Quality Assessment of Some High Consumption Foods in Zanjan City

Tooran Yarahmadi[a], Hassan Hassanzad Azar[b,*], Sajad Chamandoost[b], Majid Aminzare[b]

[a] Department of Environmental health engineering, School of Public Health, Zanjan University of Medical sciences, Zanjan, Iran.
[b] Department of Food Safety and Hygiene, School of Public Health, Zanjan University of Medical Sciences, Zanjan, Iran.

*Corresponding Author. E- mail address: Hassanzadazar_h@zums.ac.ir

A R T I C L E I N F O

A B S T R A C T

Background: Foods go through many changes from production to table and continuous control is necessary to maintain food safety and supply foods with good quality. The aim of this study was to evaluate the quality of some foods with high consumption in Zanjan city within 5 years from 2009 to 2013.
Methods: In a case-control descriptive study with an annually- controlled program within 5 years from 2009 to 2014, some food samples including pasteurized milk, vegetable oils, flour, kebab, salt, confectionary products and a special cookie called nan-chay were collected and analyzed in food control laboratory of Zanjan university of medical sciences.
Results: According to national standard of Iran, of Nan-chay, salt, vegetable oils, kebab, confectionary products, and pasteurized milk samples 68.4%, 46%, 24.3%, 10.4%, 9.3%, 5% were out of national standard limits and unacceptable, respectively. All flour samples had good standard quality. Mean± sd values of pH in Nan-chay samples were 7.5 and 1.19, respectively. Mean± sd values of the degree of purity in salt samples were 98.21 and 1.75, respectively.
Conclusion: Results showed that among the 7 types of collected foods in Zanjan city, the most nonstandard cases were of Nan-chay samples and the best quality was seen in flour samples.

1. Introduction

Good nutrition is one of the key factors in the development of healthy and productive population. Despite continuous progress in the knowledge and application of food safety techniques, the direct cause of many diseases is still contaminated foods (1).

Production and supply of wholesome food is considered as a key step in improving nutrition, in a way that does not threaten the health of the consumer. Access, quality and choice of food used in people are affected by socio- economic status, race and culture. People with different social systems and cultures consume different types and qualities of foods (2).

Food-borne diseases are a large and growing public health problem. Most countries with a robust system for recording and reporting food-borne diseases have documented and reported a significant increase in the incidence of these diseases characterized by microorganisms in foods. According to World Health Organization report in 2008, the incidence of food-borne disease has had a growing trend. Incidence of food-borne disease in countries such as Australia and Spain

has grown by 69.35% (1985-2003) and 74.137% (1983-2004), respectively. Incidence rate of food-borne diseases in developing countries has been reported to be about 916 cases per 100000 of population. Food-borne diseases are assumed to be much higher in developed countries. Given that Iran is a developing country, unfortunately there is no statistical data on the incidence of such diseases (3).

Although there are no statistics on the incidence of infections and food poisoning in developing countries, their outbreaks definitely occur due to the poor conditions of production, storage, distribution, and consumption of food, a cycle that is often carried out without proper control of authorities. In addition, low level of education and poor public health conditions cause food poisoning. In general, studies conducted on contamination of food products with chemical and microbial agents are focused on specific contaminants in a food group and scant information is available on various food groups (2).

Approximately 3.2 million children die of diarrhea and 2 million are malnourished every year. In the past, it was assumed that the problem was only related to contaminated water and poor hygiene practice but today, food is known as the major cause of about 70 percent of all cases in the world (5). Soltandallal et al., in 2015 showed that 57% of food - borne disease outbreaks were due to food contamination with various microbial and chemical contaminants (6). Since poor quality and contamination of food can cause short and long-term side effects on nutritional status, high costs and threatening of human health, identifying how the foods were contaminated and recognition of contaminated foods and providing good quality of foods are imperative. Accordingly, the aim of this

The highest nonstandard rate of vegetable oil samples was seen in 2013.86.6% of samples was non-standard in this year. Abundance of non-standard rate of these samples was constant between 2010- 2013 and 20% of samples were non-standard in those years.

