DETECTION OF MICROBIAL CONTAMINATION IN SOME FOOD PRODUCTS AVAILABLE IN THE LOCAL MARKETS IN AL-MUTHANNA PROVINCE, IRAQ

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Abstract

The result of this study investigation of microbial contamination for some food products that collected from locally markets in Al-Muthanna province during the period 1/6/2019 to 1/9/2019 which refers to great different in information on cans and showed some samples were empty from production date, expiry date, trade name, weight and batch number. While detection of microbial contamination in foods showed that absence of microbial contamination in 6, 8, 9 and 13 samples. But the total number of aerobic bacteria for 1, 2, 4, 7, 11 and 12 samples were 1×10^6, 3×10^2, 1×10^5, 1×10^5, 5×10^3 and 2×10^3 cfu/ml respectively. the total number of coliform bacteria were 6×10^1 cfu/ml in sample number (3). Whereas the investigating of *E.coli*, *Staph. aureus* and Salmonella in food products, all these samples were pure from contamination by these bacteria. Moreover, the results of this study revealed yeast and mold contamination detection in all samples and only 5 and 10 samples were contaminated 1×10^8 and 1×10^2 cfu /ml respectively.

Key words: Canned food, Beef , *Staph. aureus*, APC.

Introduction

Human health is taken great attention by specialists in the food field, nutrition and public health (WHO, 2004). There is no doubt that food have great importance in human life and considered the basis of his body building and growth (Gorny, 2006). As well as, Canned food is one of the most consumed types of food in the world, as the food industry began to appear significantly at the commercial level from beginning of the twentieth century and increased global production of these foods, Canned food is packed in tightly closed containers and commercially sterile (David and Philip, 2006). Various studies have shown that even though strict procedures on processing and canning of food products, several cases of poisoning are reported essentially due to the consumption of canned foods (Czerwinski *et al*., 2012). The spoilage and poisoning of canned food products due to several factors, including presence of microorganisms such as, bacteria, yeast and mold, which are eliminated by thermal treatments and sterilization carried out on these types of food, but failure to conduct these treatments properly lead to growth and reproduction and thus cause

food intoxication (Abadias *et al*., 2008). The microbiological culture methods (Niederhauser *et al*., 1992), high-performance liquid chromatography (Hernández-Jover *et al*., 1996), hyperspectral imaging (Gowen *et al*., 2007), Raman spectroscopy (Yang and Irudayaraj, 2003), nuclear magnetic resonance technique (Duarte *et al*., 2006) and mass spectroscopy (Mayr *et al*., 2003), have been established to examine and identify microbes and pathogenic agents in food canned products. These methods very important to provide us information about the occurrence of pathogenic microorganisms which ensures food safety and quality. The aims of this work were to, detection of microbial contamination by aerobic bacteria, coliform bacteria, Staph.aureus, *E.coli,* salmonella Yeast and Molds in locally manufactured food samples taken from supermarkets in Al-Muthanna province to educating the people about food safety and determine its suitability for consumption.

Materials and Methods

Sample collection: Collected 13 locally food samples from Al-Muthanna province markets during the period 1/6/2019 to 1/9/2019. The samples are arranged as follows:

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Table 1: Tested locally food samples.

Expiry date	Production date	Trade name	Type of food	Sample no.
30/3/2019	30/12/2018	Al-Ameer	Beef	1
*—	*—	*—	Raisin juice	2
14/10/2019	14/1/2019	Al-Omaraa	Tarshi Sesame	3
18/1/2020	19/1/2019	Al-Arabi	Cold ketchup	4
1/6/2019	1/3/2018	*—	Iraqi Dates	5
15/11/2019	16/2/2019	Orginal	Orange and carrot juice	6
30/3/2019	30/12/2018	Al-Ameer	Beef Kabab	7
28/1/2019	7/1/2019	Al-Saheel	Condensed milk	8
1/7/2019	23/10/2018	Al-Sabah	Tahin	9
19/5/2020	20/11/2018	Karbala	Date syrup	10
9/12/2019	10/12/2018	Talen	Tomato ketchup	11
5/3/2021	5/3/2019	Al-Tahona	Vermicelli	12
1/1/2020	1/1/2018	Al-Yakot	Salt	13

*Not contained on cans.

We used a special form to confirm the information for all food products examined such as, Food sample name, trade name, production date, expiry date, manufacture, batch number and weight.

Detection of microbial contamination

Microbial tests for the food samples were conducted according to (APHA, 1992 and AOAC, 2000), included: Aerobic Plate Count (APC), Coliform, *E. coli*, *Staph. aureus*, Salmonella, Mold and Yeast. The media was prepared according to instructions of manufacturer and after pH adjusted sterilized by autoclave at a temperature $121^{O}C$ and pressure 15 lb/in^2 for 15min. Then incubated with various temperature according to each test.

Results and Discussion

Scaning information card: Table 2, shows scan information card for food samples, all samples contained

the trade name except sample number 2 and 5 also all these samples contained the manufacture, production date and expiry date, except sample number 2 was empty from production date and expiry date, this explain that these foods can be expired as well as available in local markets and sold to consumers while many local food products did not contain weight and batch number, this is one of the important indicators in the presence of damage in these products to know productive meal that produced these foods. From previous results there is variation in information recorded on information card, as the legal legislation states on the food products must contain number of the meal and storage conditions clearly in addition to putting warning labels on how to deal with these foods before and after consumption. As well as the inclusion of period of validity and use language of the country in which these foods are consumed so that the consumer can read them accurately before buying (David and Philip, 2006, Patterson, 1991 and Wolf, 1992).

