

RESEARCH ARTICLE

**A Study on Some Bacterial Diseases Infected Freshwater Fish *Oreochromis niloticus* on Jebal Aulia Reservoir**

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**ABSTRACT**

This study conducted to investigate some bacteria infected fish in Jubal Aulia Reservoir south of Khartoum in the Sudan. One hundred fresh samples from *Oreochromis niloticus* family of (Tilapia) selective from Jubal Aulia Reservoir (White Nile) ranged in length 11–40 cm and in weight 50; during the period 2017–2019, brachialis, eyes, mouth, and skin investigated to identified type of bacterial infected fishes. Results observed that total samples were infected (81) from hundred samples and identified four types of fish bacterial diseases, the identified bacterial were *Aeromonas hydrophila* Gram-negative bacteria rod in shape, *Staphylococcus*, *Streptococcus faecium*, and *Mycobacterium fortuitum* Gram-positive bacteria with general prevalence infection 78%, 30.2, 26.2, and 20.3, respectively, and the investigation found that the skin was more infected from other organs with significant change ( $P \geq 0.05$ ). The study tends to determine *Oreochromis niloticus* fishes bacterial diseases distribution at all seasons, winter, summer, and autumn, no with general prevalence infection 78%, 30.2, 26.2, and 20.3, respectively. No bacterial necrosis, deformations, and mortality rate were recorded due to the infection in the present finding that confirms the normality infection for law of fishes leaving in water environment, the study offered some recommendation based on the results of the search.

**Key words:** Bacterial, Diseases, *Oreochromis*, Jebel Aulia Reservoir

**INTRODUCTION**

The importance fish pathogens are related directly to the economic values of fishes that may be affected. As our word more populated, all foodstuffs, including fishes, become increasingly valuable. It is well known that fishes are an excellent source of proteins containing little saturated fats fish which can die through disease or pollution of the water. In case of pollution,

death is more or less rapid for all sizes belong in sometimes, to various species. The difference between diseases and pollution is not absolute for the cause of bad quality water which may cause more or less serious diseases.<sup>[1,2]</sup> The frequency and important of disease which occur on fish farms can be as a result of stocking density and poor conditions of farming, the small number of species disease. In a wild state, fishes are widely dispersed and the diseases are often not noticed as the risks of contamination fewer and the losses less. Conditions such as holding warmwater fishes in cold water, during the summer and debilitation caused by other factors probably render fishes susceptible to be attacked by fungus.<sup>[3]</sup> Many bacterial pathogens are capable in causing serious

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out break among various species of fishes, according to the staining reaction with Gram stain, they are classification into Gram-negative bacteria such as *Aeromonas* and *Vibrio* and Gram-positive bacteria such as *Streptococci* and *Staphylococci* – the bacteria always present either in the surrounding water, or the surface of the fish or within the fish in the intensive organs, the bacteria disease of fishes characterized by skin ulceration, necrosis, lesions, and hemorrhages, all the bacterial diseases are common in warm and cold, freshwater, and plankish water.

### Objectives

- The research investigated about *Streptococcus* sp. due increase of fish mortality that happened in 2015 in White Nile.
- Study bacterial species impact for the fishes in White Nile.

### MATERIALS AND METHODS

Jebel Aulia Reservoir is located south of Khartoum state, almost 50 km away from Khartoum along the White Nile at Khartoum state. *Tilapia* spp. were caught, early in the morning from fishing sites of the dam, collected and preserved in ice tanks and transported to the Institute of Research in Veterinary Science Laboratories in Soba area for analysis.

### Media preparation

The media used for culturing the bacterial was blood agar Columbia, nutrient agar medium was supplemented with 0.1% chloramphenicol to inhibit bacterial growth and it was sterilized by autoclaving at 121°C for 24 h. Then, the sterile medium was poured in sterile Petri dishes ready to be used.

### Culturing of fish samples

A sterile scissor was used to remove the gill covering (operculum) and a small part of the gills was cut off and scraped on the surface of blood agar base plate using a sterile loop. The plate was

incubated at 37°C overnight and observed for bacterial growth.

