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Isolation and definition of bacteria from fresh common carP*Cyprinus carpio* L. in Shatt al-Arab River

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Abstract. General Background: Fish, particularly *Cyprinus carpio*, are vital to global food security and aquaculture economies due to their high protein content and widespread availability. Specific Background: However, these fish can harbor a range of bacterial pathogens, especially in environments like the Shatt al-Arab River, where pollution and aquaculture stressors may exacerbate microbial contamination. Knowledge Gap: There is limited localized data on the bacterial flora present in healthy common carp from this river system, particularly regarding potential human pathogens. Aims: This study aimed to isolate and identify bacterial species present in the skin, liver, and intestines of apparently healthy *C. carpio* from the Shatt al-Arab River. Results: A total of 122 bacterial isolates were identified using phenotypic methods and Vitek II, with *Aeromonas hydrophila* (13.93%), *Vibrio spp.* (12.29%), *Staphylococcus aureus* (12.29%), and *Escherichia coli* (11.47%) among the most prevalent. Novelty: The detection of high bacterial incidence in healthy fish, particularly fecal indicators, suggests significant environmental contamination and unrecognized risks to consumers. Implications: These findings underscore the need for improved water quality monitoring and hygienic handling practices in fisheries to prevent potential zoonotic infections and ensure public health safety.

Highlight :

1. The study identifies a high prevalence (85%) of bacteria in healthy *Cyprinus carpio*, highlighting public health risks from contaminated fish.
2. Dominant bacteria included *Aeromonas* spp., *Vibrio* spp., *E. coli*, and *Staphylococcus aureus*, indicating possible fecal contamination.
3. The intestine was the most bacteria-rich organ, suggesting it as a critical site for monitoring bacterial colonization in aquatic species.

Keywords : Common carp, Aeromonas Species, Shatt al-Arab River, Gram-Negative Bacterial .

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Introduction

Fish has health and economic importance, as it is one of the most important natural resources that can regenerate when there are appropriate environmental conditions for it, and it is one of the most important food sources for humans, as it is an important source of proteins and fats [1].

Common carp (*C.carpio*) is one of the most important species of the Cyprinidae family of economic value in the internal waters of Iraq, it is found in abundance in various water bodies, especially in the southern and central provinces, and it is one of the productive aquatic communities that contribute globally to more than 72% of freshwater production [2].

In aquaculture, there is intensive farming with many fish in a limited space, and although hygienic measures and stress reduction are part of the normal routine in modern aquaculture, large numbers of fish can be a hindrance; therefore, the situation may create ideal conditions for the spread of diseases inside cages [3].

Stress resulting from either the above factors or due to environmental or microbial pollutants will lead to many reactions, including the accumulation of free radicals, which cause problems for the body's cells [4].

Diseases seriously hinder the expansion and development of sustainable aquaculture globally and the prevailing trend is the emergence of a previously unreported pathogen that causes a new and unknown disease and spreads very quickly thus causing production losses [5]. There are some bacteria that live in the aquatic environment necessary for the balance of nature without any direct impact on fish diseases, however, about 125 species of different bacteria belonging to 34 families have been associated with various fish diseases in the world [6]. Among the most famous of these families are gram-negative bacteria such as Pseudomonadaceaeo Vibrionaceae, and Enterobacteriaceae.[7].

Material and Method

a. Fish sample

C. carpio healthy fish (11.5±1.5 g) was obtained from the Shatt al-Arab River and it observed clinical symptoms, which were isolated and identified by biochemical analysis and then classified. 20 fish were randomly and bacteria isolated from the fish.

The water quality of Shatt al-Arab River temperature, salinity, pH, and dissolved oxygen levels were 22.2–24.2°C, 1.3–1.6 psu, 8.2–8.7, and 7.2–7.6 mg.

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b. Isolated and identified bacterial

The bacteria were isolated using the following culture media Nutrient Agar, TCBS, Macconkey Agar.

The bacteria were isolated from the skin, liver, intestines, intestines, and Liver by taking (1 g) of each portion using a sterile scalpel, mixed with(9 ml) of sterile physiological saline solution in sterile test tubes. A series of dilutions were carried out sequentially, and(0.1 ml) was transferred to the culture media using a pipette implanted by the diffusion method. Different culture media are used to isolate the bacteria and placed in the incubator with a 37 thermocycle for 24 - 48 hours. After the growth of pure bacterial colonies on the nutrient agar culture medium, they were diagnosed by their culture traits, where their phenotypic traits were recorded, including The shape of the growing colonies on the culture medium, and the isolates were subjected to microscopic examination [8]and identified by(Vitek II).

