RESEARCH ARTICLE

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Hygienic Quality of traditional and industrial yoghurt produced in Qazvin province of Iran

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Background & Aims of the Study: Because of yoghurt is a particular flavor (caused by diacetyl) and appropriate essential oils (from Atanal) as well as enjoy the soft tissue, it is considered as one of the most palatable dairy products. With regards to the yoghurt portion in supplement of protein food needs in our society, it is necessary to ensure its health. In this research the hygienic quality of traditional yoghurt (no licensed) and industrial yoghurt (licensed) during hot and cold seasons (2015-2016) was evaluated. The samples collected from distributed yoghurt in Qazvin province, Iran.

Materials and Methods: In this cross-sectional study, distributed yoghurt in Qazvin province has formed our statistical society. A total of 95 samples hand-picked during hot and cold seasons randomly. Samples were transferred at 4 °C to the laboratory. The microbiological characteristics of the samples were evaluated in accordance with ISIRI 695. Searching for E. coli and Staphylococcus aureus and also coliforms counting were done according to national standards (ISIRI 5234; ISIRI 6806; ISIRI 5486) by Lauryl Sulfate broth and EC broth, Baird-Parker agar, VRBL agar and Brilliant Green Bile Lactose broth. The YGC agar medium was used for count of fungi (molds and yeasts).

Results: Microbial count showed a significant difference between the traditional and industrial yoghurt samples at the levels which were considered significantly different at $P< 0.05$. The result showed that traditional yoghurt samples are highly contaminated with microbes than industrial ones and within traditional yoghurt samples; There was a noteworthy difference on the fungi totals at warm seasons.

Conclusions: Results have shown that microbial load increase in traditional yoghurt during summer, noticeably. It can indicate poor health conditions in the units, failure to maintain cold chain and inadequate training for vendors dairy products.

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Background

Yoghurt is a prevalent milk which is produced all over the world, achieved by a lactic acid fermentation (1,2). Typically yoghurt is produced by two microorganisms, Streptococcus thermophilus and Lactobacillus delbruckii spp. Bulgaricus as the starter culture (3,1). Their optimum growth temperature is at 39 and 45 °C, correspondingly (3).

Yoghurt compared to milk has a higher shelf life. Nowadays, increased consumption of this product is a result for its particular organoleptic features (4). Diacetyl (at a concentration of 0.5 mg/Kg) create specific flavors and

acetaldehyde (Atanal), (with a concentration about 23-41 mg/Kg) produce a good aroma in it. Also, the consistency of yoghurt is due to the acidification of milk by lactic acid bacteria (3).
Yoghurt is respected for its beneficial effects on the health of users (5). It considered as a healthy food because of highly digestible and nutritional value (6). Also, it is suggested to the people with lactose intolerance, gastrointestinal disorders such as inflammatory bowel disease, irritable bowel disease. It has many benefits for immune function and weight control (7,8).
The main sources of contamination of milk and dairy products are inside and outside of the udder, milking and storage equipment (9).
Yoghurt is an exceptional growth medium for numerous varieties of microorganisms by providing rich nutrients for microbes. Exposure to these fermented dairy products is a potential for microbial contamination throughout processing, storage and transportation deprived of basic hygienic performs in a place and temperature control, handling yoghurt will swiftly spoil and become unacceptable for human consumption (10).
Due to the gross unhygienic manner of preparation and handling Nono (a Nigerian milk food similar to yoghurt) has been demanded to be highly contaminated by micro-organism e.g. staphylococcus aureus, E.coli, salmonella, pseudomonas spand Bacillus sp (11).
Contaminated yoghurt can carry some health hazards (12). According to Institute of Standards and Industrial Research of Iran (ISIRI), the Yoghurt sample must not contain fungi more than 1 × 102 cfu/g, the coliform standard similarly lets the presence of less than 10 cfu/g of coliform bacteria and 0 cfu/g of E.coli and coagulase-positive staphylococcus.
The study is important because it deals with Consumers' health and the future of this industry.

Aims of the study:

Our study targets to compare the hygienic quality of traditional yoghurt samples (no licensed) and industrial one (with a license) during the period of a year (2015-2016) in Qazvin province, Iran.

Materials & Methods

In this cross-sectional study, during 4 seasons, 33 industrial and 62 traditional yoghurt samples were collected from supply of milk products; in the region roofed by Office of Food, Hygienic & Cosmetic Control Laboratory of Qazvin Province.
Samples were transported to the laboratory in ice boxes and until such tests were stored at 4 °C.

Sample preparation

Initial suspension and serial dilutions for microbial test was performed according to 9415 ISIRI. In the following, samples were evaluated in terms of microbiological characteristics in accordance with 695 ISIRI. Searching for E.coli, Staphylococcus aureus and total coliform count were in keeping with 5234 ISIRI, 6806 ISIRI and 5486 ISIRI, respectively.EC broth, Baird-Parker agar, VRBL agar and Brilliant Green Bile Lactose broth were used. YGC agar medium was used for the count of fungi (molds and yeasts).

