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A SURVEY OF IMPORTANT CONTAMINANTS MICROBIAL FOOD IN HILLA CITY

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ABSTRACT : Pathogens transmitted by foods are considered as a significant danger agent on human life in progressed in addition to poor regions because of their spread all everywhere the earth. This study was carried out during the year 2019 when 475 samples were collected from various foods available in the local markets of the city of Hilla and imported canned foods, Where the Public Health Laboratory, Babylon was used to collect information on spoiled foods and it was noticed that the percentage of spoilage was in items that contain a high percentage of sugars such as molasses, juices, and sweets. Microbial pathogens are considered a single of the utmost significant agents that lead to food spoil. The microorganisms that cause this spoilage are varied, such as molds, aerobic plate count, *E. coli*, coliform, *Staph. aureus* and fungi, which 475 samples include 341 samples of local food and cans and 134 samples of imported food. It was found that 27 of them had chemical changes, 34 had microbial growth and 14 had defects in manufacturing or packaging. The present study aimed to conduct a survey of the most important microbial causes of food spoilage and to make a comparison of the most important spoiled foods with microorganisms.

Key words : *Staphylococcus aureus*, coliform, *Escherichia coli*, food contamination.

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INTRODUCTION

It is assumed that the troubles of spoilage and food poisoning appeared early with the coming of prepared foods, the troubles of disease transport by foods and of faster deterioration caused by inappropriate store made their manifestation (James *et al*, 2005). Categorization of spoil by microorganisms in packaged foods is at most established on the tartness and pH of the canned food. Produces damage to packaged foods either due to the presence of micro-organisms or non-microbial causes. damage of packaged food outcome for three major purposes: unsuitable heat uses permit presence of mesophilic microbial, unsuitable refrigeration fallowing the warming and rising temperature permits emergence in addition to the development of thermophilic spore formers and infiltrate pollution of cans fallowing heat handling. Anaerobic spoil is caused by anaerobic Thermoanaerobacter and Thermoanaerobacterium with the production of large quantities of hydrogen and carbon dioxide gases, in addition to causing acid fermentation at high temperatures in middle acid packaged foods. Several genes of spore forming psychrophilic bacteria have the capability to contamination refrigerated packaged foods in addition to production of gas, off flavors, and smells. Generality significant chemical deterioration of packaged foods is due to the presence of H_2 gas (Osman and Bozoglu, 2016).

The office of Food and cultivation in addition to the World Bank issued it clarifying that one out of either forty people in Ghana tolerates from food-borne diseases yearly, with more than 420,000 cases recorded throughout the year. In 2005, the Food and Agricultural Organization in addition to World Health Organization are registered report on food safeness for microbiological dangers from street foods (Enoch *et al*, 2017). *Staphylococcus aureus*, *Listeria*, *Salmonella*, *Bacillus* and *Escherichia coli* are caused foodborne diseases (Foriwaa-Ababio, 2014). The trouble of food safety is not a maintain of poor countries

on its own. There are registered numbers of important food toxin cases and cholera in developed countries in any case of their progress in food chain control systems (Scallan *et al*, 2011). *E. coli* and *Staph. aureus* are many popular bacteria establish to effect on meat goodness. *E. coli* strains have appeared as significant zoonotic foodborne microorganisms (Caine *et al*, 2014). So, because their capacity to cause many occasional cases and foodborne disease epidemic in people, they have become an important common health warning (Mhone *et al*, 2011; Jindal *et al*, 2015; Havelaar *et al*, 2015). *Staph. aureus*, furthermore, manufactures a diversity of strong staphylococcal enterotoxins, which are reluctant to inactivation by gastrointestinal proteases and are thus accountable for staphylococcal food toxicity (Mhone *et al*, 2011; Casagrande Proietti *et al*, 2010). Acute gastroenteritis can evolve during 1-7 hours next the exhaustion of *Staph. aureus* contaminated food, result to diarrhea, vomiting, and dehydration. Contagions of the skin, soft tissue, joint, bone, respiratory, and endovascular troubles have frequently been recorded (Shuiep *et al*, 2011). Moreover, complexities like pneumonia, meningitis, osteomyelitis and toxic shock syndrome have been related with staphylococcal contagion. Diseases transmitted by food stay serious popular health troubles in many poor countries (Havelaar *et al*, 2015; Ahmed *et al*, 2014). *E. coli*, 1-30 species of the bacterial family of Enterobacteriaceae, mesophilic bacterium that develops in 7 to 45°C. The collection of coliform bacteria include *Enterobacter*, *Klebsiella* and *Escherichia* (Gözde and Emek, 2019). *Staph. aureus* is a gram-positive. It is oftentimes positive for catalase and nitrate reduction and is a facultative anaerobe that can implant without the need for oxygen, Though *S. aureus* generally work as a exhibiting of the human microbiota, it can also become an opportunistic microorganism, being a common cause of skin infections inclusive abscesses, respiratory infections for example sinusitis, food poisoning (Masalha *et al*, 2001). Molds and yeast (fungi) are lead to break down of natural materials, which can be undesirable when it becomes food spoilage. Several diseases of animals or humans can be caused by particular molds: infections coming from hypersensitive to mold spores, from growth of pathogenic molds within the body, or from the actions of indigestible or that entered through the nose by inhalation toxic components (mycotoxins) produced by molds (Moore *et al*, 2011).

