Original Article

Evaluation of Environmental Health Indicators of Halva and Tahini Production Centers in Ardakan, Yazd

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Abstract

Introduction: Food safety and health should be considered at all stages from production to consumption. Inappropriate sanitary status of the food production, distribution and shopping centers cause food-borne diseases. The aim of this study was to evaluate the environmental health indicators of halva and tahini production centers in Ardakan, Yazd; 2013.

Materials and Methods: This is a descriptive, cross- sectional study. For data collection, we used a 5-part checklist, which consisted of raw materials store, production processing halls, packaging halls, product store and bathrooms. This tool was prepared according to the Iranian Ministry of Health regulations. We have completed all the checklists throughout inspections from 16 production centers during the winter of 2013. Finally, the collected data was analyzed by SPSS, version 18.

Results: Generally, 75% of production centers had favorable hygienic status, while 25% of them were slightly favorable. According to the obtained results, hygienic status of production centers had relatively favorable conditions and only in January and February, 31.3% and 18.8% of the processing halls and 12.5% of the product stores were in a very favorable hygienic status. The results showed that 62.5% of production centers had favorable status in raw materials store, 66.66% in production processing hall, 20.83% in packaging hall, 60.41% in product store and 37.5% in bathrooms. Statistical analysis showed that there is no significant relationship between hygienic status and production rate (p=0.411).

Conclusion: The results showed that halva and tahini production centers of Ardakan in terms of environmental health indicators had slightly favorable to favorable status. Therefore, the situations should be improved to satisfactory status.

Keywords: Environment health, Halva and Tahini production centers

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Introduction

Halva is known with different names of halvah, chalva, chalwa and halawa and it is one of the most popular foods in the Eastern Mediterranean countries and the Middle East [1]. Due to the presence of nutrients, ease of use and also affordable price, interest in halva consumption as a source of high energy especially in cold areas is increasing. Halva compounds include tahini (50%), sugar (25-35%), glucose (12-25%), Choobak root extract or Saponaria officinalis root extract, citric acid, egg white and flavoring agents such as cardamom and vanilla [2, 3].

One of the most important health problems in developing countries is physical, chemical and biological pollution of food. Generally, entry of each extraneous substance to food causes spoilage and contamination of food that leads to lower product quality, decrease in customers' satisfaction and occurrence of food-borne diseases. Control of these diseases is only possible by identification and isolation of contaminant agents and methods, by which food can be contaminated [4, 5]. The most important cause of food-borne diseases is lack of accurate control of time and temperature, lack of hygiene observance and food secondary pollutions that are associated with poor performance of production food centers staff [5]. Attention to various factors is important in controlling unhealthy equipment and instruments, unhealthy and unsafe foods, chemical pollution, lack of observance, food hygiene and also unsafe and unhealthy environment in the food production, distribution and shopping centers [5-7]. Based on studies conducted during the past years, inappropriateness of hygienic status of food production, distribution and shopping centers have caused food-borne diseases. Hence, attention to food safety, hygiene and observance of hygiene in all of the food chain from production to consumption is inevitable [5]. Using appropriate control measures can prevent food-borne diseases [5-7]. Environmental health is defined as prevention of diseases, as a result of controlling and eliminating environmental factors that are effective in transmission and causing diseases and/or in other words, control and modification of environmental factors that affect physical, mental and social human welfare [8]. The environmental health criteria in the production, distribution and storage centers include safe water, proper disposal of solid wastes and wastewater, controlling insects and rodents and preventing dust and suspended matters, as well [9].

The environmental health experts as those who have surveillance on production and distribution of food play an important role in the assistance of food manufacturing to produce safe food [10]. In developed countries, to control the food hygienic quality in hotels, restaurants and foods production manufacturing, it is necessary to consider specific standards related to sanitation status of these places in accordance with existing standards [11].

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According to article 13 of the law on edible, drinking, cosmetic materials approved in 1967, violation from Health regulations such as lack of personal hygienic observance, structural status and work equipments is prohibited and may be punishable. Health regulations related to production centers, maintenance, distribution, sale and transportation of edible, drinking, and cosmetic materials in public places have been considered in this Article. In this study, based on article 13, a health checklist was prepared including workers individual hygienic, bathrooms, water used, wastewater and waste disposal, work equipments and equipment and structural status. According to the importance of environmental health indicators in the halva and tahini production centers and in order to identify the existing situation and presentation of hygienic solutions for improving tahini and halva quality, this study was conducted in Ardakan city.

Materials and Methods

This was a descriptive cross-sectional study, 16 halva and tahini production centers of Ardakan city were investigated. For determining the environmental health indicators of halva and tahini production centers according to article 13 of the law on administrative procedures (reform act of edible, drinking, and cosmetic materials of the department health, treatment and medical education), a checklist was prepared including 5 parts of raw material store (30 questions), production processing halls (45 questions), packaging halls (34 questions), product store (32 questions) and bathrooms (21 questions). Questions included different fields such as health card status, observance personal hygiene, and structural status of production centers, numbers of bathrooms to the number of personnel, wastewater disposal method, and observance of health principles in halva and tahini production centers.