Nan- chay and salt samples had the highest inconsistency with national standard. PH in 68.4%

study was assessment of the quality of some high-consumed food types in Zanjan city within 2009-2013.

2. Materials and Methods

This descriptive study was conducted based on collected results of several food samples supplied for quality assessment by the environmental health experts in 2009 -2013. In this study, a total of 731 samples were studied. The total number of each food sample was reported in table 1. All samples of vegetable oil, salt, Nan-chay, kebab, confectionary product, flour and pasteurized milk were analyzed by food control laboratory according to national standards of Iran No: 42,26,6961 and 3493, 4622, 2395 and a-3493, 2393 (103) and 2406 respectively (7-15). All uncertain and defaced results were omitted and remained results were analyzed using SPSS software (ver. 16). Quantitative data was stated as mean, and standard deviation and qualitative data was stated as plenty and abundance of acceptability and unacceptability for consumption according to national standard of Iran.

3. Results

All obtained results are shown in table 1. According to the results, 204 samples out of total samples were non-standard compared to national standard of Iran. The highest nonstandard rates of milk samples during five years were observed in 2012 and 2013 with 6 and 8.5 % plenty rate, respectively. The highest and lowest contamination rate of Kebab samples were seen in 2011and 2010 with 73% and 0% plenty, respectively. All flour samples were standard with no contamination.

The highest and lowest contamination rates of confectionary sweet samples were seen in 2013 and 2011, respectively.

of all Nan- chay samples within five years was out of standard range. Mean ± sd of pH in Nan-chay samples was 7.51±1.19. Mean ± sd of purity in salt samples was 98.21±1.75.

Purity in 54% of all salt samples was in the standard range, 8.44% and 1.2% of salt samples had purity less and more than standard range, respectively within 2009-2013.

4. Discussion and Conclusion

Microbial quality of Kebab, confectionary sweets, pasteurized milk and flour samples, chemical and microbial quality of vegetable oil samples, PH of Nan- chay samples and purity of salt samples were analyzed according to national standards of Iran.

Obtained results of milk samples showed that 5% of all samples were unacceptable according to national standard (No: 2406) due to high contamination with coliforms (>10 cfu/ml) (Table 1) (16). The results of implemented studies in Hamedan, Zahedan, Bushehr and Khorasanerazavi provinces of Iran on pasteurized milk samples showed that 25%, 15%, 15.2% and 30% of samples were non-standard for consumption due to high contamination with coliforms that were higher than the results of present study (16-18).

According to the results, it seems that biofilm formation and presence of coliforms in the pipes after pasteurization or in the storage tanks and filling devices are the main causes of product contamination. Therefore, particular proceedings to remove contamination of milk and milk products are necessary.

Compared to national standard of Iran (No. 4622), the present study results showed that 10.4% of Kebab samples had high contamination with coagulase positive *staphylococcus aureus* ($> 10^3$cfu/g) (Table 1) (11). Similar results were obtained in another study on Kebab samples (1-3). *S. aureus* is not a good competitor for other bacteria in raw foods, but with a good chance of further growing in cooked foods the count of this bacterium in raw kebab samples is low.

Bacterial count in 9.3% of confectionary sweet samples was out of national standard range (No: 2395) (Table 1). According to this standard, the count of *S. aureus* in sweets should be negative (12, 13). Results of this study were similar to other study results. In a survey in Tehran city 72.7% of sweet samples were contaminated with different bacteria and 12% of contaminations was with *S. aureus* (19). Results of another study in Tabriz city showed that 31.2% of contamination of Nan khamei sweets was with *S. aureus* (20). *S. aureus*

is one of the main causes of food poisonings in humans that seems to have originated from food handlers and its presence in the foods indicates unsanitary conditions during foods production.

According to national standard of Iran (No: 42), 24.3% of vegetable oil samples were non-standard in this study. Samples were analyzed based on visual quality and conditions such as color, smell, packaging and their clearance and light yellow color after 24 hours at 20 to 25 ° C without sediment (7, 21). Obtained results were consistent with other studies. In a survey in Yasuj city 50% and 70% of used vegetables in restaurants and fast food centers were non-standard, respectively (22). Non-compliance with hygiene regulations such as exposure to sun light and mislabeling are the main reasons of sample rejection.

