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Detection of Environmental bacterial contamination for the kitchen and its tools at Al-Hilla Teaching Hospital, Babylon, Iraq

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Abstract

The study was conducted in order to take an idea about some types of bacteria that cause a contamination in the Kitchen of Al-Hilla Teaching Hospital. This survey included the collection of 217 swabs samples from Al-Hilla Teaching Hospital for the period from January to April 2018 for the purpose of investigating the contaminated bacteria of the kitchen and tools in the hospital mentioned above. The results of the study showed that 130 samples with 59.90 positive results for bacterial microscopy, while 87 samples with 40.09 negative results were given. The isolates were seven species that were divided into two types of *Streptococcus* species including *Streptococcus pyogenes* and *Streptococcus pneumonia* and two types of *Staphylococcus* included *Staphylococcus aureus* and *Staphylococcus epidermidis* and the *Pseudomonas* sp have also included two types of bacteria which is *Pseudomonas aeruginosa* and *Pseudomonas psedumonali* and only one type of *E. Coli*. The study showed that the most common bacterial isolates was *Pseudomonas*.

Keywords: Bacteria, *Streptococcus*, *Staphylococcus*, *Pseudomonas*, *E. Coli*, Babylon, Iraq

Introduction

The most contamination of hospitals in Iraq are caused by foods prepared by the hospital canteen staff. Those are consequently associated with pollution by bacteria like *Staphylococcus aureus* and Escherichia coli. In addition to another types of bacteria such as *Pseudomonas* and *Streptococcus* which has recently been identified as a pathogenic contaminant (Al-Amiedi, 2007) .

The hospital catering staff services are hold a carriers of pathogenic microorganisms and then will represent a source of contamination (Al-Awsi, 2013). The Contamination of kitchen may be happen at any process from the arrival of the goods to the final steps of delivery to patients. So, the precaution process of Hand washing is compulsory and should be organized and strictly by the management of any hospital in order to prevent the infection. Sterilizer should be used as a hand sanitizer, it is better used after the hand washing (Aidoo *et al*., 1995).

The microorganisms that cause hospital infections may be bacteria, fungus and parasites, but the most common are bacterial pathogens (Chakraborty, 1996). Bacterial assemblies in hospitals are more dangerous than in other institutions where they are confirmed by taking samples of air or (Rachard, 1998). These antibacterial agents are resistant to many antibiotics, especially Pencillins and Amino glycosides (Strylenes, 1998). The most common bacterial pathogens, which are resistant to antibiotics and other conditions, *Staphylococcus aureus* resistant to *Staphylococcus aureus* Methicillin resistant (MRSA) and Enterococcus resistant to enterococcus Vancomycin resistant (VRE) and *Pseudomonas aeruginosa*, which is the most important of the Gram-negative bacterial pathogens due to the severity of infection (Ferroni *et al*., 1998).

The kitchen environment is also a source of many health risks for its employees. The attention to the kitchen environment is considered one of the most important factors in reducing the transmission of food infection by the employees of the hospital for long periods of food prepared, in addition to the exposure of patients to diarrhea and intestinal diseases while in hospital due to poor health (Al-Awsi, 2012). The goal of this work is to investigate the Environmental Bacterial contamination in the kitchen of Al-Hilla teaching hospital, Babylon, Iraq.

Methodology

A total of 217 environmental samples were collected from Hilla teaching hospital where sterile cotton swabs were used for this purpose, that contain a transport media. These samples were collected during the period January to April 2018. The samples included swabs from the kitchen floor, Kitchen walls, kitchen air, and food canteens. These swabs were then transferred to the

Microbiology Laboratory at the hospital for cultured and these culture media were used using the agar blood medium and McConkey agar (Collee *et al*., 1996).

Preparation of culture media

The culture media was prepared as shown below according to the instructions of the manufacture company and installed on the package and after controlling the pH and sterilized by autoclave with a 121 ° C and under 15 ° C for 15 min. The culture media were incubated after 37 ° C for 24 hours to ensure they were not contaminated.

1- Blood Agar Medium

The blood agars were prepared according to the instructions of the manufacturer and sterilized with the catheter, then left to cool down to (45-50 ° C). Added 5% blood to the mixture and mixed well and left the dishes after hardening in the incubator until the next day to ensure that they are free from contamination. For the development and isolation of bacteria as well as to detect the ability of isolates to produce Haemolysin (Atlas, 2004).

2- Urea Agar Medium

The media was Prepared by dissolving 2.5 g of urea agar in 95 ml of distilled water. Sterilize with the autoclave. Then leave to cool down to 45 - 50 m. After that, add 5 ml of 40% urea solution, mix thoroughly and distribute in 5 mL test tubes in a slanted shape. This medium was used to investigate the production of urease.

3- Motility Test Medium

For this type of test, Nutrient broth was used with semi sold, which was prepared by adding agar media 0.3 to 0.5% to nutrient broth before sterilization. The samples were first identified by observing the morphological characteristics of the growing colonies on the growth media in terms of size, height, shape and color of the colony. Thin swabs were observed and chromed in the observation of cells, their arrangement and their susceptibility to dyes in this pigment (Johanson *et al*., 2002). A number of biochemical tests have been performed to diagnose bacteria as shown below:

A- Oxidase test

Bacterial colonies aged 18-24 were moved by a wooden stick to a filter paper moistened with oxidase enzyme reagent. The change of color to dark violet after 30 seconds was a sign of positive examination (Alexander *et al*.,2004).

