

# Bacterial Contamination of the Local Available Ice Cream in Hila City

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## ABSTRACT

Ice cream is a frozen food which is usually consumed during summer. it is considered as good food which may provide refuge for many microorganisms that can cause many diseases. Also, it is considered important because it is associated with consumers health. This research investigates the contamination of ice creams available in markets by microbes. Ten types of Ice cream were gathered from the market (Behtak, Jawaad Azburi, Core Dor, AL-Fakma ice cream, KDD silver, Fistachio, AL-Furat, Solero, KDD White), The samples were transported to the laboratory to conduct the necessary tests using a clean and sterilized container with a temperature of zero Celsius. One gram of each specimen was taken and diluted. afterwards, each sample was cultivated on different cultivation mediums under 37 degree Celsius for 24 hr. Also, other biochemical tests were conducted in this research to determine the type of bacteria. The results shown the type of bacterial isolated was (*Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, *salmonella enteritidis*) this types of bacteria caused of many type of human diseases and food poisonings.

**Keywords:** Ice cream, Bacterial contamination, Food poisonings

## Introduction

It is not known exactly when ice cream was began synthesis, but it is believed that the Chinese were the first to use a mix of ice and fruit juice to make dishes after food nearly 3,000 years ago <sup>1</sup>. The Romans also used ice to cool drinks in the summer and believed that this idea came from the Pharaonic civilization or the Babylonian civilization <sup>2</sup>. Marco Palo, the Italian traveler, is said to have brought with him from Beijing to Venice in 1292 a complete recipe to make frozen milk, believed to be the origin of the frozen beverage industry. However, until the mid-nineteenth century, the frozen confectionery industry and its production were very primitive and limited, In 1851 Jacob Fussell was able to establish the first ice cream factory in Baltimore, and since then the ice cream industry has developed a very large development. Ice cream can be defined as the products obtained by freezing a mixture of different ingredients (pasteurized milk, sugar cream, eggs, flavors, natural and artificial dyes, stabilizers, emulsifiers and other additives). This mixture keeps it frozen until consumed. <sup>3</sup>. The main ingredient of ice cream is milk, which contains a large amount of saturated fat,

protein and calcium, as well as vitamin C and because of it is considered ice cream of nutritious food <sup>4</sup>. The composition of ice cream is different according to its type. Ice cream is generally composed of 5-15% milk fat, milk protein 4-5%, lactose 5-6%, milk ash 1%, sugar 15%, stabilizers 0.1- 0.4% And emulsifying materials 0.2%. <sup>5</sup>. The high percentage of nutrient material found in ice cream, such as lactose and proteins, as well as the neutral pH, can make it a good growth medium for many microorganisms that cause many serious and infectious human diseases such as cholera, typhoid and chronic intestinal diarrhea. There are many types of microorganisms that cause disease in ice cream such as *Listeria monocytogens*, *Staphylococcus aureus*, *Bacillus species*, *Salmonella species*, *Shigella species*, *Streptococcus spp.*, *Pseudomonas spp.*, *Campylobacter spp.*, *Brucellasp.* As well as the presence of *E. coli* in general <sup>(6, 7)</sup>. The presence of such living, accurate and pathogenic organisms in pasteurized ice cream is evidence of their ability to survive after pasteurization in the case of Spor <sup>8</sup>. This spor stage may continue to survive under the freezing process in an inhibitory state, unless appropriate conditions are available for growth to start again, causing many diseases. The sources of

microorganisms contamination the ice cream from, the raw materials used in the manufacture of ice cream, especially milk in the case of being a result of a sick animal or the residue of antibiotics or pesticides, pollution from people involved in the process of manufacturing and selling, which add a large germ load at Not following the sanitary conditions in terms of clothing and hygiene in their work, manufacturing machinery and tools <sup>3</sup> The present research aims at studying the type of bacteria contamination of some types of ice cream in local markets to evaluate and determine the quality of ice cream and to allow the treatment of species that are within The accepted limits set by the World Health Organization because of their association with the health of consumers<sup>5</sup>.