Results and discussion

The results of the current study showed the emergence of different bacterial species on different culture media.

a. Identified of bacterial:

Phenotypic bacterial: took 122 bacterial isolates from healthy fish and studied the phenotypic traits from the growing colonies on different culture media the most important traits of the Identified species and(Fig. 1) shows the types of Gram-negative and Gram-positive bacteria under a light microscope (9).

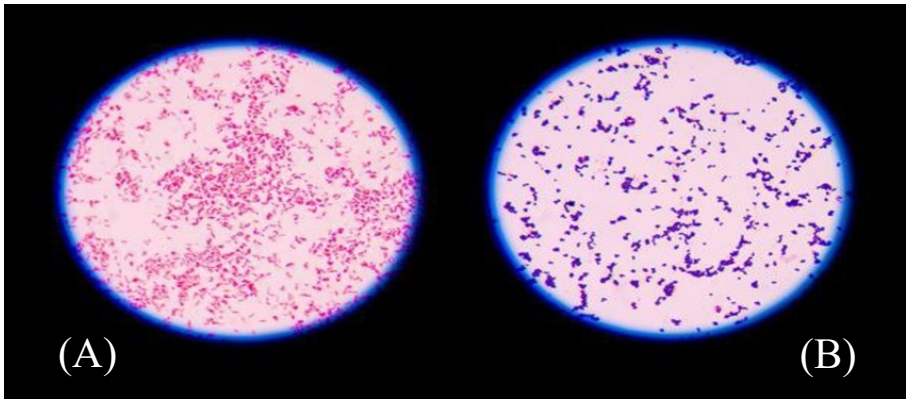

Fig.(1) The image of samples inside the microscope (A) gram-positive bacteria and (B) gram-negative bacteria.

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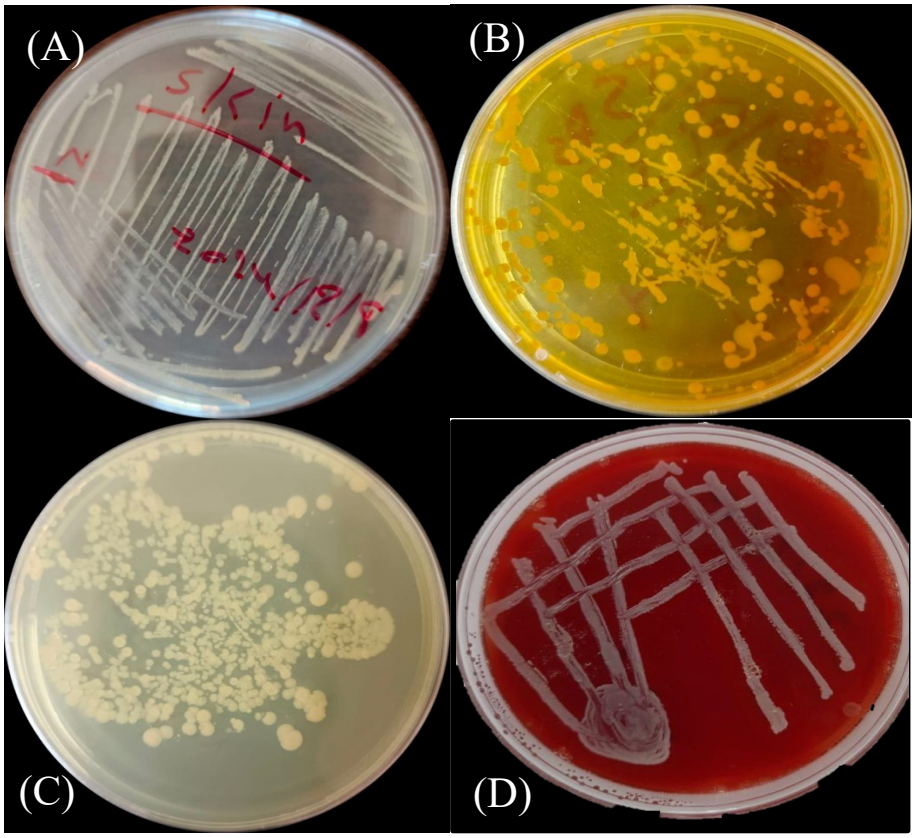

Fig (1) shows the bacterial colonies that appeared on culture media Nutrient Agar (A,C) TCBS (B), Macconkey Agar (D).