Vegetables in restaurants and fast food centers were non-standard, respectively (22). Non-compliance with hygiene regulations such as exposure to sun light and mislabeling are the main reasons of sample rejection.

All flour samples were acceptable for consumption according to national standard of Iran (No: 2393) within five years. Obtained results and no contamination in all samples have no compliance with similar studies. In a survey, 31.5% of flour samples in Tabriz bakeries had fungal contamination higher than standard limit (15). In another study 30% of flour samples in Zahedan had fungal contamination with over 10^4cfu/g(23).

No contamination of flour samples in this study indicates good manufacturing practice (GMP) during production process and good hygienic practice (GHP) during storage of raw materials and transport of produced flours.

Salt samples were analyzed based on purity. Purity in 1.2% and 44.8% of salt samples was higher and lower than standard limit, respectively (standard No: 26) (8). Standard limit of purity is 99.2%. Mean±sd of purity was 98.21±1.75 %. A study in Karaj city of Iran showed that 39% of supplied salt samples were non-standard which is consistent with the results of this study (24).

Table 1: List of studied foods, total number of samples per year, total number of non-standard samples, and numbers of Iranian national Standard used for analyzing of each food.

Food type	All collected samples during five years	All non-standard samples during five years	2009		2010		2011		2012		2013		National standard No.
			Total	Non-standard	Total	Non standard	Total	Non-standard	Total	Non-standard	Total	Non-standard	
Vegetable oils	70	14	10	3	15	3	15	3	15	3	15	2	**42**
Salt	163	75	23	10	35	15	35	15	35	15	35	20	**26**
Nan-chay	133	91	23	10	25	20	25	21	30	20	30	20	**6961& 3493**
Kabab	77	8	10	1	10	0	17	1	20	4	20	2	**4622**
Confection arysweets	86	8	10	1	16	1	20	1	20	2	20	3	**2395 & a-3493**
Flour	41	0	6	0	5	0	10	0	10	0	10	0	**2393 (103)**
Pasteurized milk	161	8	30	1	31	1	30	1	35	2	35	3	**2406**

Due to the numerous health problems, it is suggested that purity be improved to at least 99.2% by manufacturers and continuous monitoring is necessary for compliance with the standard.

Nan-chay samples acceptance for consumption was based on pH value. According to national standard of Iran (No: 6961) 68.4% of samples were non-standard due to high pH value (> pH=6) (9). Mean ± sd of pH in all samples was7.51±1.19. High pH in this traditional cookie indicates the use of high dose Na bicarbonate as baking powder in Zanjan city which is not according to recommended standard and is hazardous to consumer's health (9). This contamination may be due to insufficient monitoring of health inspectors in those years on production processes. At present, there are no similar studies on Nan-chay samples quality in Iran.

In conclusion, based on obtained results of this study it is suggests that the control and monitoring of foods be performed continuously every year, as well as more oversight of relevant institutions and Regulatory authorities in all stages of food production, transport and distribution.

References

1. Jalali S, Gharibi M. Microbiological quality of raw – cooked kebab in the supply unitsbushehr in 2011. Academic report. *Bushehr University of Medical Scinces.* 2011; (InPersian).

2. Jafari F, Kholdi N, Davati A, Nezamdust Z. The Study of Oils Consumption Pattern and Its Related Tehran. *Journal of Fasa University of Medical Sciences.* 2013; 3(3): 202-7 .

3. Tavakoli H, Farhang K, AA KZ, Heydari E. Bacteriological quality of ready to eat food in four military restaurants. *Journal Mil Medical.* 2012; 13(4): 207-12.

4. Faramarzi T, JonidiJafari A, Dehghani S, Mirzabeygi M, Naseh M, RahbarArasteh H. A survey on Bacterial Contamination of Food Supply in the West West of Tehran. *Journal of Fasa University of Medical Sciences.* 2012; 2(1): 11-8.

5. The United Nations Children's Fund.The right ingredients: the need to invest in child nutrition. www.unicef.org.uk. 2013; 3.