B- Catalase test

A bacterial transplant of 18- 24 hours was mixed with a drop of hydrogen peroxide H2O2 on a clean glass slide. The appearance of the air bubbles was an indication of the positive effect of the test by producing the catalase enzyme, which hydrolyzed H2O2 into water and oxygen gas (Benson, 2002).

C- Indole test

Rinse the center of the peptone water with colonies of isolates and incubate at 37 ° C for 24 hours and add 0.5 mL of Kovacs reagent and mix well. The positive result of the interaction of a red ring in the isomyl alcohol was found to be due to the degradation of the amino acid tryptophan and its transformation into indole (Alexander *et al*.,2004).

D- Motility test

The test tubes containing semi-solid agar medium were vaccinated in a staining manner and incubated for 24- 48 hours at 37 ° C. Growth was observed with the spread of bacteria from the pollination area. This means that the bacteria have mobility. The non-spread of bacteria around the area of the challenge indicates that the bacteria are not moving (Alexander *et al*., 2004).

E- Urease test

The result of this test is a change in the color of the yellow medium to pink indicating the urea degradation by the production of the enzyme urease by the bacteria and the production of ammonia, which led to lift the pH of the medium and then change the color of the phenol red detector (Alexander *et al*., 2004).

Results and Discussion

The results of this study showed that 130 samples were given positive results for bacterial microscopy, while 88 samples were given negative results for examination at Hilla Teaching Hospital. The isolates were seven species that were divided into two types of *Streptococcus* species including *Streptococcus pyogenes* and *Streptococcus pneumonia* and two types of *Staphylococcus* included *Staphylococcus aureus* and *Staphylococcus epidermidis* and the *Pseudomonas* sp have also included two types of bacteria which is *Pseudomonas aeruginosa* and *Pseudomonas psedumonali* and only one type of *E. Coli*. The study showed that the most common bacterial isolates were *Pseudomonas* as shown in the table below

Table.1. Number of isolates and percentage of bacteria isolated from the kitchen and its tools in Hilla Hospital Education has been isolated and diagnosed

Isolated Bacteria	Isolate No	Percentage	Number of samples that showing growth	Number of Samples	Location
Staphylococcus epidermidis *Staphylococcus aureus* *Escherichia coli* *Pseudomonas aeruginosa*	1 1 1 3	93.5	29	31	Floor
Staphylococcus aureus *Streptococcus pyogenes* *Escherichia coli* *Pseudomonas aeruginosa*	2 1 1 2	77.4	24	31	Walls
Staphylococcus aureus *Escherichia coli* *Pseudomonas Pseudomonali*	2 2 3	83.8	26	31	Air
Staphylococcus aureus *Escherichia coli* *Pseudomonas aeruginosa* *Streptococcus pyogenes*	3 2 1 1	67.7	21	31	Canteen tables
Pseudomonas aeruginosa *Pseudomonas Pseudomonali* *Escherichia coli* *Staphylococcus aureus* *Staphylococcus epidermidis*	1 3 2 2 1	61.2	19	31	Differentiated sources
Staphylococcus aureus *Streptococcus pyogenes*	1 3	41.9	13	31	Worker's clothes

Staphylococcus epidermidis *Pseudomonas aeruginosa*	1 2				
Staphylococcus aureus *Escherichia coli* *Pseudomonas Pseudomonali* *Pseudomonas aeruginosa* *Streptococcus pneumonia*	2 1 2 2 2	58	18	31	Kitchen tools

The number of bacterial that isolated from the kitchen was 4 species which including two Gram positive species of Staphylococcus that classified into *Staphylococcus aureus* and *Staphylococcus epidermidis,* and the genus *Streptococcus*, like *Streptococcus pneumonia* and *Streptococcus pyogenes*, and two negative dyes of the gram dye are *Escherichia coli* and genus *Pseudomonas that classified into Pseudomonas Pseudomonali* and *Pseudomonas aeruginosa*.

It is clear from the results shown in the above table that *Pseudomonas* bacteria was the top in the survey taken from the kitchen and tools at Hilla Teaching Hospital followed by *Staphylococcus* bacteria, *Streptococcus,* while the lowest percentage of E. coli bacteria respectively.

The results of this study consistent with the findings of Al-Khalidi (2002), which indicated that *Staphylococcus* bacteria, which was the highest percentage when isolated from Diwaniyah Teaching Hospital. The prevalence of *Pseudomonas* bacteria may be due to resistance to antimicrobials and antiseptics used in the hospital (Douglas *et al*., 1998) or to possess pigments that have an important role in the bacterial colonization process of the host if they work to give these bacteria the power to compete with the other bacterial species in the place where they are settled if these pigments act similar to the act of antibiotics, which leads to inhibition those other genus with it and have the opportunity of dominancy (Greenwood 1997).

The table above shows that the highest percentage of pollution (93.5) has been recorded in the kitchen floor, while the percentage of pollution in both air, walls, eating troughs in the doctors canteen, miscellaneous sources, tools and cooking utensils and workers' clothes in the following sequence (83.8, 77.4, 67.7, 61.2, 58, 41.9) respectively.

The results of this study are consistent with those of Al-Kanani 2005 when she studied in Al-Diwaniyah Teaching Hospital, where she found that the highest percentage of pollution was in the kitchen floor 100%. While William and Jarvis (2002) in Czechoslovakia reported that the highest percentage of pollution was 98% recorded in the kitchen floor, but these results differ

from those reached by Prolife (2003) in his study in the Egyptian hospitals where he found that the percentage of pollution in the kitchen was 10%. And also this study difference with Al-Maamouri 2010 indicated that the highest percentage of pollution was in the kitchen walls if it reached 83%.

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