

Microbial quality assessment of pasteurized milk of supplied to Loerstan province market, Southwest of Iran

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ABSTRACT

Objective: Bacterial contamination and food poisoning is one of contemporary issues in the early years which many governments like Iran allocate some million dollars a year to medical and social treatment to prevent the implications.

Methods: This paper aims to determine the bacterial load in pasteurized milk, produced for Loerstan province market in 2014. During the course of the year, 118 samples were collected and sent to the official laboratory.

Results: According to the Iran standard testing protocols, 11% of samples exceeded acceptable range.

Conclusions: The diversity of reports is because of different range of personal hygiene, delivery system quality, maintaining equipment and regards for milking. Beside these factors, season of sampling may affect the subject.

KEY WORDS: Pasteurized milk, Lorestan province, Iran, *Escherichia coli*, Coliforms

1. INTRODUCTION

Food and nutrition are essential to live but it should be noted that, this crucial role is eclipse when food-borne pathogens get involve. Then, they may cause some disorders instead of promoting growth (Shams, 2002). All of nutrients are exposed to physical, chemical and biological contaminations (Giti, 1991). Milk as a rich nutritional environment encourage proliferation of microorganism (Laval, 1995). Milk contamination impact both nutritional content and health of consumers (Nanu, 2007). Different unprotected condition threatens hygiene standard of milk which the post pasteurization factors have attracted more often attention (Rahman, 2015). However, quality of row milk and sanitary condition of milk products' industry are the most important treat which influence sanitary quality of dairy products (Herrera, 2014).

Results of studies shown which foodstuff infectious and human food born diseases as the most well-known diseases have become more common and cause suffering human with serious problems, especially in undeveloped countries (Fatholahzadeh, 2009; Asadollahi, 2011; 2012; Taherikalani, 2011; 2008; Emaneini, 2009; Jabalameli, 2011; 2012; Soroush, 2010; Pakzad, 2011; Shahsavani, 2012; Haghi-Ashteiani, 2007; Khoramrooz, 2012; Akbari, 2010; Sahebkhah, 2011; Kalantari, 2007; Nakhjavani, 2013).

Many researches have demonstrated that about 70% of infectious diseases are related to unhygienic foods. More than 450 bacteria, viral, fungal and parasitical infections have transmitted to human through animal source foods. (Marandi, 1999). The presences of some indicator microorganisms are the criteria for verifying appropriate manufacturing process and hygienic production condition (Flores, 1999). Total coliform bacteria investigation is one of common test for evaluation fecal contamination (Vahedi, 2015).

Coliforms are known as normal flora of intestinal track. Determination of coliforms in milk indicates negligence in carry out sanitary procedure in distribution, transportation and preparation systems (ISO, 2002). *Salmonella* spp., *Staphylococcus aureus*, and *E. coli* are the most common pathogens involving in milk contamination (Angulo, 2009; Vahedi, 2015). This study aims to assess sanitary condition of milk producer factories and to prove the necessity of improvement in systems of control and protection.

2. MATERIALS AND METHODS

2.1. Sample collection: During March to April 2014, 118 pasteurized milk samples were collected at random from different producer in Lorestan province. The samples were transmitted to laboratory and were tested for load of total bacteria, coliform and *E. coli* according to the Iran national standard protocol. By considering standard limits (table.1) two types of samples were defined acceptable and unconsumable which respectively referred to samples with lower and higher level of contamination. The samples were prepared by sterilized equipment and were preserved in 4 degree Celsius before running the tests.

Table.1. The standard microbial load range for milk sample

Microorganism	Acceptable limit (cfu/ml)
Total count	$<1 \times 10^3$
Coliforms	$<1 \times 10^1$
Aerobic microorganisms	$<5.7 \times 10^4$
<i>E-Coli</i>	0 (Negative)

2.2. Microbial tests: All culture media and materials were purchased from Merck Company.

2.3. Identification of Escherichia coli in pasteurized milk (Iran national standard No. 2946): 1 ml milk sample was diluted ten times in a tube which contained 10 ml LST Broth and was equipped with Durham tube for gas production determination. The tube was incubated for 24 to 48 hours at 37°C temperature. If gas production or turbidity were observed, 1-2 drops of liquid culture were added to other tube which contained 10 ml EC broth and Durham tube and were incubated at 44 to 45°C for 24 to 48 hours (ISO, 2005). If gas production or turbidity were observed again, 1-2 drops of suspension culture were added to tube contained peptone water missed indole and were incubated at 44 to 45°C for 24 to 48 hours. Then, 0.5 ml Kovac's indicator were added the tube. The positive reaction caused red color appearance otherwise the culture medium didn't change. Mac conkey agar medium was used for streak culture of EC broth suspension and lactose-positive colonies with purple color were isolated and cultured on nutrient agar medium. *E.coli* species recognition were confirmed by running TSI, indole, methyl red, simon citrate (IMVIC) tests.