Microbial Count

Total viable count of separates were passed by exposing the incubated plates to colony counter for the total colony count before promote for microscopy. Separates were characterized based on colonial morphology and microscopic form.

Data analysis

All data were analyzed, using SPSS 17 (SPSS 17.0 for Windows; SPSS Inc., Chicago, IL). The statistical methods were based on Paired Samples Test. The levels were considered significantly different at $P<0.05$.

Results

Table 1 shows the total viable count of yoghurts. Studies on the microbial quality of traditional and industrial yoghurt in Qazvin province showed in total of 95 samples, in both warm and cold seasons, there is no Staphylococcus aureus infection.

Traditional yoghurt, fungal contamination and E. coli, in warm and cold seasons, had the highest portions, respectively. Also, the industrial yoghurt samples, E. coli contamination in both warm and cold seasons allocated the most important part.

There was a significant difference in bacterial count between warm and cold seasons, in both traditional and licensed yoghurt samples.

Table 1) The Microbial parameters of traditional and industrial yoghurt samples in Qazvin province, 2015-2016

	traditional yoghurt samples (no licensed)								industrial yoghurt samples (licensed)							
	S.aureus		*E.coli*		Fungi (cfu/g)		Coliform count (cfu/g)		*S. aureus*		*E.coli*		Fungi (cfu/g)		Coliform count (cfu/g)	
	No	Positive (%)	Negative (%)	Positive (%)	Negative (%)	x>10^2	x<10^2	x>10	x<10	No	Positive (%)	Negative (%)	Positive (%)	Negative (%)	x>10^2	x<10^2	x>10	x<10
Warm seasons	27	0^{a}	100^{a}	11.11$_{a}$	88.11$_{a}$	25.92$_{a}$	74.07$_{a}$	0^{a}	100^{a}	12	0^{a}	100^{a}	16.66^{a}	83.33$_{a}$	0^{a}	100^{a}	8.33$_{a}$	91.66^{a}
Cold seasons	35	0^{a}	100^{a}	14.22$_{b}$	85.71$_{b}$	8.57^{b}	91.42$_{b}$	0^{a}	100^{a}	21	0^{a}	100^{a}	9.52^{b}	90.47$_{b}$	0^{a}	100^{a}	0^{b}	100^{b}

Data in the column with different letters are significantly different (P < 0.05).

Discussion

The results of this study demonstrated a statistically significant difference between the microbial quality of traditional and industrial yoghurt, especially in the hot season.

According to the study of Mirzaalizade about 50 samples of pasteurized yoghurt which were produced in Zanjan province of Iran, any of samples had not contamination with a variety of pathogenic microorganisms more than its standardized limits (2406 ISIRI). (4)

In a study about microbiological quality of set yoghurt, high total bacterial count were reported both in mixed and whole milk powder used for production of set yoghurt, which indicated poor quality of milk. The microbial content shown significantly (P<0.05) lower levels of total bacterial count (TBC) in mixed set yoghurt ($6.06\times10^{11}\pm1.86\times10^{12}$cfu/ml) compared to whole set yoghurt samples ($1.23\times10^{12}\pm2.85\times10^{12}$cfu/ml). (13)

In the assessment of microbiological quality of yoghurt which is sold by street vendors in Anambra state, Nigeria, samples grouped to four brands (A-D). The consequences showed

that E.coli was detected in all samples and the value of 4.4×10^5cfu/ml was observed in sample B. There was no significant difference in the coliform count among the 4 sample groups at α =0.05 and $p_{\text{-value}}$ =0.529296 (14).

The study was done on 96 samples of pasteurized milk and dairy products in Bandar Abbas city of Iran in terms of microbial contamination; no colonies of fecal coliform and Staphylococcus aureus were formed (15).

In year 2014 a study by volume of 110 yoghurt samples showed that counting values in May and June were higher than in February, March and April. The average value of the load for May was 2.8×10^3cfu/ml (5).

An assessment in Bangladesh revealed that TCC only in one yoghurt sample (open) collected from vendor presented TVBC of 9.1×10^3 to 8.2×10^7cfu/ml and TCC only in a sample which was collected from Dhanmondi, Dhaka. The packed yoghurt samples showed TVBC of 2.2×10^2 to 6.1×10^3cfu/ml and TCC only in one sample (12).

Results of our study showed the evidence of microbial load increase in traditional yoghurt during summer, clearly. It can indicate poor health conditions in the units; failure to maintain cold chain and inadequate training for vendors dairy products.

Conclusion

The significant differences between the number of isolates of the two group of samples which were analyzed (traditional and industrial yoghurt), varies with traditional yoghurt having the highest microbial load in each of the analysis. Thus, industrial yoghurt has lesser unhygienic capacity when parallel by traditional yoghurt samples. This shows necessity attention to train people who are involved in the manufacture, storage, distribution and supply as well as increased surveillance measures in all these steps.

Footnotes

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Conflict of Interest:
The authors stated no conflict of interest.

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