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Full Length Research Paper

Assesment of some microbiological and chemical properties of pismaniye sweet

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The objective of this research was to determine some microbiological and chemical properties of pismaniye sweet. A total of 47 plain and with cacao pismaniye samples were purchased from retail markets in the Marmara region, Turkey. Mean moisture, ash, fat and total sugar contents were found as 3.16 to 3.31, 0.18 to 0.23, 11.67 to 11.87 and 37.10 to 35.72%, for plain and with cacao, respectively. The microbial counts were in the range of 3.05 to 3.12 log cfu g^{-1} for total mesophilic aerobic bacteria (TMAB). 2.19 to 2.51 log cfu g^{-1} for yeast and mould, 0.17 to 0.59 log cfu g^{-1} for total Coliform group *bacteria*. It was observed that 51.06% of samples were contaminated by *Staphylococcus* types, 42.55% by *Salmonella-Shigella* and 10.64% by *Escherichia coli*. The microbiological findings showed the presence of high counts of microorganisms depending on poor sanitary practices due to empiric traditional manufacturing procedures.

Key words: Pismaniye sweet, quality characteristics.

INTRODUCTION

pismaniye sweet is a Western Anatolian confectionary similar to fairy floss in fine strands made by blending flour roasted in butter into pulled sugar, which received its name from Persian and Armenian descents who, in the 1600s, settled in Turkey. It is sometimes garnished with ground pistachio nuts and/or coated with chocolate and is either plain or with cacao (Anonymous, 1991, Karaman et al., 2004). There are many different names used for this delicious confection, such as tel helva, cekme helva, pesmek, keten helva and saray helva. Although it is an artisanal sweet, the manufacturing of pismaniye is partially commercialized. There have been relatively few references on production process, and the chemical and microbiological properties, particularly most information is encyclopedic and from websites of the manufacturer (Anonymous, 2009a, b, c, d). Thus it is crucial to standardize the manufacturing process when considering their high risk of contamination and various chemical structures.

The aimof this article is to know the counts of thedifferent microbial groups of hygienic and technological interest as well as chemical properties in order to support further legislative actions to improve and standardize the final product quality, which would be the concern for consumer health and product reliability.

MATERIALS AND METHODS

Sample collection and preparation

In this research, a total of 47 plain and with cacao pismaniye samples, all in original 400 g packages of different manufacturers were randomly collected from retail markets of the Marmara region, Turkey. In order to determine the microbial counts of technological, hygienic and pathogenic flora analysis of the pismaniye samples, the total mesophilic aerobic bacteria (TMAB), yeast and mould (Y-M), total *Coliform* group bacteria (TC) *Escherichia coli* (EC), total *Staphylococcus types.* (TS) and *Salmonella-Shigella* (SS) counts were obtained by the drop plating technique. For analysis, 10 g of each sample was homogenized with 90 mL of a sterile solution of NaCl for 2 min in a Stomacher bag (Seward, Thetford, Norfolk, UK). Serial decimal dilutions were prepared in the same diluents and parallel 1 ml samples of appropriate dilutions were poured or

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Table 1. The culture media for microbiological analysis and incubation conditions.

Microbial group	Culture media	Growth conditions		Reference
		Temperature (°C)	Days	
TMAB	Standard Plate Count agar (Oxoid)	37	2	Harrigan (1998)
Y-M	Potato Dextrose Agar (Oxoid)	25	5	Beuchat and Cousin (2001)
TC	Violet Red Bile Agar (Oxoid)	37	1	Kornacki and Johnson (2001)
TS	Mannitol Salt Agar (Oxoid)	37	2	Shimamura et al. (2006)
SS	Salmonella-Shigella Agar (Oxoid)	37	1	US-FDA BAM (2008)
EC	Violet Red Bile Agar (Oxoid)	44	1	Kornacki and Johnson (2001)

*TMAB, total mesophilic aerobic bacteria; Y-M, yeast and mould; TC, total *Coliform* group bacteria; TS, total *Staphylococcus* types; SS, *Salmonella-Shigella*; EC; *Escherichia coli*.

spread onto agar plates.

Microbiological analysis

The microbial groups enumerated in each sample and the culturing and incubation conditions are summarized in Table 1. After incubation, plates with 30 to 300 colonies were counted and the results were expressed as log cfu g^{-1}.

Chemical analysis

The moisture, ash and fat (Soxhelet method) contents of pismaniye samples were determined according to Anonymous (1989). Total sugar content was quantified using the Lane Eynon method (as sucrose) (Cemeroglu, 1992). All analyses were performed in triplicate.

RESULTS AND DISCUSSION

There is no scientific research on pismaniye sweet concerning composition and hygienic/pathogenic flora. The available data is limited with only Turkish Pismaniye Standard, which is based on technical and microbiological quality and with information from websites. The results of the microbiological analyses of pismaniye samples are represented in Tables 2 and 3 with frequency distributions. The number and species found in pismaniye are highly variable. The range of contamination depend on applied sanitary conditions during production, packaging, storage, marketing, and human contact during production and packaging aside with contact with knives, workbench, tools and boxes. Pismaniye is a low-moisture sweet, and thus in order to provide the stability of quality attributes it is usually packaged in moisture-proof materials. The changes in humidity and temperature of external environment during production, storage, distribution and use are effective factors on microbial and chemical stability. As being rich in carbohydrates pismaniye is a good source for microbial growth under insufficient sanitary conditions. The mean TMAB counts, which are regarded as general indication of hygienic conditions during production and marketing processes, of pismaniye samples were between 3.05±0.714 and 3.12±0.872 log cfu g^{-1}. These are considerably lower than the maximum counts indicated in Turkish Pismaniye Standard, which is 5.00 log cfu g^{-1} (1.00 x 10^5 cfu g^{-1}). Yeast and moulds appear to be effective over shelf life and sensory quality of products, since their growth results in undesired taste, smell and color changes (Ray, 2005; Jay et al., 2005).