2.4. Total count of microorganisms in pasteurized milk at 30° C (Iran National Standard No. 5272): In order to counting total number of aerobic and anaerobic microorganism in sample, 1.0 ml of diluted series was poured into empty plates. Then 15 to 20 ml of pcsmA medium (plate count skim milk Agar) at 45 to 50 °C were added and shaken carefully. The medium of surface was covered with an extra thin layer in case of aerobic colonies expansion on growth medium. The plates were inverted and incubated at 30°C for 72 hours. Total number microbial contaminations were calculated by equation.1 (ISO, 2003) and the average amount was reported.

$$\text{Eq.1: Colonies number (cfu/mL)} = \text{total number of colonies} \times \text{dilution-1} \times \text{volume-1}$$

Colony counting was carried out under adequate light condition to avoid being mistaken about milk powder sediments particles of medium and colonies.

2.5. Enumeration of coliforms in pasteurized milk at 30°C (Iran National Standard No. 5486-1): As it was described, a dilution series of milk samples were prepared and 1.0 ml of them were poured into empty plates. Then, 15 ml of VRBL (Violet Red Bile Lactose) at 45 ± 1 °C agar were added and mixed softly. When the medium cooled down and became solid about 4 ml of culture medium were added to cover the medium surface.

The inverted plates were incubated for 24 ± 2 hours at 30°C. The purple colonies with central red spot caused by bile particle accumulation were easily recognized as coliform and were counted. The uncertain colonies were confirmed by gas production in Brilliant Green Bile Broth medium at 30° C for 24 ± 2 hours incubation. If microorganisms produced gas, the uncertain colonies were considered as coliform and were counted. If tubes were turbid and no gas was produced, suspension was streaked on Mac conkey agar. Coliforms bacteria which formed reddish purple colonies on the medium were counted. Total coliforms number was calculated using the following equation, Eq.2 (ISO, 2004).

$$\text{Eq.2: Coliforms number (mL)} = \text{total number of colonies (confirmed and uncertain colonies)} \times \text{dilution-1} \times \text{volume-1}$$

3. RESULTS

The experiment which carried out on 118 milk samples according to the Iran's national standard demonstrated that 11% percent of products were inconsumable. Test results were reported distinctly in table.2.

Table.2. Contamination % results

Contamination item	Number of samples out of standard range from 118 samples	% of contamination
<i>E.Coli</i>	3	11.01%
Coliforms	11	9.32%
Total count	13	2.54%

4. CONCLUSION

This study investigate contamination level of 118 pasteurized milk sample were collected from different supplier centers of Lorestan province. Counting results of total microbial population, coliforms and *E.coli* determined health status of milk samples. 11% of samples were tested below the norm and were inconsumable for human. There are many reports up to now reported microbial contamination of dairy products.

61% and 5% of raw milk and pasteurized milk sample were collected in Shahrood city of Iran were contaminated and labeled inconsumable (Arab Amery, 2007). Salari and coworkers found that about 81% of milk sample in Yazd city of Iran satisfied standard criteria (Salari, 2007). Quality Evaluation of raw milk was produced in Kerman province of Iran were near 37.31×10^6 and 7.47×10^6 cfu/ml for microbial load in bulk storage and through delivery time (Vahmi, 2003). Microbial analysis of 300 milk and yogurt samples were collected from Dhaka city in Bangladesh showed that all samples had *E.coli* and Shigella-like species contamination and all pasteurized milk contained total bacterial count of 1.9×10^2 to 2.8×10^3 cfu/ml. also it has been stated that microbial competition and low pH are the inhibitory factor for contamination (Rahman, 2008). Another studies detected different contamination in pasteurized milk and suggested controlling critical steps of pasteurization like heating, handling, storage and post

pasteurization process confronted with bacteria (Rizwanet, 2011; Khan, 2008). A study on 739 pasteurized milk sample carried out in Iran showed 8.68% of products were contaminated higher than standard level (Karimi, 2006). In a distinctive observation indicated that 19.7% of milking, 49% of transporting and 58.4% of selling center weak operation were led to *E.coli* and *S.aureus* contamination of milk (Sadeghi-Fard, 2006). Pourhassanan and Taravat reported proportion of *E.coli*, *Enterobacter*, *Klebsiella* and *S. aureus* in raw milk contamination in Malayer city of Iran (Pourhassanan and Taravat, 2011).

