contents of the Kashk samples were found between 63.64 to 80.34% and its average was 74.20%. Low level of moisture in the samples resulted with a hard texture and vice versa. Generally, more concentrated of food samples makes strong taste and flavor. Statistical measurement shows significant difference between samples ($p\leq0.05$). According to International standard No. 1989 maximum level of moisture for Kashk samples is 80%, therefore all of this samples was acceptable. Generally, most part in solid not fat in dairy product include Kashk is composed of nitrogenous substance that refers to proteins. These proteins components are important and valuable in terms of biological value especially when they derived from animal sources. Protein content of these samples has shown difference and this difference statistically was significant ($p\leq0.05$). The minimum protein contents of Kashk samples were 10.95%. This value is near the protein contents of some cheeses. So, it can be said that Kashk is a suitable source of animal protein, carrying an important role in diet of people. Fat is one of the most important components of dairy product and contribute aroma, taste, flavor, quality, and nutritional value in the final product. Fat content has an effective factor on softness and creamy flavor of the samples. In this study, fat level was obtained in low percent, the min value of fat was 2.01% and its range was between 1.36 to 2.33%, this difference was statistically significant ($p\leq0.05$). According to International standard minimum level of fat for Kashk is 1%, all of this samples have higher fat content and so were acceptable. The lowest fat content refers to D samples and show significant difference with other samples ($p\leq0.05$). We can say this sample is diet product and recommended for people with overweight. Salt is an important ingredient in food stuff and contributing taste, consistency and safety. In Kashk production process salt should be added to product. So Kashk with this salty characterization becomes important in usage area such as cooking. People add Kashk on food (such as Ash Reshteh) like sauce. In this case cookers add lower salt in food. The lowest salt content was 0.42% and the highest was 0.72%. Statistical study performed to determine significant difference between these samples ($p\leq0.05$). However, all of them were in acceptable limit. According to international standard of Iran No. 1989, maximum percent of salt for Kashk was 2%. Kashk is a fermented product and due to presence of lactic acid bacteria, lactose in milk metabolism and convert to lactic acid and for this reason acidity increased it means decease of pH. Acidity of sample was varied from 0.58 to 1.14% and which has effect on the flavor and aroma of the food. According to international standard acceptable limit for acidity was between 1.3 to 2%, therefore 2 samples (B and C) not acceptable due to the acidity lower than 1.3%. Also, maximum acceptable level of pH is 4.2, and so again 2 samples (B and C) not acceptable due to the higher level of pH than 4.2. The pH of All samples was lower than 4.6. In this case, it can be said that Kashk is an acidic product when pH values were considered. The product having pH values between 3.7 and 4.6 derived in acidic product. Also, low pH may contribute for safety of the food stuff. Ash content of the entire sample statistically was similar, and its min value was 1.03%. According to International standard ash content should be below 2.5% and therefore the entire Kashk sample was according to International standard. Calcium and phosphorus is essential and valuable nutrients in the human diet. There isn't any statistically difference between Calcium and phosphorus content of samples. The highest content of calcium and phosphorus was 0.17 and 0.70% respectively. Sensory properties of the samples were shown in Table 2. There isn't any statistically difference between the sensory properties of samples, but C and B samples have highest texture score maybe due to the lower moisture content. Also, A and D samples have highest aroma and flavor score maybe due to the higher level of acidity. It means that consumer prefers Kashk with high content of dry mater due to makes better

sense and mouth feel and also prefers sour taste. There wasn't any similar study about properties of Kashk. But few study was down about similar product for example Çakır *et al,* in 2009 has reported properties of traditional Turkey fermented product that called as "Keşk","Kesük", "Kiş" or "Cockle" that is rather similar to Kashk. Some of properties like as pH and acidity were similar with this study but another property was so different. Also, similar study was made about Kes by Kirdar (2012). This variation could be explained due to the composition and type of raw milk used for production, manufacture process, drying and storage condition or the lake of available and suitable standard production method.

Table 1. Physicochemical properties of pasteurized kashk.