The present study aimed to conduct a survey of the most important microbial causes of food spoilage and to make a comparison of the most important spoiled foods with microorganisms.

MATERIALS AND METHODS

Sample aggregation

Data were aggregated from the Public Health Laboratory, Babylon for the year 2019. The number of samples collected was 484 samples of food from January to December. The sample included (meat, ground meat, flour, sweets, milk and its derivatives, tea, nuts, cakes, ice cream. Juices, dates, rice and other materials).

Phenotypic examination

This test depended on the expire and the method of packaging, label (the name of the company and origin of manufacture, the packing is good or not), the method of taking the sample and transporting it to the laboratory.

Chemical examination

The chemical examination includes the presence of an unwanted taste, color or odor in addition to the presence of impurities or insects.

Microbiology examination

This examination included the investigation on bacteria, fungi, yeasts and molds. The most important bacteria that are investigated and which indicate the presence of microbial contamination are (aerobic plat count, total coliform, *E.coli*, *Staphylococcus* (Coagulase +), *Bacillus cereus*, *Salmonella* spp. molds and yeast in this test used the TEMPO instrument (bioMerieux).

Aerobic Plate Count (A.P.C.)

- The trial results in an counting of the overall aerobic bacterial population of a specimen.
- Never bacterial identifications are detect, while the resulting CFU (colony forming unit) can be utilized to inner approval criterions for a product
- This is as well a beneficial test to measurement freshness of a product
- 50g minimum sample is recommended.

Yeast and mold

1. The trial is an counting of the overall yeast and mold population of a specimen. No symmetries are synthetic, while the resultant data can be applied to inner approval criterions for a product or process.
2. 50g minimum specimen is recommended.

Overall coliforms and *E. coli*

- In most cases, coliforms are considered a sign of food contamination. Where it is considered a non-pathogenic organism, while if it is found in the environment, this point that the statuses are appropriate for the existence of pathogens.

Note: Positive results is recorded the total no. of *E.coli* and *Staphylococcus aureus* more than (1) colony, also Coagulase Positive *Staphylococcus* spp. represent the positive result.

RESULTS AND DISCUSSION

E. coli and other coliform bacteria such as *Proteus*, *Klebsiella pneumoniae*, *Enterobacter*, *Serratia*, *Morganella morganii* are significant pathogens transmitted by food. Almost of the main causes of spoilage, which have been originate from the pathogens, recorded as: regions with undesirable sanitary, polluted trash water, meat manufactures. overall coliform in addition to *E. coli* count is recognized to be the index of undesirable sanitary statuses and fecal contamination in foods (Gözde and Emek, 2019).

In this study, which 475 samples were collected during the year 2019 from January to December of various foods available in the local markets of the city of Hilla, in addition to food imported from abroad. include 341 samples locally food and cans, and 134 samples of imported food. It was found that 27 of them had chemical changes, 34 had microbial growth, and 14 had defects in manufacturing or packaging. the data were taken from the Public Health Laboratory, Babylon by collecting information on spoiled foods and it was noticed that the percentage of microbial and chemical damage was more in local food than in important food. This may be due to the failure to take the correct means of preservation or manufacture, or the failure to follow the standard for the manufacture and preservation of food and canned foods.

