



## Assessment of microbiological contamination of some household kitchenware

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**Abstract** This study conducted on 20 samples from four household in Brack region , from five places ( sponges, dishcloths, cutting boards, refrigerator handles and kitchen sink drains), after reaching the samples to the laboratory serial dilutions were made, which cultured on TSA media for total count, After incubation time the growing colonies are counted, morphological studies such as colony morphology, gram stain, shape, size and cell regulation, it conducted for some isolates to evaluate the extent of microbial contamination in some household kitchen tools. The numbers of microbes on the cutting boards were more than  $49 \times 10^6$  cfu/ml, Followed by the handles of refrigerators estimated at more than  $31 \times 10^6$  cfu/ml, , and sponges contained more than  $25 \times 10^6$  cfu/ml, and kitchen sink drains containing more than  $24 \times 10^6$  cfu/ml, the least in the dish clothes estimated more than  $13 \times 10^6$  cfu/ml The total number of isolated strains, The negative is predominant, positive and variable rods respectively, followed by negative, positive and variable cocci, respectively, for the number of isolated strains on the kitchenware, which were more prevalent on dishcloths, sponge, cutting boards, refrigerator handles, kitchen sink drains respectively. *Micrococcus* and *Pedococcus* was found in all samples, *Staphylococcus* found in the samples of the kitchen sink drains, the dishcloths and the sponges. The bacterium species were identified as the following *Bacillus* and curved bacteria (*Lactobacillus*) found in the sample of the cutting boards and kitchen sink drains, while the constituent of negative bacteria were in the dish clothes samples, cutting boards, handles of refrigerators.

**Keywords:** Evaluation, sponges, cutting boards, refrigerator handle, dish clothes, contamination.

## تقييم مدى التلوث الميكروبي لبعض الأدوات المستخدمة في المطابخ المنزلية

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**المخلص** اجريت هذه الدراسة لغرض تقييم مدى التلوث الميكروبي في بعض الأدوات المستخدمة في المطابخ المنزلية ومن خلال النتائج المتحصل عليها نجد ان أكثر أعداد للميكروبات كان على لوحات التقطيع كان أكثر من 49 مليون خلية بكتيرية، ذلك لاستخدامها لأكثر من غرض داخل المطبخ من تقطيع الخضروات واللحوم وغيرها، تليها مقابض الثلاثيات في أعداد البكتيريا حيث قدرت بأكثر من 31 مليون خلية بكتيرية، ويعزى ذلك لاستخدامها من أكثر من شخص في المنزل وفي أوقات مختلفة وبشكل متكرر، أما الإسفنجيات احتوت على أكثر من 25 مليون خلية بكتيرية، وذلك نظراً لتواجدها رطبة حيث تكون مكان مناسب لتكاثر البكتيريا، وقد تحتوي على بقايا الأغذية، أحواض الغسيل احتوت على أكثر من 24 مليون خلية بكتيرية، نظراً لعدم استقرار وتواجد المواد الغذائية على الحوض كذلك قلة نسبة الرطوبة وتجدد المياه فيه، وكانت أقلها في الليفات حيث قدرت بأكثر من 13 مليون خلية ميكروبية، ويعزى ذلك لتواجد المسامات البينية والفراغات بين أجزاءها، وعدم احتفاظها للمياه، وسرعة جفافها، بالنظر إلى الممارسات في المطبخ لتفسير الفرق في الأعداد الميكروبية على الليفة، والليفة المحتوية على أعداد أقل من المنازل التي تغير يومياً ومن خلال نتائج العدد الكلي للسلاسل المعزولة نجد أن العسوية السالبة هي السائدة، من حيث العدد الكلي، والعسوية الموجبة والمتغيرة على التوالي، يليها الكروية السالبة والموجبة والمتغيرة على التوالي بالنسبة لأعداد السلاسل المعزولة على أدوات المطبخ كان تواجدها أكثر على الليفة، الأسفنجية، لوحة التقطيع، مقبض الثلاجة، حوض الغسيل على التوالي، المبين انواع واعداد البكتيريا للعينات تحت المجهر تم التعرف على بعض الأجناس البكتيرية الأتية *Micrococcus*, *Pedococcus* تتواجد في جميع العينات *Staphylococcus* وجدت في عينات حوض الغسيل والليفة والأسفنجية، أما أجناس البكتيريا العسوية تم التعرف على الأجناس التالية، بكتيريا المكونة للجراثيم *Bacillus spp* والبكتيريا المنحنية *Lactobacillus curvatus*، البكتيريا المنحنية وجدت في عينة لوحة التقطيع وحوض الغسيل، أما المكونة للجراثيم السالبة كانت في عينات الليفة، لوحة التقطيع، مقبض الثلاجة. فيما يخص السالمونيلا والشيجيلا ومجموعة القولون تتواجد في معظم العيناتان تواجداً بكتيريا السالمونيلا والشيجيلا والمكورات العنقودية ومجموعة القولون، في العينات المدروسة.