In plain and with cacao pismaniye samples, average Y-M numbers were determined as 2.51±0.93 and 2.19±0.92 log cfu g^{-1}. These values are higher than 2.00 log cfu g^{-1} (1.00 x 10^2 cfu g^{-1}), the maximum amount mentioned in Turkish Standard (Anonymous, 1991). In small and medium size enterprises, applying traditional manufacturing methods, the risk of contamination and growth of yeast and moulds is higher due to unsuitable packaging, storage, distribution and marketing conditions. The average TC numbers were determined as 0.59±0.86 log cfu g^{-1} for plain pismaniye and 0.17±0.67 log cfu g^{-1} for with samples. When considering total *Staphylococcus* counts 24 samples (51.06%), *Salmonella-Shigella* counts 20 samples (42.55%) and *Escherichia coli* counts 5 samples (10.64%) were out-of-limits designated for Pismaniye according to Turkish Standards as “should not be found”. It is of special significance, from the sanitary point of view, determination of these micro-organisms means lack of personnel hygiene (Blackburn, 2006, Marriott and Gravani, 2006). Although food handlers are usually the main source of contamination, equipment and environmental surfaces can also be sources of contamination with these bacteria. The more the produce is handled the more the likelihood of introducing pathogens. Since pismaniye is usually hand-packaged, hygiene of workers is extremely important.

Some chemical characteristics of pismaniye samples are summarized in Table 4. The great variability in the compositional factors reflects variations in production measures and the knowledge of standard manufacturing practices. The composition can play an important role in determining the shelf life of pismaniye, as even a slight

Table 2. Microbiological analyses of pismaniye samples (log cfu g^{-1}).

Type of pismaniye	Number of sample (n)	Microorganisms	Mean	Standard deviation	Minimum	Maximum
Plain	28	TMAB	3.05	0.714	1.85	4.54
		Y-M	2.51	0.926	1.00	4.53
		TC	0.59	0.861	0.00	2.52
		TS	0.81	0.910	0.00	2.57
		SS	0.48	0.698	0.00	1.78
		EC	0.18	0.527	0.00	1.99
With cacao	19	TMAB	3.12	0.872	1.87	4.57
		Y-M	2.19	0.921	1.00	4.17
		TC	0.17	0.669	0.00	2.59
		TS	0.69	0.855	0.00	2.36
		SS	0.39	0.698	0.00	1.94

Table 3. Population distribution of the microorganisms of pismaniye samples.

Type of pismaniye	Microorganisms	Percentage of samples in different population groups			
		<2	2-3	3-4	4-5
Plain	TMAB	6.7	40	20	33.3
	Y-M	26.7	60	6.7	6.7
	TC	93.3	6.7	-	-
	TS	86.7	13.3	-	-
	SS	100	-	-	-
	EC	100	-	-	-
With cacao	TMAB	5.9	29.4	52.9	11.8
	Y-M	17.6	58.8	11.8	11.8
	TC	94.1	5.9	-	-
	TS	82.4	17.6	-	-
	SS	100	-	-	-
	EC	100	-	-	-

Table 4. The chemical characteristics of pismaniye.

Type of pismaniye	Number of sample (n)	Parameters	Mean	Standard deviation	Minimum	Maximum
Plain	28	Moisture (%)	3.16	0.913	1.18	4.63
		Ash (%)	0.18	0.055	0.11	0.30
		Fat (%)	11.67	1.938	8.10	14.98
		Total Sugar*	37.10	7.890	26.66	50.78
With Cacao	19	Moisture (%)	3.31	0.874	1.09	4.33
		Ash (%)	0.23	0.063	0.13	0.38
		Fat (%)	11.87	2.416	7.70	14.97
		Total Sugar*	35.72	9.809	21.52	51.73

*as sucrose g^{-1}100 g.

increase in humidity, is effective on spoilage depending on microbial growth and chemical Changes, if suitable packaging is not used and kept under improper storage conditions.

Conclusion

Pismaniye is a traditional sweet made in Marmara region of Turkey that has a good appreciation among the consumers and a great introduction in the local markets. At the present, this sweet is manufactured in semi-industrial way following empirical traditional procedures. Therefore, the final product has a quite heterogeneous microbiological and chemical quality and usually does not display a sanitary guarantee, and the results of current study are in confirmation with these observations. In order to control the quality of pismaniye, it is necessary to know the nature and levels of the microbial populations present, as well as their metabolic activities related to the organoleptic characteristic of the final product. If one wants to promote pismaniye and to achieve a bigger expansion in the national and international markets it is necessary to apply good manufacturing and storage practices with novel technology that offer full sanitary guarantees to the consumers. Moreover, depending on scarce literature on chemical and microbiological characteristics of pismaniye further study is needed for detailed information on industrial-scale manufacturing technology and complete characterization.

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