Essential oils and extract of Iranian hebal plants have several antioxidant and bioactive compounds which those have antimicrobial effect on any types of bacterium such as gram-negative and gram-positive bacterium. Therefore, they can be used for safeguarding of food and decreased of microbial quality (Bahmani, 2014; 2015; Delfan, 2014; Sarrafchi, 2015; Asadi-Samani, 2014; Saki, 2014; Karamati, 2014; Asadbeygi, 2014).

The diversity of reports is because of different range of personal hygiene, delivery system quality, maintaining equipment and regards for milking. Beside these factors, season of sampling may affect the subject.

According to Iran standard and testing institute, 13 sample from 118 exceeded the norms of microbial load which oriented by improper processing and packaging. Considering the microbial load of contaminated sample it could be recommended that, in the first place raw milk contamination by reason of unhygienic soil, feed, air, water, cow udders, milkers' hands and milking equipment in farms should be protected from hazardous microorganism, because Spore prone microorganism can emerge after pasteurization process and spoil products. In the second place using appropriate equipment for milk handling and storage and staff training can prevent further contaminations in collection centers and factories.

5. ACKNOWLEDGMENT

This study was conducted in cooperation with Food & Drug deputy of Lorestan University of Medical Sciences.

REFERENCES

- Akbari M, Niakan M, Taherikalani M, Feizabadi MM, Azadi NA, Soroush S, Emaneini M, Abdolkarimi A, Maleki A, Hematian A, Rapid identification of Iranian *Acinetobacter baumannii* strains by single PCR assay using BLA oxa-51 -like carbapenemase and evaluation of the antimicrobial resistance profiles of the isolates, *Acta Microbiol Immunol Hung*, 57 (2), 2010, 87-94.
- Alfa Laval, Manual Dairy Industries, AMV editions, Editorial Iragra, SA, 2nd Edition, Madrid, Spain, 1995, 1-145.
- Angulo, Frederick J, Jeffrey T, Le Jeune, and Paivi J, Rajala-Schultz, Unpasteurized milk: a continued public health threat, *Clinical Infectious Diseases*, 48 (1), 2009, 93-100.
- Arab Amery M, Evaluation of bacterial contamination of raw and pasteurized milk in shahrood, Shahidbeheshti University of Medical Sciences Autumn, 2007.
- Asadbeigi M, Mohammadi T, Rafieian-Kopaei M, Saki K, Bahmani M, Delfan B, Traditional effects of medicinal plants in the treatment of respiratory diseases and disorders: an ethnobotanical study in the Urmia, *Asian Pac.J.Trop. Med.*, 7 (1), 2014, S364-S368.
- Asadi-Samani M, Bahmani M, Rafieian-Kopaei M, The chemical composition, botanical characteristic and biological activities of *Borago officinalis*: a review, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 22-28.
- Asadollahi K, Taherikalani M, Maleki A, Alizadeh E, Valadbaigi H, Soroush S, Maleki H, Asadollahi P, Emaneini M, Diversity of aminoglycoside modifying enzyme genes among multidrug resistant *Acinetobacter baumannii* genotypes isolated from nosocomial infections in Tehran hospitals and their association with class 1 integrons, *Acta Microbiol.Immunol.Hung*, 58 (4), 2011, 359-70.
- Asadollahi P, Akbari M, Soroush S, Taherikalani M, Asadollahi K, Sayehmiri K, Maleki A, Maleki MH, Karimi P, Emaneini M, Antimicrobial resistance patterns and their encoding genes among *Acinetobacter baumannii* strains isolated from burned patients, *Burns*, 38 (8), 2012, 1198-203.
- Bahmani M, Banihabib EKHM, Rafieian-Kopaei M, and Gholami-Ahangaran M, Comparison of Disinfection Activities of Nicotine with Copper Sulphate in water Containing *Limnatis nilotica*, *Kafkas Univ.Vet.Fak Derg*, 21 (1), 2015, 9-11.
- Bahmani M, Karamati SA, Banihabib EKH, Saki K, Comparison of effect of nicotine and levamisole and ivermectin on mortality of leech, *Asian Pac.J.Trop.Dis.*, 4 (1), 2014, 477-480.
- Bahmani M, Karamati SA, Hassanzadazar H, Forouzan SH, Rafieian-Kopaei M, Kazemi-Ghoshchi B, Asadzadeh J, Kheiri AGH, Ehsan Bahmani E, Ethnobotanic study of medicinal plants in Urmia city: identification and traditional using of antiparasites plants, *Asian Pac.J.Trop.Dis.*, 4 (2), 2014, 906-910.