**الكلمات المفتاحية:** المطبخ، الإسفنجيات، أحواض الغسيل، الليفات، لوحات التقطيع، التلوث الميكروبي.

## Introduction

The problem of pollution of the environment has now taken the world's attention. Industrial development has had a negative effect on the increase in chemical waste. The pesticides used in many agricultural crops, as well as sewage waste, have played two major roles in this problem

Pollution is the impact on the environment resulting from different activities, and the environmental pollution of food is the main danger to the organisms on the planet.

The world's interest in the problem of pollution is due to the negative impact on human beings, which is the focus of real development as a means and an end, a means as it is the product of all elements of production and the end as it is the consumer of all these elements. Therefore, we must take prevention as a means to reduce pollution if not eliminate it Definitely [1]

Microorganisms exist everywhere around us, in the soil, water and air, as well as in food, in and out of our bodies, and in any ecosystem.

Microbes in the air are major sources of pollution for the food industry, microbial labs and others. And are linked in many ways to the food we eat, causing changes that may be useful and may be undesirable, affecting the type of food and how much and how to benefit from it. Food is exposed to pollution from many sources that may be natural, such as the field, air, animals, sewage waste, during circulation, transportation, and manufacturing processes. Thus, the types and numbers of microbes depend on the source. Vegetables and fruits are exposed to bacteria, fungi and viruses. Meat is also exposed to pollution from outside surfaces and from the surrounding environment. During transport and handling, pollution occurs during the removal of internal organs and microbial rich intestinal . Foods from their natural sources contain some microbes and are contaminated during circulation. The microbial content and growth of microbial food, which acts as an environment of these microbes through food, causing diseases to the consumer, or produce toxins causing food poisoning, most food is considered a suitable environment for the growth of microbes, which if It has the right conditions, it is a change in food, and it is a nurse for humans and animals [2].

Kitchen sponges deserve attention from families because they can remain wet and operate as a store and a means of transmission of diseases, and used in dishwashing and carrying *E.coli*; O15: H7 pathogenic by food more than salmonella [3].

Contaminated foodborne disease from family kitchens contributes to an estimated 76 million food-borne diseases in the United States per year [4]

Approximately 87% of foodborne diseases in the UK, Europe, Australia, New Zealand, America and Canada are estimated to be home-made and consumed food [5]

It is known during the process of cleaning pots and wash basins in the kitchen, the washing process is done with sponges to reduce the residue of food, and part of the residues glued to the surface of the sponges, these residues of food with

moisture all due to an environment for the growth of bacteria and this leads to the formation of biofilms [6]

Sponges can provide environmental of the diseases diffusion, which lead to food poisoned this sponges acted as food reservoir of the genic contaminated sponges my lead to transmitted infection to the surface which are related to food[7]

Many home kitchen sponges are left at room temperature in the middle of a container with water and food residues that support multiplication of microorganisms. Good cleaning methods are important in preventing pollution. Bacteria grow and live in kitchen sponges. Disinfection of sponges can prevent and spread epidemics in the kitchen [8].

Each square inch contains 10 million bacteria, although the tools used in the kitchen contain a lower proportion, but they pose a hidden danger that may gradually lead to diseases that may lead to eventual paralysis. These instruments carry dangerous bacteria towels and cutting boards that The researchers found that the proportion of bacteria in them is equal to the proportion of toilet seats [9]