The pilot and questions were evaluated and revised by health environmental experts, during the winter of 2012, 16 halva and tahini production centers of Ardakan were selected and visited randomly.

Hygienic status checklist was completed for these centers and their hygienic status was classified in 4 groups: unfavorable (questionnaire score: <55), slightly favorable (questionnaire score: 55-70), favorable (questionnaire score: 70-85) and very favorable (questionnaire score: > 85). Obtained data on each of the parameters in the production centers of the halva and tahini centers were analyzed by SPSS, version 18. To assess the hygienic status of the production centers based on production rate of tahini and halva, we used χ^2 test.

Results

The obtained results from the assessment of the hygienic status of different parts of halva and tahini production centers are presented in Table 1.

According to the results, the hygienic status of the raw material store was classified as slightly favorable and favorable. In January,

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12.5% of raw material stores were in slightly favorable hygienic status and 87.5% of them were in the favorable hygienic status. Hygienic status of the raw material warehouse of production centers in February and March was unfavorable, so that in March, 62.5% of the production centers were in the slightly favorable hygienic status and 37.5% of them were in favorable hygienic status.

In the processing halls, none of halva and tahini production centers had unfavorable hygienic status and they were grouped as slightly favorable, favorable and very favorable category.

Hygienic status of packaging hall in January had the best conditions, so that 62.5% of them had slightly favorable conditions and 37.5% were favorable.

However, 12.5% of packaging hall of production centers had favorable conditions in February, which increased to 18.5%in March.

Table 1: Hygienic status of different parts of halva and tahini production centers

The different parts of production centers	**Month**	**January**		**February**		**March**		***P-value***
	Hygienic status	**Number**	**%**	**Number**	**%**	**Number**	**%**	
Raw material store	Unfavorable	0	0	0	0	0	0	0.014
	Slightly favorable	2	12.5	6	37.5	10	62.5	
	Favorable	14	87.5	19	62.5	6	37.5	
	Very favorable	0	0	0	0	0	0	
Processing halls	Unfavorable	0	0	0	0	0	0	0.027
	Slightly favorable	0	0	3	18.8	5	31.3	
	Favorable	11	68.8	10	62.5	11	68.5	
	Very favorable	5	31.3	3	18.8	0	0	
Packaging halls	Unfavorable	0	0	2	12.5	3	18.8	0.131
	Slightly favorable	10	62.5	11	68.5	12	75	

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Table 1: Hygienic status of different parts of halva and tahini production centers(Continue)

The different parts of production centers	Month	January		February		March		*P-value*
	Hygienic status	Number	%	Number	%	Number	%	
Product store	Favorable	6	37.5	3	18.8	1	6.3	0.013
	Very favorable	0	0	0	0	0	0	
	Unfavorable	0	0	0	0	1	6.3	
	Slightly favorable	1	6.3	7	43.8	8	50	
Bathrooms	Favorable	13	81.3	9	56.3	7	43.8	0.947
	Very favorable	2	12.5	0	0	0	0	
	Unfavorable	5	31.3	4	25	4	25	
	Slightly favorable	5	31.3	5	31.3	7	43.8	
	Favorable	6	37.5	7	43.8	5	31.3	
	Very favorable	0	0	0	0	0	0	

Hygienic status of product store was assessed to be in each of the four statues of unfavorable, slightly favorable, favorable and very favorable. Hygienic status of product store in January had the best conditions, so that 12.5%

of production centers had very favorable conditions, but in February and March, this value dropped to zero.

None of the production centers' bathrooms had very favorable hygienic status. The bathrooms hygienic status of the production centers was either in category of unfavorable, slightly favorable or favorable.

According to the results, the maximum health score belongs to the processing hall (89.33%) and minimum health score is attributed to the bathrooms (24.33%). In terms of descriptive indicators, mean and standard deviation of the hygienic status score in the raw material store, processing hall, packaging hall, product store and bathrooms were equal to 72.687±4.385, 76.145±6.237, 65.729±6.281, 71.625±5.947 and 61.625±14.017,

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respectively. Generally, hygienic status of the production centers was either in slightly favorable or favorable statuses (Table 2).

Table 2: The descriptive indicators of hygienic status of different of halva and tahini production centers

The different parts of production centers	Minimum health score	Maximum health score	Mean± SD
Raw materials store	46.97	79	72.687±4.385
Processing halls	66.67	89.33	76.145±6.237
Packaging halls	53.33	75.67	65.729±6.281
Product store	57.33	81.67	71.625±5.947
Bathrooms	24.33	77.67	61.625±14.017

The Frequency distribution of production rate is presented in Figure 1. According to Figure 1, 56.25% of the production centers had average production rate (12000 to 24000 kg per month).