### Materials and Method

**Collection of Samples:** 10 types of ice cream (Behtak, Jawaad Azburi, Core Dor, AL-Fakma ice cream, KDD silver, Fistachio, AL-Furat, Solero, KDDWhite) . Industry in Turkish Iraq, Iran and Kuwait. The collected samples were carried in a clean, sterile and 0 ° C container directly to the laboratory for high resolution results and then microbial tests were performed.

**Preparation of serial dilution:** 1 ml of each sample of ice cream collected by a sterilized and disinfectant pipette and transferred to a sterile test tube containing 9 ml of peptone for dilution 1:10. In this dilution a sequence dilution of 10<sup>-3</sup> <sup>4</sup>.

**Isolation of bacteria from samples:** The samples were incubated in nutrient agar at 37 ° C for 24-48 hours. After growth, the isolating colony cultured on blood agar plates, MaConkeys agar, Salmonella Shigella agar, Mannitolaalt agar and TCPS agar and purified in the initial assay of the isolating nutrients of each type Of the types of bacteria developing and stored in the refrigerator at a temperature of (4) m. Bacterial isolates were identified by growing the colony size, color, surface, edge, slope and elevation. As shown by <sup>(9, 10)</sup>.

**Gram stain:** Bacterial cells were observed under the optical microscope and were observed by the oil lens (100 X) after the bacterial isolates were treated with a gram dye <sup>11</sup>.

**Biochemical tests:** The most important differences between the bacteria observed in the present study were sugar fermentation tests, bile solubility, starch

hydrolysis, gelatin digestion, catalase, lecithinase, indole production and nitrate reduction test <sup>(9, 12, 13)</sup>, which are the most important differences between the bacteria in the current study.

### Results

Table (1) shows the types of bacteria isolated according to the type of ice-cream sample, and notes through this table that some bacteria have appeared in more than one type of ice cream.

**Table 1: The type of bacteria isolated according to the type of ice cream**

Type of ice cream	Type of bacteria
1. Behtak	Proteus mirabilis, salmonella enteritidis
2. Azburi Jawaad	Bacillus subtilus, Escherichia coli
3. Core Dor	<i>Staphylococcus aureus</i>
4. Fakma	Escherichia coli
5. KDD silver	<i>Klebsiella pneumonia</i> , <i>Bacillus subtilus</i>
6. Fastochio	Bacillus subtilus, Klebsiella pneumonia
7. Local Azberi	<i>Vibrio paraheamolyticus</i>
8. AL-Furat	<i>salmonella enteritidis</i> , <i>Escherichia coli</i>
9. Solero	Escherichia coli
10. KDD White	Klebsiella pneumonia, Escherichia coli

Table (2) shows the type of isolated bacteria and the number of ice-cream species studied. Table (3) shows the total number of bacterial colonies for each type of ice cream collected for the current study in the 10<sup>-1</sup>, 10<sup>-2</sup>, 10<sup>-3</sup>

**Table 2: The type and the number of bacteria isolated**

Type of Bacteria	Sample Number of Ice cream
<i>Proteus mirabilis</i>	1
<i>Bacillus subtilus</i>	3
<i>Staphylococcus aureus</i>	1
<i>salmonella enteritidis</i>	2
Escherichia coli	5
<i>Vibrio paraheamolyticus</i>	1

**Table 3: Colony Forming Unit of bacteria isolated from ice cream**

Type of ice cream CFU/ml	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>
Behtak	76	62	46
Jawaad Azberi	53	43	32
Core Dor	45	35	31
AL- Fakma	68	49	35
KDD silver	45	36	30
Fistachio	67	54	49
Local AzbEri	105	85	76
AL Furat	150	91	78
Solero	130	98	76
KDD White	87	69	54