- Bahmani M, Rafieian M, Baradaran A, Rafieian S, Rafieian-kopaei M, Nephrotoxicity and hepatotoxicity evaluation of *Crocus sativus* stigmas in neonates of nursing mice, *J. Nephrothol.*, 3 (2), 2014, 81-85.
- Bahmani M, Rafieian-Kopaei M, Hassanzadazar H, Saki K, Karamati SA, Delfan B, A review on most important herbal and synthetic antihelmintic drugs, *Asian Pac.J.Trop.Med.*, 7(1), 2014, 29-33.
- Bahmani M, Saki K, Rafieian-Kopaei M, Karamati SA, Eftekhari Z, Jelodari M, The most common herbal medicines affecting *Sarcomastigophora* branches: a review study, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 14-21.
- Bahmani M, Shirzad HA, Majlesi M, Shahinfard N, Rafieian-Kopaei M, A review study on analgesic applications of Iranian medicinal plants, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 43-53.
- Bahmani M, Zargaran A, Rafieian-Kopaei M, Identification of medicinal plants of Urmia for treatment of gastrointestinal disorders, *Rev.Bras.Farmacogn.*, 24 (4), 2014, 468-480.
- Bahmani M, Zargaran A, Rafieian-Kopaei M, Saki M, Ethnobotanical study of medicinal plants used in the management of diabetes mellitus in the Urmia, Northwest Iran, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 348-354.
- Delfan B, Bahmani M, Eftekhari Z, Jelodari M, Saki K, Mohammadi T, Effective herbs on the wound and skin disorders: a ethnobotanical study in Lorestan province, west of Iran, *Asian Pac.J.Trop.Dis.*, 4 (2), 2014, 938-942.
- Delfan B, Bahmani M, Hassanzadazar H, Saki K, Rafieian-Kopaei M, Identification of medicinal plants affecting on headaches and migraines in Lorestan Province, West of Iran, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 376-379.
- Delfan B, Bahmani M, Rafieian-Kopaei M, Delfan M, Saki K, A review study on ethnobotanical study of medicinal plants used in relief of toothache in Lorestan Province, Iran, *Asian Pac.J.Trop.Dis.*, 4 (2), 2014, 879-884.
- Emaneini M, Taherikalani M, Eslampour MA, Sedaghat H, Aligholi M, Jabalameli F, Shahsavani S, Sotoudeh N, Phenotypic and genotypic evaluation of aminoglycoside resistance in clinical isolates of *staphylococci* in Tehran, Iran, *Microb.Drug Resist.*, 15 (2), 2009, 129-32.
- Fatholahzadeh B, Emaneini M, Aligholi M, Gilbert G, Taherikalani M, Jonaidi N, Eslampour MA, Feizabadi MM, Molecular characterization of methicillin-resistant *Staphylococcus aureus* clones from a teaching hospital in Tehran, *Jpn.J.Infect.Dis.*, 62 (4), 2009, 309-11.
- Fatholahzadeh B, Emaneini M, Feizabadi MM, Sedaghat H, Aligholi M, Taherikalani M, Jabalameli F, Characterisation of genes encoding aminoglycoside-modifying enzymes among methicillin-resistant *Staphylococcus aureus* isolated from two hospitals in Tehran, Iran, *Int.J.Antimicrob.Agents*, 33 (3), 2009, 264-5.
- Flores LJJ, Martinez FJC, Casillas GFJ, Manual of Good Hygiene Practices, 2nd Edition, 2nd Reprint, Ministry of Health under secretary of Health Regulation and Development, Directorate General for Health Quality of Goods and Services, Mexico, D.F, 1999.
- Giti K, Microbiological Examination of Food, Tehran: Tehran University Publication, 1991.
- Haghi-Ashteiiani M, Sadeghifard N, Abedini M, Soroush S, Taheri-Kalani M, Etiology and antibacterial resistance of bacterial urinary tract infections in children's medical center, Tehran, Iran, *Acta.Med.Iran*, 45 (2), 2007, 153-157.
- Herrera, Carlos Flores, Jose Luis Montanez-Soto, Jose Venegas Gonzalez, Aurea Bernardino-Nicanor, and Leopoldo Gonzalez-Cruz, Effect of Good Hygiene Practices Implementation in the Milk Sanitary Quality Used in the Cotija Cheese Elaboration, 2014.
- Jabalameli F, Mirsalehian A, Khoramian B, Aligholi M, Khoramrooz SS, Asadollahi P, Taherikalani M, Emaneini M, Evaluation of biofilm production and characterization of genes encoding type III secretion system among *Pseudomonas aeruginosa* isolated from burn patients, *Burns*, 38 (8), 2012, 1192-7.
- Jabalameli F, Mirsalehian A, Sotoudeh N, Jabalameli L, Aligholi M, Khoramian B, Taherikalani M, Emaneini M, Multiple-locus variable number of tandem repeats (VNTR) fingerprinting (MLVF) and antibacterial resistance profiles of extended spectrum beta lactamase (ESBL) producing *Pseudomonas aeruginosa* among burnt patients in Tehran, *Burns*, 37 (7), 2011, 1202-7.
- Kalantari N, Taherikalani M, Parvaneh N, Mamishi S, Etiology and antimicrobial susceptibility of bacterial septic arthritis and osteomyelitis, *Iran J.Public Health*, 36 (3), 2007, 27-32.
- Karamati SA, Hassanzadazar H, Bahmani M, Rafieian-Kopaei M, Herbal and chemical drugs effective on malaria, *Asian Pac.J.Trop.Dis.*, 4 (2), 2014, 599-601.
- Karimi G, Milk and milk products, Sepehr.Pub, Iran, Tehran, 2006, 30-50.
- Khan M.T.G, Zinnah M.A, Siddique M.P, Rashid M.H.A, Islam M.A, and Choudhury K.A, Physical and microbial qualities of raw milk collected from Bangladesh agricultural university dairy farm and the surrounding villages, *Bangladesh Journal of Veterinary Medicine*, 6 (2), 2008, 217-221.