As for Table 1 overall number of specimens that were selected during the year 2019, as well as the number of local and imported samples and the number of chemically and visually damaged samples. the total of the examined samples is 433, of which 341 include locally food and cans, and 92 samples of imported food. It was found that 27 of them had chemical changes, 35 had microbial growth and 14 had defects in manufacturing or packaging.

Table 2 shows the most important locally manufactured canned foods that were examined, it was found that Date molasses, sweets, kebabs and ice creams contain *E. coli* and this is an indication of the occurrence of microbial contamination either from feces as a result of not following hygiene methods in manufacturing or packaging. As for other foods, such as nuts, molasses, yoghurt, dates, tea, they contained molds and fungi, meat and chips contained *Staph. aures*, while sweat and juices, cream, lamb chops, chips contained aerobic plate count (A.P.C.).

The mostly microbial that effected the imported foods and cans, where it was represented by the Table 3 found that rice contained molds, *E.coli* and coliform. Jam contained molds, while sausage, cheese and milk contained aerobic plate count.

This study showed that the most frequented neighborhoods in the local and imported foods, which

Table 1 : Total no. and characteristic of samples.

Months	Total No.	Locally	Imported	Negative	Positive	Appearance defects	Microbial	Chemical
January	51	44	7	47	4	1 local	2(Local)	1
February	69	55	14	54	15	1	4	10
March	77	32	45	66	11	0	7(local) 2(imported)	2(local)
April	27	17	10	17	10	1(local) 2(imported)	4(local) 3(imported)	0
May	31	27	4	26	5	0	1(Local)	4(local)
June	32	29	3	24	8	4(imported)	2(Local)	2(local)
July	45	16	29	41	4	0	1(imported)	1(local) 2(imported)
August	24	20	4	23	1	0	1(Local)	0
September	35	27	8	29	6	1imported	1(Local)	3(local) 1(imported)
October	13	9	4	10	3	0	3(Local)	0
November	36	31	5	33	3	1local	2(imported)	0
December	35	34	1	30	5	3local	1(Local)	1(local)
Total no.	475	341	134	400	75	14	34	27

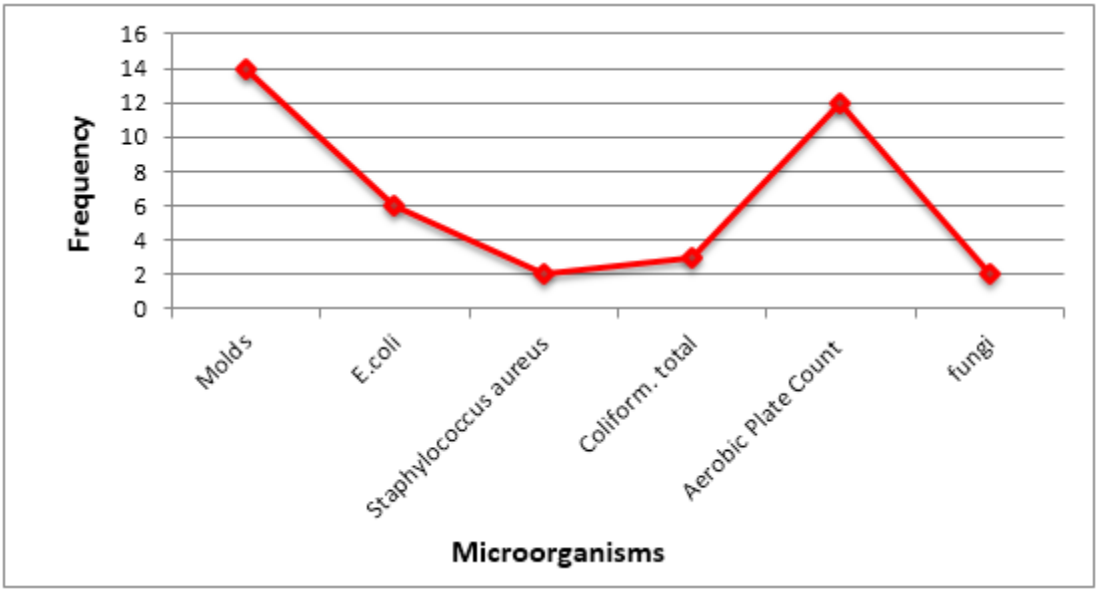

Fig. 1 : The frequency of microorganisms in the food.