6. SoltanDallal MM, Motalebi SM, MasoumiAsl H, RahimiForushani A, SharifiYazdi MK, Rajabi Z, Aghili N. Analysis of epidemiological data of foodborne outbreak reported in Iran. *Tehran University Medical Journal (TUMJ).* 2015; 72(11): 780-8.

7. Iran National Standard. Vegetable oils, No 42. *Iran Standard and Institute.*1998; 1-4.

8. Iran National Standard. Food grade salt - Specification, No 26. *Iran Standard and Institute*. 1996; 1-2.

9. Iran National Standard. Cereal and cereal products – Traditional cookie - Specifications, No 6961. *Iran Standard and Institute*. 2002; 1-11.

10. Iran National Standard. Cookies and pastry-Specification and test methods, No 3493. *Iran Standard and Institute*. 2010; 1-16.

11. Iran National Standard. Kabab koobideh - Specification and test methods, No 4622. *Iran Standard and Institute.* 2013; 1-15.

12. Iran National Standard. Microbiological of pastry and confectionary products - Specifications and test method, No 2395. *Iran Standard and Institute*. 2007; 1-18.

13. Iran National Standard. Cookies and pastry-Specifications and test methods (Amendment no.1), No a-3493. *Iran Standard and Institute*. 2011; 1-5.

14. Iran National Standard. Cereal product and pulses, flour and soya protein- Microbiological specification and test methods, No 2393. *Iran Standard and Institute*. 2013; 1-15.

15. Iran National Standard. Microbiology of milk and milk products- Specifications, No 2406. *Iran StandardandInstitute*. 2008; 1-15.

16. Food borne illness. Department of Health and Human Services Centers for Disease control and prevention Division of Bacterial and my cotic Disease. 2005.

17. Shekar foroush SS, Razavi Rohani SM, Karim G, Kiaie SMM, Rokni N, Abbasvali M. Study on the overview on food borne bacteria in food with animal origin in Iran; Part three: seafood. *Journal of Food Hygiene.* 2013; 2(8): 15-33. (In Persian).

18. Dobaradaran S, Hamedian AA, Tahmasebi R, Qaedi H, Mohamadi A, AlizadehOtaghvarHR.Microbial quality evaluation of pasteurized andsterilized marketing milks in Bushehr city. *Iranian South Medical Journal*. 2014; 17(1): 76-84. (In Persian).

19. SoltanDallal MM, Fazelifard P, Tabatabaeibafroei A, Rashidi S, Zarrin M. Determination the rate of microbial contamination of cream pastry from confectionaries in south of Tehran. *Journal of Microbial Biotechnology*. 2010; 2(6): 7-11. (In Persian).

20. Nikniaz Z, Mahdavi R, Jalilzadeh H, Vahed Jabbari M. Evaluation of Microbial Contamination in Cream Filled Pastries Distributed in Tabriz Confectionaries. *Food Technology & Nutrition.* 2011; 8(1): 66-71. (In Persian).

21. Rahimzadeh Barzoki H, Beirami S, Mansourian M, Bay A, Qorbani M, Shafieyan Z, Rezapoor A, Ebadi FardAzar F, Norimotlagh Z, Shafieyan N. Determination of Peroxide Value of Edible Oils Used in Confectionary, Restaurants and Sandwich Shops in Gorgan in 2011. *The journal of toloo-e-behdasht*. 2015; 1(1): 40-47. (In Persian).

22. Pourmahmoudi A, Akbartabar Turi M, Poursamad A, and Sadat AM, Karimi A. Determination of Peroxide Value of Edible Oils Used in Restaurants and Sandwich Shops in Yasuj in 2006.

23. Ebrahim zadeh A, Mohammad zadeh F, Salimi A. Prevalence of Fungal Contamination of Flours in Zahedan Bakeries in 2013. *Medical Journal of Mashhad University of Medical Sciences.* 2014; 57(5): 705-710. (In Persian).

24. Akhavansiahkali K, Jafarinia M, Rafiee M, Zarabi M, Afshar A. Iodine concentration, Purity and insoluble compounds concentration in edible salts marketed in Karaj supermarkets. 16th Congress of Environmental Health, Tabriz, Iran. 2013. (In Persian).