Khoramrooz SS, Mirsalehian A, Emaneini M, Jabalameli F, Aligholi M, Saedi B, Bazargani A, Taherikalani M, Borghaei P, Razmpa E, Frequency of *Alloicoccus otitidis*, *Streptococcus pneumoniae*, *Moraxella catarrhalis*, and *Haemophilus influenzae* in children with otitis media with effusion (OME) in Iranian patients, *Auris Nasus Larynx*, 39 (4), 2012, 369-73.

Marandi A, Health in the Islamic Republic of Iran, UNICEF, 1999, 585.

Nakhjavani FA, Emaneini M, Hosseini H, Iman-Eini H, Aligholi M, Jabalameli F, Haghi-Ashtiani MT, Taherikalani M, Mirsalehian A, Molecular analysis of typical and atypical enteropathogenic *Escherichia coli* (EPEC) isolated from children with diarrhoea, *J.Med.Microbiol.*, 62 (2), 2013, 191-5.

Nanu E, Latha C, Sunil B, Thomas Prejit M, and Vrinda Menon K, Quality assurance and public health safety of raw milk at the production point, *American Journal of Food Technology*, 2 (3), 2007, 145-152.

National Standard of Iran, The milk and milk products, Method of colony counting of bacteri grown at 30°C, 2002.

Pakzad I, Ghafourian S, Taherikalani M, Sadeghifard N, Abtahi H, Rahbar M, Mansory Jamshidi N, qnr Prevalence in Extended Spectrum Beta-lactamases (ESBLs) and None-ESBLs Producing *Escherichia coli* Isolated from Urinary Tract Infections in Central of Iran, *Iran J.Basic Med.Sci.*, 14 (5), 2011, 458-64.

Pourhassan M, and Najafabadi A.R.T, The spatial distribution of bacteria pathogens in raw milk consumption on Malayer City, Iran, *Shiraz E Medical Journal*, 12 (1), 2011, 2-10.