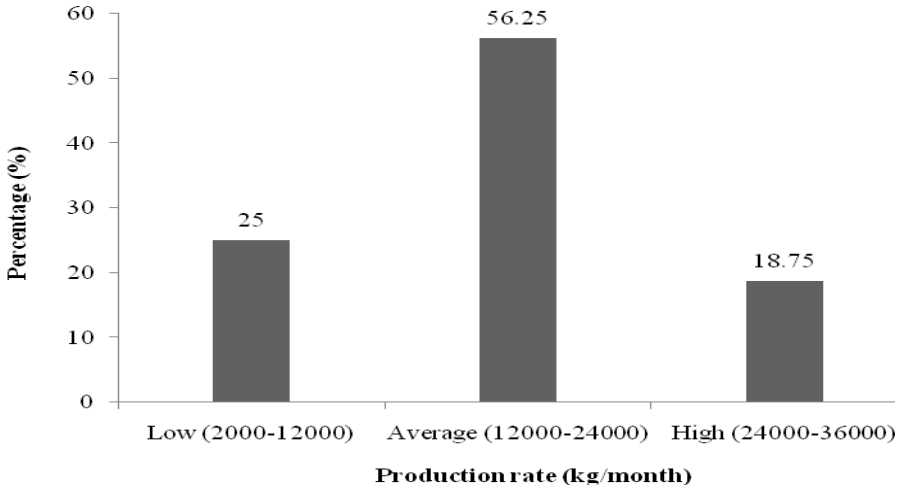


Figure 1: Frequency distribution of production centers production rate

Hygienic status of the various production centers based on production rate is shown in Table 3. According to Table 3, hygienic status of 25% production centers was slightly favorable and 75% of them had favorable hygienic status.

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Table 3: Frequency distribution of production centers based on hygienic status and total production rate of halva and tahini (kg/month)

Hygienic status	slightly favorable		favorable	
Production rate	**Number**	**%**	**Number**	**%**
2000-12000 (Low)	0	0	4	33.3
12000-24000 (Average)	3	75	6	50
24000-36000 (High)	1	25	2	16.7
Total	4	100	12	100

Discussion

Inappropriate hygienic status of the food production, distribution and shopping centers cause food-borne diseases. Paying attention to food safety and health, and hygiene observance at all stages of food chain from production to consumption is inevitable.

The obtained results from the present study showed slightly favorable and favorable hygienic status in halva and tahini production centers of Ardakan city, Yazd. Zangiabadi et al. (2010) investigated environmental health status of restaurants and hotel dining areas in Isfahan city. Their results showed that environmental health status were at good level in 2 units, moderate level in 8 units and poor level in 2 units [12].

The present study results indicated that the main hygienic problem in production centers is related to bathrooms. The main reason for the low score of bathrooms was lack of separate toilet and showers and also opening the toilet door into the production hall. In a similar study, environmental health status of Ardabil city bakeries was investigated by Pouraslani et al. in 2003. Their results showed that the overall status of environmental health in bakeries was relatively favorable and according to health standards.

In three cases of not using proper coveralls and hat, existence of insects, and cracked ceilings, they observed a high deviation from standard and desirable level because of low awareness of workers and employers, high price of standardization and using the essential equipments for no letting the insects in [8].

The environmental health criteria of Khorramabad fast food stores were investigated by Malekshahi et al.

According to obtained results from this survey, the majority of units were in the unfavorable status in terms of environmental health. Their results showed that the most

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unfavorable cases (96%) are related to lack of lace in surveyed units [13].

According to our results, 25% of production centers had slightly favorable hygienic status and 75% of them had favorable hygienic status. Malakootian et al. (2002) investigated hygienic status of Rafsanjan city bakeries. In their study, only 16% of surveyed bakeries had good and acceptable hygienic status [14].

Special training on public health is one of the most important hygienic indicators. In the present study, in 87.5% of production centers, workers were trained on public health that was a positive indicator.

Statistical results showed that the relationship between hygienic status and production rate with p=0.411 is not significant. According to the statistical analysis of our results, hygienic status of raw material store, processing hall and product store of halva and tahini production centers in three months of January, February and March had significant difference (p<0.05) but the relationship between hygienic status of packaging hall (p=0.131) and bathrooms (p=0.947) in three months were not significant.

Based on our results, the production centers had the best hygienic status in January, the quality was lower in February and it was the lowest in March. The reason of the better hygienic status of production centers in January might be related to the period of production, for the majority of the production centers start to produce in the beginning of winter. As the job continues, high production and tiredness of the workers lowers the hygienic status in the following months.

Conclusion

In this survey, some of the important points of article 13 were investigated and among them, some defects were observed. For modification of the current situation, improving several measures is essential: the number of inspections, staff training, and surveillance from different parts of production centers and maintenance of technical work of production centers.

Discussing the problems and diseases caused by poor hygiene are suggested through relevant training courses.

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