Table (1) percentage distribution of bacteria in healthy common carp samples based on the site of taking isolates.

no	Species of bacterial	Number of isolates	Percentage ratio	Isolation sites		
				Skin	Intestines	Gills
1	*Aeromonas hydrophila*	17	%13.93	7	6	4
2	*Aeromonas caviae*	17	%13.93	11	1	5
3	*Vibrio* spp.	15	%12.29	5	5	5
4	*Aeromonas sobria*	16	%13.11	4	7	5
5	*Pseudomonas* sp..	14	11.47%	6	6	2
6	*Staphylococcus aureus*	15	%12.29	4	7	4
7	*Aeromonas bivalvium*	14	11.47%	3	8	3
8	*Escherichia coli*	14	11.47%	3	7	4

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	Total	122		43	47	32

This study aims to isolate and diagnose bacteria found in common carp (*Cyprinus carpio*) fish in the Shatt al-Arab River of Basrah governorate. This fish is of great economic and health importance, as it is a major source of protein in the human diet. However, their exposure to pathogenic bacteria can affect their health and quality, leading to economic losses and a threat to public health. Therefore, the importance of this study lies in identifying the types of bacteria present in these fish and understanding their possible impact on fish and human health [10].

The fish caught in the Shatt al-Arab River were analyzed for bacterial contamination. The total incidence of bacteria isolated from this study was 84.00%. This is quite high considering the fact that microorganisms are ubiquitous, and this is consistent with the results of . Such a high incidence indicates the fact that these fish are very contaminated with bacteria. Viable charges also indicate that the carrying of bacteria in these fish is extremely important. These pose a great danger to consumers who usually eat them because the infectious dose of these bacteria can be dangerous to humans when ingested, often leading to food poisoning. Another fact is that the viable counts of bacteria from this study are more than the accepted norm. Distribution of bacteria by organs: it was noted that the highest percentage of bacteria was in the intestine (50 isolates), followed by the skin (43 isolates), and then the glomerulus (31 isolates). This suggests that the digestive tract of fish may be a fertile environment for the growth of bacteria due to the nature of food and internal conditions. Table (1) percentage distribution of bacteria in healthy common carp samples based on the site of taking isolates.

The presence of bacteria such as *Escherichia coli* and *Staphylococcus aureus* in fish indicates possible contamination with sewage or human waste. These bacteria can cause diseases in humans if undercooked fish is consumed [11].

Some isolated bacteria (*E. coli* and *Staphylococcus aureus*) are human pathogens and may be transmitted by eating undercooked fish and direct contact with infected fish fishermen [12].Bacteria such as *Aeromonas hydrophila* and Vibrio spp. They cause serious diseases such as skin ulcerative disease (Red-sore disease), bleeding fins, and damage to internal organs (such as the liver and spleen) these diseases lead to mass deaths(up to 80-100% in some cases, according to), threatening fisheries [13].

Explained by the [14]. High rates of isolation indicate a significant public health concern. That is, consumers of *Cyprinus carpio* are at high risk of developing food-related infections

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Mhango. This is confirmed by the findings of [15], [16]. The large number of *Aeromonas hydrophila* 17 (13.93%), *Vibrio* spp 15(12,12%). *E. coli* 14 (11.47%) is an indicator of fecal contamination that can be attributed to poor health and unsanitary practices by sellers in the study area. This study is similar to a study by [17], who reported the presence of pathogenic organisms such as Salmonella typhi and *Escherichia coli* indicating organisms transmitted via the fecal-oral route. [18]

CONCLUSION

The Bacteriological Analysis of the fish *Cyprinus carpio* was carried out in this study. The incidence of bacterial contaminants was found to be 85.0%. The isolated organisms were, *Aeromonas hydrophila*, Vibrio spp. *Escherichia coli*, and *Staphylococcus aureus*. Which has the highest rate of isolation. The fish was the most contaminated. The high rate of isolation recorded in this study is cause for concern. This is because fish contaminated with fecal matter before or during harvesting may cause an outbreak of gastrointestinal diseases in humans and may be transmissible between humans and animals.

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