Table 2 : Microbial contamination defect in local food.

No.	Months	Food sample	Microbial growth
1	January	Date molasses Meat	*E.coli*, molds A.P.C., *Staph. aureus*
2	February	Tea Sweet	Molds, A.P.C.
3	March	Juices (3 samples) Cream Lamb chops Packed dates	Molds, A.P.C. A.P.C. A.P.C. Molds
4	April	Tea sweet kebab tea	Fungi, *E.coli*, *E.coli*, Fungi
5	May	Ice cream, Sweets	*E.coli*, Coliform Molds
6	June	Yoghurt Ice cream	Molds. A.P.C. *E.coli*
7	July	0	0
8	August	Ice cream	Coliform
9	September	Nuts Chips	Molds A.P.C., *Staph. aureus*
10	October	Molasses(2sample) Yoghurt	Molds Molds
11		0	0
12	December	Dates	Molds

were examined are the molds, aerobic plate count, *E. coli*, coliform, *Staph. aureus* and fungi (Fig. 1).

In spite of the fact that food products with high sugar content have minimum water activity (a_w), which is recognized to prevent the presence or development of bacteria that cause food spoilage, however, spoilage

Table 3 : Microbial contamination defect in imported food.

No.	Months	Food sample	Microbial defect
1	January	Sausage	A.P.C.
2	February	0	0
3	March	Jam Cheese	Molds A.P.C.
4.	April	Rice (3 sample)	Molds, *E.coli*, coliform
5	May	0	0
6	June	0	0
7	July	Cheese	A.P.C.
8	August	0	0
9	September	0	0
10	Ocrober	0	0
11	November	0	0
12	December	Milk	A.P.C.

occurs as a result of the presence of yeasts and molds (Brown, 1976), Where water activity(a_w) ranges from rise sugar products among 0.20 - 0.80 (Jay *et al*, 2005). The ability of yeasts and molds (fungi) to spread numerous foods is required in great part to their comparatively diversity environmental demands. In spite of the fact that the plurality of yeasts and molds are obligate aerobes, their acid or alkaline demand for growth is quite wide, ranging among pH 2- pH 9. Their temperature range 10 to 35°C is also wide, with a little species have ability of growth under or up this range. Moisture demands of molds transmitted by foods are comparatively minimum; utmost species can cultivate at a water activity of 0.85 or lower, although yeasts mostly demand a top water activity (Valerie *et al*, 2001).

Existence of coliform bacteria in food is signal of fecal pollution, needy sanitary statuses or presence of enteric microorganisms. For example, the existence of coliform group in raw milk is an signal of needy public health in milking or storage statuses. The existence of coliform bacteria in iced fruits and vegetables is not important as *Enterobacter*, *Citrobacter* and *Klebsiella* are naturally current in the microorganisms of plants. Whilst, *E. coli* presence in fruits and vegetables is extremely significant in terms of unsuitable hygiene. *E. coli* is an significant microorganism as it is an indicator of fecal pollution in foods and drinking water. Because this feature, it is believed as an signal to food safety and public health in absent this bacteria (Balpetek, 2010; Uçar *et al*, 2015; Erkmen and Erkmen, 2013).

Some studies have recorded spread of *S. aureus* in many food products inclusive cool retail meat indicating that consumers are at potential danger of *S. aureus* growing and the following contagion by Staphylococcal food-borne disease (SFD). The existence of microorganisms in food products causes stress risk for consumers and causes grave economic loss and loss in human productivity by diseases transmitted through food, Symptoms of SFD contain nausea, vomiting, in addition to abdominal spasms, present or absent diarrhea (Jhalka *et al*, 2014).

CONCLUSION

The most important food sources that were exposed to microbial growth were with high carbon content, such as date molasses and juices because they contain sugars. We noticed the growth of molds in the first place, after which the total plat count came. It was also observed that the microbial growth in the local foodstuffs was higher than in the imported foodstuffs.

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