In recent years, food safety and health have become a point of concern for many communities. The shift to industrial food is producing and causing a lot of food-borne diseases, and these have increased significantly now. Companies' search for economic efficiency leads to the production of food at low cost on a large scale and such companies do not have the ability to prevent the introduction of bacterial pathogens in their products. Ice-cream is one of many food products that can serve as a means of transmission for a pathogen<sup>7</sup>. The quality and quality of food is the total number of microorganisms detected through total bacterial counts. However, the microbial load or microbial contamination in food products is influenced by a variety of factors, for example the general environment of the food product, Raw materials used in manufacturing, manufacturing and processing conditions, as well as sanitary conditions, which are the cleanliness of the tools used, the packaging and, finally, the storage conditions of the food product<sup>12</sup>. Milk is the main component of ice cream, which is more susceptible to infection with pathogenic bacteria. 17 Ice cream, which is the refuge of many bacterial pollutants, is also a part of the flavors and colors added. Some studies have shown that some flavors, especially cocoa, Other flavors Parker. L.A. (1947). Two types of ice cream, one containing cocoa flavor and the other containing flannel flavor, were found. After examining the samples, they found that the ice cream with three times as much bacteria as the vanilla ice cream<sup>18</sup>. The results of the study showed the emergence of a number of colonies of various types of bacteria, most of which are classified within the bacteria that cause many diseases (Table 1).

That the number of bacteria that appeared in ice cream is due to several reasons, including inadequate treatment of raw materials in the industry, especially milk and pasteurization process as well as the cooling of the good mixture of ice cream in the first stage of production after the heating process, which may be the main reason for the multiplication of the existing microbes In ice cream after pasteurization<sup>19</sup>. Pasteurization of ice cream components, especially milk, eliminates most of the hazards of the existing microbes, as well as the freezing process<sup>20</sup>. However, at long storage times and containing high nutrient content and neutral pH, ice cream remains susceptible to bacterial growth<sup>21</sup> The results of the present study show the emergence of coliform bacteria in the collected samples of ice cream, as they appeared in (Jawaad Azberi, AL-Furat, solero and KDD). The presence of this type of bacteria is a clear indication of the presence of microbial contamination in the sample. Colon bacteria are generally a good indicator of food and water contamination<sup>(22,23)</sup>. According to BSTI standards for the quality and manufacture of global ice cream and the number of bacteria in it, the number of cacti bacteria should be *E. coli* contained 10 g/g of ice cream, and in this study found through the results that the total number of colon bacteria exceeded the limits allowed<sup>19</sup>. The contamination of this number of bacteria and their spores may be due to the wrong heating and freezing of all ice-cream manufacturing stages, the poor quality of water used in the industry, which may be contaminated, the lack of personal hygiene of the manufacturer and its personnel, and the tools used in industry. C. *et al.*, 2008) Large *E. coli* contamination occurred in ice cream in Mangalore, India, where *E. coli* was isolated from the IMVIC test and a report was written stating that *E. coli* should not be present in 1 g of ice cream<sup>24</sup>. The number of *E. coli* colony colonies in 100 ml of water used in the ice cream industry is 640 683). Therefore, water is considered the main source of ice-cream contamination when used in its manufacture<sup>4, 25</sup>. In this study, the number of colonies of *E. coli* has exceeded permissible limits (Table 3). *Staph. aureus* has been observed in most of the studied samples. These bacteria cease to grow at 7 ° C. Some studies have shown that in the case of a mixture of ingredients *Staphylococcus aureus* is kept alive for 7 months at -18 ° C and resistance may increase at this level. According to FSSAI, *sta. aureus* should be 10 g/d of ice cream. The results of the present research indicate that the number of bacteria in the cluster of gold has exceeded the limits (Table 3).

## Conclusions

The results of the study showed that the presence of microorganisms that cause possible and serious diseases in the samples of ice cream that have been analyzed and examined should be considered because they cause concern for many people. The presence of *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia* and *salmonella enteritidis* An important threat to human health is caused by many dangerous diseases. Milk pasteurization may destroy most pathogens, but the presence of non-lethal spores and pollution during the manufacturing process, as well as the use of contaminated tools, the lack of cleanliness of the workers, the workplace and the poor storage of the products cause these pollutants to appear. Therefore, in particular, to follow the good and sound steps in the industry through the use of sterile raw materials, automatic and clean in the best pollution-free product in microorganisms

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