The Microbial food contamination is one of the oldest types of pollution known to humans and the most widespread. And food contaminated with harmful bacteria because of the infection of various diseases such as typhoid and Bara typhoid bacteria may release food toxins resulting in diseases such as diarrhea, vomiting and stomach pains and the proliferation of bacteria, and thus increase the rate of production of toxins in food may be before or after eating food, and usually the impact of contaminated food Faster and more severe if the food is contaminated before it is prepared for consumption. The main causes of bacterial pollution are lack of interest in personal hygiene, cleanliness of tools and places of food preparation, as well as poor food handling and storage at inappropriate temperatures or long periods. The Actively causing bacteria contamination and poisoning causes lack of good cooking food allowed to eat food from unreliable sources, Some types of fungus grow on food and produce highly hazardous toxins in humans, causing liver cancer and actually different heart and tissue functions [10]

The Sources of food contamination and access routes Food containers, where the presence of species of microorganisms in food vessels depends on the type of food and the extent of care, it is expected to spread some microorganisms from food to vascular and vice versa and when the vessels are cleaned hot or boiled water, the remaining microbiological groups are those that resist this treatment, In addition to some of the neighborhoods that reach them from dust and other sources, in addition to the existence of several strains of bacteria, which are related specifically to the hands and nasal cavities and mouth *Staphylococcus*, *Micrococcus*, while the species *Shigella*, *Salmonella* mainly in the digestive devices and then take the food and utensils by

Where individuals do not observe the required health instructions [11]

**The aim** evaluation of microbiological contamination of some household kitchenware

**materials and methods**

**study area**

The samples in this study were collected from four different households in Brack region, 20 samples were taken from five different sites (sponges, dishcloths, cutting boards, refrigerator handles and kitchen sink drains).

**Sample Collection:**

The samples were collected from household. Samples of sponges and dishcloths were collected in 500 mL conical flasks containing 200 ml of sterile peptone water. The cutting boards, refrigerator handles and kitchen sink drains samples were collected by cotton swabs with 10 ml of sterile peptone water and transported to the laboratory at hours of collection, and was analyzed after reaching to the laboratory [12]

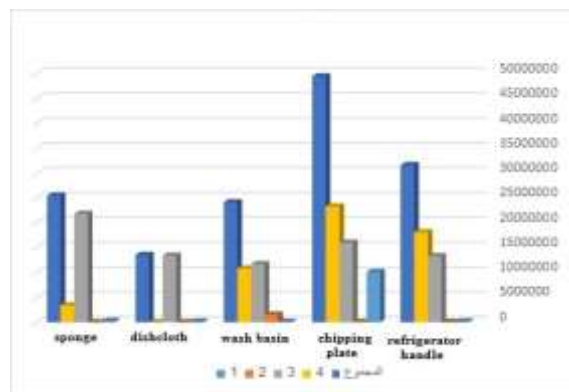
**Isolation of pure strains**

TSA-containing dishes were prepared from dilutions by  $10^{-1} - 10^{-5}$  in 1 ml per dish, placed in incubation at 37 ° C for 48 hours. After incubation period The dishes containing growing bacterial colonies were tested. Different bacterial colonies from these dishes are to study their phenotype. The selected colonies were cultured on a slanted agar environment that was incubated at 37 ° C for 24 hours, smear is made on the glass slide to make a membrane to make a gram dye.

The samples were also placed on Petri dishes containing Nutrient agar, S.S agar and MacConkey agar, attended by Oxoid LTD by taking 1 ml of the original samples and diluting  $10^{-3}$  on the surface of the environment. The samples were distributed by sterile glass stalk, Incubation at 37 ° C for 48 hours to detect *salmonella*, *shigella* and total colon group and Gram Stain [12].