Properties	A	B	C	D	Means ± SD	Acceptable limit *
pH	3.68 ± 0.00^{b}	4.39 ± 0.01^{a}	4.41 ± 0.02^{a}	3.54 ± 0.00^{b}	4.005 ± 0.0075	4.2 max
acidity	1.14 ± 0.02^{a}	0.58 ± 0.05^{b}	0.69 ± 0.03^{b}	1.08 ± 0.01^{a}	0.8725 ± 0.0275	1.3 – 2 (%)
Fat	2.32 ± 0.11^{a}	2.04 ± 0.07^{a}	2.33 ± 0.12^{a}	1.36 ± 0.06^{b}	2.0125 ± 0.09	1 (%) min
Moisture	80.03 ± 2.05^{a}	72.80 ± 1.63^{b}	63.64 ± 0.37^{c}	80.34 ± 0.46^{a}	74.2025 ± 1.1275	82 (%) max
Protein	9.05 ± 1.04^{c}	10.98 ± 0.53^{b}	12.32 ± 0.68^{a}	8.03 ± 0.32^{c}	10.095 ± 0.6425	8 (%) min
Salt	0.42 ± 0.04^{c}	0.72 ± 0.08^{a}	0.49 ± 0.10^{c}	0.66 ± 0.05^{b}	0.5725 ± 0.0675	2 (%) max
Carbohydrate	9.80 ± 0.67^{c}	13.02 ± 0.22^{b}	16.01 ± 1.03^{a}	9.34 ± 0.79^{c}	12.0425 ± 0.6775	-
Ash	0.98 ± 0.04^{a}	1.02 ± 0.02^{a}	1.21 ± 0.07^{a}	0.93 ± 0.04^{a}	1.035 ± 0.0425	2.5 (%) max
phosphorus	0.17 ± 0.01^{a}	0.14 ± 0.06^{a}	0.13 ± 0.05^{a}	0.16 ± 0.02^{a}	0.15 ± 0.035	-
Calcium	0.60 ± 0.09^{a}	0.52 ± 0.04^{a}	0.70 ± 0.02^{a}	0.65 ± 0.03^{a}	0.6175 ± 0.045	-

*: International standard No. 1989; Similar letters in each column are non-significant at $p<0.05$.

Table 2. Organoleptic properties of pasteurized kashk.

Properties	Flavor	Aroma	Texture	Total Acceptability
A	4.38 ± 1.03^{a}	4.56 ± 0.54^{a}	4.03 ± 0.16^{a}	4.32 ± 0.11^{a}
B	4.12 ± 0.22^{a}	4.02 ± 0.17^{a}	4.63 ± 0.09^{a}	4.30 ± 0.06^{a}
C	4.21 ± 0.16^{a}	4.11 ± 0.08^{a}	4.78 ± 1.01^{a}	4.36 ± 0.09^{a}
D	4.45 ± 0.17^{a}	4.61 ± 0.21^{a}	4.02 ± 0.10^{a}	4.36 ± 0.25^{a}

Similar letters in each column are non-significant at $p<0.05$.

Conclusion

The study has provided physicochemical properties of different pasteurized traditional fermented Iranian dairy products called Kashk. This product is good source of protein and mineral and compare to milk have long shelf life. However, more studies about traditional food are necessary.

REFERENCES

Azadnia, P., A. Khalegh Babaki, A., Shah, M. Ahmad Hgasemi, M. JashniKarimi, M.H. Zamani and N Taarof (2011). Isolation and Identification of Leuconostocs from traditional yogurt in tribes in Kazeron. *Journal of Animal and Veterinary Advances*, 10 (4): 552-554.

Barani, H. (2007). Teaching the shepherds or learning from them?: The Iranian experience. Anthropological Notebooks, 13 (1): 69–73.

Çakır, I., H. Coşkun, I.T. Akoğlu, M.F. Işleyen, M. Kıralan and A. Bayrak (2009). Introducing a traditional dairy product Keş: chemical, microbiological and sensorial properties and fatty acid composition, *Journal of Food Agriculture Environment*, 7: 116-119.

Institute of Standards and Industrial Research of Iran (ISIRI), (2001). *Milk and milk product, determination of titrable acidity and value pH*. No: 2852.

Institute of Standards and Industrial Research of Iran (ISIRI), (2001). *Milk and milk products – Guidance on sampling*. No: 326.

Institute of Standards and Industrial Research of Iran (ISIRI), (2003). *Milk and milk products – Determination of dry mater*. No: 637.

Institute of Standards and Industrial Research of Iran (ISIRI), (2002). *Determination of milk protein*. No: 639.
Institute of Standards and Industrial Research of Iran (ISIRI), (2002). *Determination of ash.* No: 1755.
Institute of Standards and Industrial Research of Iran (ISIRI), (2002). *Determination of salt.* No: 1809.
Institute of Standards and Industrial Research of Iran (ISIRI), (2002). *Industrial liquid Kashk specification*. No: 1989.
Kirdar, S.S. (2012). A survey on chemical, biochemical and microbiological characteristics of a traditional dairy product in mediterrean region: kes. *Journal of Animal and veterinary advances*, 11(3): 330-334.
Tajabadi Ebrahimi, M., A. Ouwehand, M.A. Hejazi and P. Jafari (2012). Traditional Iranian dairy products: A source of potential probiotic lactobacilli. *African Journal of Microbiology Research*, 5(1): 20-27.

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