Detection of microbial contamination: The result of table 3 showed that absence of microbial contamination in sample number 6, 8, 9 and 13. There was various contamination in the samples 1, 2, 4, 7, 11 and 12 the total number of aerobic bacteria reached (cfu/ml) 1×10^6, 3×10^2, 1×10^5, 1×10^5, 5×10^3 and 2×10^3 respectively. While the coliform bacteria reached 6×10^1 (cfu/ml) in sample number (3). Whereas the investigating of *E.coli*, *Staph. aureus* and Salmonella in food products it is free from contamination by these bacteria, as well as molds and yeasts examination showed that contamination in the samples number $5(1\times10^8)$ and $10(1\times10^2)$ (cfu/ml) respectively. While the remaining samples were free from yeast and molds contamination. The above results showed that there is a high percentage of pollution in most samples collected from local markets and sold at low prices and the consumer accepts to buy these foods in large quantities

Table 2: Scanning information card.

Weight	Expiry date	Production date	Batch number	Manufacture	Trade name	Type of food	N
*—	30/3/2019	30/12/2018	*—	Locally	Al-Ameer	Beef	1
*—	*—	*—	*—	Locally	*—	Raisin juice	2
*—	14/10/2019	14/1/2019	*—	Locally	Al-Omaraa	Tarshi Sesame	3
340g	18/1/2020	19/1/2019	*—	Locally	Al-Arabi	Cold ketchup	4
*—	1/6/2019	1/3/2018	*—	Locally	*—	Iraqi Dates	5
200ml	15/11/2019	16/2/2019	B28k-I	Locally	Orginal	Orange and carrot juice	6
*—	30/3/2019	30/12/2018	*—	Locally	Al-Ameer	Beef Kabab	7
*—	28/1/2019	7/1/2019	*—	Locally	Al-Saheel	Condensed milk	8
*—	1/7/2019	23/10/2018	*—	Locally	Al-Sabah	Tahin	9
1000g	19/5/2020	20/11/2018	*—	Locally	Karbala	Date syrup	10
350g	9/12/2019	10/12/2018	*—	Locally	Talen	Tomato ketchup	11
*—	5/3/2021	5/3/2019	*—	Locally	Al-Tahona	Vermicelli	12
5kg	1/1/2020	1/1/2018	*—	Locally	Al-Yakot	Salt	13

*Not contained on cans.

Table 3: Results of microbial tests for locally food products.

Yeast & Molds (Cfu/ml)	Tests					Type of food	N
	Salmonella (Cfu/ml)	Staph.aureus (Cfu/ml)	E.coli (Cfu/ml)	Total Coliform (Cfu/ml)	APC (Cfu/ml)		
Zero	Zero	Zero	Zero	Zero	1×10^6	Beef	1
Zero	Zero	Zero	Zero	Zero	3×10^2	Raisin juice	2
Zero	Zero	Zero	Zero	6×10^1	Zero	Tarshi Sesame	3
Zero	Zero	Zero	Zero	Zero	1×10^5	Cold ketchup	4
1×10^8	Zero	Zero	Zero	Zero	Zero	Iraqi Dates	5
Zero	Zero	Zero	Zero	Zero	Zero	Orange and carrot juice	6
Zero	Zero	Zero	Zero	Zero	1×10^5	Beef Kabab	7
Zero	Zero	Zero	Zero	Zero	Zero	Condensed milk	8
Zero	Zero	Zero	Zero	Zero	Zero	Tahin	9
1×10^2	Zero	Zero	Zero	Zero	Zero	Date syrup	10
Zero	Zero	Zero	Zero	Zero	5×10^3	Tomato ketchup	11
Zero	Zero	Zero	Zero	Zero	2×10^3	Vermicelli	12
Zero	Zero	Zero	Zero	Zero	Zero	Salt	13

is not interested in the period of validity or quality of these foods or their origin. The presence of this contamination due to combination of many factors such as: failure to follow the basic health rules in manufacturing processes and control of critical points in production and use of appropriate temperatures for the sterilization process, which leads to elimination of all microorganisms which ensures no contamination of canned foods (Winniczuk and Parish, 1997, Okagbue, 1995). The high temperature used in sterilization processes to mutate and change protein molecules in microorganism which found in foods as well as effect on multiplication and replication process of the genetic material furthermore its impact on activity of enzymes and loss of biological activity, especially those enzymes that perform important vital functions in cell such as respiration and reproduction (Sadler *et al.*, 1992, Shour and Cheng, 1996). The incorrect handling often leads to foods contamination as a result of food cans damage through transport or storage and incorrect methods of storage and display (Wolf, 1992). While the absence of microbial contamination in other food products indicates efficiency and accuracy of manufacturing processes in elimination of these microorganisms, which cause product damage as a result of controlling the critical points in the production stages, which play an important role in absence of product pollution and damage in addition to use of modern technologies in manufacturing and production processes, which ensures non-contact with product by workers (Bernstein, 2004, Panisello and Quantick, 2001).

Conclusions

The present study showed that some food products were contaminated with aerobic bacteria, total Coliform, yeasts and molds. These are not matching with Iraqi microbiological standards, this contamination may be from hands of workers in the food industry processes. These results are serious indications that health requirements are not followed in the local food industry, which emphasizes the need to tighten health control.

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