Rahman M.M, Mashiar Rahman M, Arafat S.M, Atiqur Rahman, Khan M.Z.H, and Rahman M.S, Microbiological Quality Assessment of a Local Milk Product, Kwacha Golla, of Bangladesh, *J.Korean Soc.Appl.Biol.Chem.*, 51 (4), 2008, 251-257.

Rahman, Tasmina, Tanzania Akon, Iftikharun Nessa Sheuli, and Naima Hoque, Microbiological analysis of raw milk, pasteurized milk and yogurt samples collected from different areas of Dhaka city, Bangladesh, *Journal of Bangladesh Academy of Sciences*, 39 (1), 2015, 31-36.

Rizwan M, Pervez A, and Khan J, Bacteriological quality of raw and packed milk, *Canadian J.Sci.Indust.Res.*, 2 (2), 2011, 86-94.

Sadeghi-Fard N, Azizi-Jalillean F, Seyed-Khani-Nahal A, Evaluation of contamination of raw milk for *E.coli* and *Staphylococcus aureus* in Eilam University of Medical Sciences, *J Eilam Univ Med Sci.*, 14, 2006, 44-9.

Sahebekhtiari N, Nochi Z, Eslampour MA, Dabiri H, Bolfion M, Taherikalani M, Khoramian B, Zali MR, Emaneini M, Characterization of *Staphylococcus aureus* strains isolated from raw milk of bovine subclinical mastitis in Tehran and Mashhad, *Acta Microbiol Immunol Hung.*, 58 (2), 2011, 113-21.

Saki K, Bahmani M, Rafieian-Kopaei M, Hassanzadazar H, Dehghan K, Bahmani F, Asadzadeh J, The most common native medicinal plants used for psychiatric and neurological disorders in Urmia city, northwest of Iran, *Asian Pac.J.Trop.Dis.*, 4 (2), 2014, 895-901.

Saki K, Bahmani M, Rafieian-Kopaei M, The effect of most important medicinal plants on two important psychiatric disorders (anxiety and depression)-a review, *Asian Pac.J.Trop.Med.*, 7 (1), 2014, 34-42.

Salari MH, Sharifi MR, Golzari SM, Sadr-Abadi EA, Kafilin MH, Evaluating the contamination milk and its products in Yazd province, *Journal of Public Health and Institute of Health Research*, 4 (1), 2007, 43-37.

Shahsavan S, Emaneini M, Noorazar Khoshgnab B, Khoramian B, Asadollahi P, Aligholi M, Jabalameli F, Eslampour MA, Taherikalani M, A high prevalence of mupirocin and macrolide resistance determinant among *Staphylococcus aureus* strains isolated from burnt patients, *Burns*, 38 (3), 2012, 378-82.

Shams Khoram, Abadi GH, Jahanbani N, Microbiological Quality of Juice and Ice Cream in Khoram Abad City, *Yafteh Journal*, 4 (15), 2002, 6-11.

Soroush S, Haghi-Ashtiani MT, Taheri-Kalani M, Emaneini M, Aligholi M, Sadeghifard N, Pakzad I, Abedini M, Yasemi M, Paiman H, Antimicrobial resistance of nosocomial strain of *Acinetobacter baumannii* in Children's Medical Center of Tehran: a 6-year prospective study, *Acta Med Iran*, 48 (3), 2010, 178-84.

Taherikalani M, Etemadi G, Geliani KN, Fatollahzadeh B, Soroush S, Feizabadi MM, Emergence of multi and pan-drug resistance *Acinetobacter baumannii* carrying bla OXA-type -carbapenemase genes among burn patients in Tehran, Iran, *Saudi Med.J.*, 29 (4), 2008, 623-4.

Taherikalani M, Maleki A, Sadeghifard N, Mohammadzadeh D, Soroush S, Asadollahi P, Asadollahi K, Emaneini M, Dissemination of class 1, 2 and 3 integrons among different multidrug resistant isolates of *Acinetobacter baumannii* in Tehran hospitals, Iran, *Pol.J.Microbiol.*, 60 (2), 2011, 169-74.

Vahedi M, Nasrolahei M, Sharif M, and Mirabi A.M, Bacteriological study of raw and unexpired pasteurized cow's milk collected at the dairy farms and super markets in Sari city in 2011, *Journal of preventive medicine and hygiene* 54 (2), 2015.