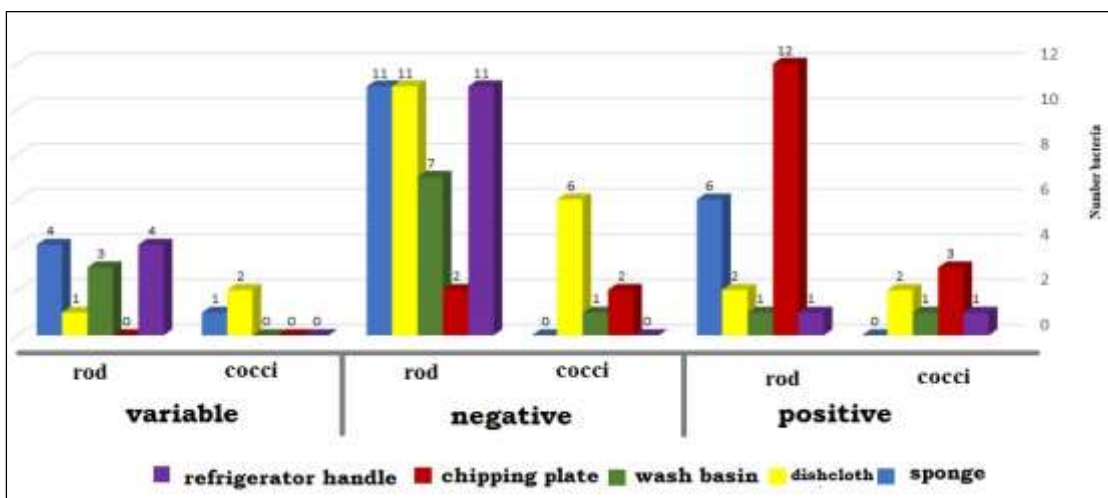
**Results and discussion**

Of the results obtained from figure (1), we find that the most numbers of microbes were on the cutting boards: it was more than 49 million bacterial cells, for use for more than one purpose within the kitchen of cutting vegetables, meat and others.



**Figure(1):**Total colony count in household kitchenware

Followed by refrigerator handles in the number of bacteria, estimated at more than 31 million bacterial cells, due to the use of more than one person at home and at different times and repeatedly. Sponges contain more than 25 million bacterial cells, because they are moist, where they are suitable for breeding bacteria, and may contain food residues. Wash basins contain more than 24 million bacterial cells, due to the instability and presence of food on the basin as well as the lack of moisture and water replenishment. The least of which is in the dishcloths estimated at more than 13 million microbial cells, due to the presence of interstitial pores and voids between their parts, lack of water retention, and rapid drying. The presence of bacterial numbers on the fiber, in line with tests conducted by HTTM in the United States of America [14], found that the dishes of the air count of the pots ranged from 500 units of colonies counting / gram, to  $2 \times 10^6$  cfu/ml. Given the practices in the kitchen to explain the difference in the microbial numbers on the dishclothes, this which changed daily in home kitchen contain lower microbial numbers. dishcloths containing large microbial numbers used in home kitchens for 5 days or more, did not dry during that period. There are nutrients for living organisms. dishcloths and sponges maintain the growth of most bacteria. [13]



**Figure (2):** Percentage of bacteria corned to gram stain

In Figure (2) of the results of the total number of isolates, the negative group is predominant, in terms of total number, positive and variable, respectively, followed by negative cocci, positive cocci and variable respectively.

**Table (1): showing coccus bacteria species**

kitchenware	Type
refrigerator handle	Micrococcus
	Pediococcus
Cutting board	Micrococcus
	Pediococcus
kitchen sink drains	Staphylococcus
	Micrococcus
	Pediococcus
Dishcloths	Micrococcus
	Pediococcus
	Staphylococcus
Sponge	Staphylococcus
	Micrococcus
	Pediococcus

The number of isolates on kitchen utensils was more frequent on dishcloth, sponge, Cutting boards, refrigerator handle, kitchen sink drains respectively.

Of the shown Table (1) Species and bacterial preparation of the samples under the microscope. Some of the bacterial strains of *Micrococcus*, *Pediococcus*, were found in all samples. *Staphylococcus* found in the samples of the kitchen sink drains, dishcloth and the sponges. Bacterial species were identified as *Clostridium* and *Lactobacillus curvatus*. The curved bacteria were found in the sample of the Cutting boards and the kitchen sink drains. The negative bacteria were found in the dishcloth samples, the kitchen sink drains, the refrigerator handle.

For *Salmonella*, *Shigella* and the coliform group are found in most samples, the presence of *Salmonella*, *Shigella*, *Staphylococcus aureus* and

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the colon group in the studied samples corresponds to a study [14]. *Staphylococcus* is also consistent with many studies. [7] Of the bacteria from the samples of the studied kitchen is consistent with some studies which indicate that sponges, kitchen sink drains, dishcloth, contain large numbers of total colon and fecal groups, and non-self-feeding bacteria [15].

### Conclusions

Bacteria are heavily present on household kitchen appliances. Kitchens are a microbial incubator environment, the presence of bacterial populations varies depending on the type of material used, the time of use, the types of disinfectants and cleaning tools. Different use of these tools in different conditions can not be confirmed the finest in the conditions of use.

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