### Isolated and identification of bacteria

The bacteria growing on blood agar base medium were isolated, purified, and identified according to the method described by Lucky<sup>[4]</sup> (1977). The identification was based on the cultural characteristic, especially the color of surface of the colony and the rate of growth and size, as well as the microscopies morphology.

### Statistical analysis

The data analyzed by Excel program, SPSS program (ANOVA test).

### RESULTS

Sample that was diagnosed was 100 in number of *Oreochromis niloticus* collected from Jubal Aulia Reservoir to investigated bacteria, species were isolated *Aeromonas hydrophila*, *Staphylococcus*, *Streptococcus*, and *Mycobacterium* from different parts of *O. niloticus* body and different season that showed in Table 1 type of bacteria from eyes part in winter season the *Staphylococcus* with high percentage 52% – Table 2 shows the percentage

**Table 1:** Type of bacteria isolated from eye part of *O. niloticus* from Jebel Aulia Reservoir on winter season

Types of bacteria	Observed number	Percentage
G+ve cocci ( <i>Staphylococcus</i> spp.)	12	52.20
G+ve cocci ( <i>Streptococcus</i> spp.)	5	21.70
G+ve bacilli ( <i>Mycobacterium</i> spp.)	5	21.70
G-ve bacilli ( <i>Aeromonas hydrophila</i> )	1	4.30
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**Table 2:** Type of bacteria isolated from branchial part of *O. niloticus* from Jebel Aulia Reservoir on summer season

Types of bacteria	Observed number	Percentage
G+ve cocci ( <i>Staphylococcus</i> spp.)	8	47.05
G+ve cocci ( <i>Streptococcus</i> spp.)	3	17.60
G+ve bacilli ( <i>Mycobacterium</i> spp.)	4	23.50
G-ve bacilli ( <i>Aeromonas hydrophila</i> )	2	11.76
Total	17	99.91

of bacteria bronchial part in autumn season *Staphylococcus* with high percentage 47.05%, Table 3 shows the infected of bacteria on mouth part in summer season and *Staphylococcus* with high percentage 26.3% – Table 4 shows the percentage of infection bacteria on skin part of *O. niloticus* in summer season, *Aeromonas hydrophila* with high percentage 34.7%.

Table 5 observed that the skin more part infected with all type of bacteria with difference significant (0.02).

## DISCUSSION

Kitao *et al.*<sup>[5]</sup> reported *Streptococcus* from *Oreochromis niloticus* in Japan out breaks caused by

**Table 3:** Type of bacteria isolated from mouth part of *O. niloticus* from Jebel Aulia Reservoir on autumn season

Types of bacteria	Observed number	Percentage
G+ve cocci ( <i>Staphylococcus</i> spp.)	5	26.30
G+ve cocci ( <i>Streptococcus</i> spp.)	5	26.30
G+ve bacilli ( <i>Mycobacterium</i> spp.)	5	26.30
G-ve bacilli ( <i>Aeromonas hydrophila</i> )	4	21
Total	19	-

**Table 4:** Type of bacteria isolated from skin part of *O. niloticus* from Jebel Aulia Reservoir on summer season

Types of bacteria	Observed	Percentage
G+ve cocci ( <i>Staphylococcus</i> spp.)	11	35.50
G+ve cocci ( <i>Streptococcus</i> spp.)	7	22.50
G-ve bacilli ( <i>Aeromonas hydrophila</i> )	13	41.90
Total	31	-

**Table 5:** The M±SD and different significant for bacteria infected many part of *O. niloticus*

95%		Ss'	Std. error	Mean difference	Treatment	Parameters
Upper	Lower					
4.89	18.85	7.67	5.317	-7	<i>Staphylococcus</i>	Eye
16.85	-6.85	3.67	5.317	5	<i>Streptococcus</i>	
5.21	5.12	1	2.338	0	<i>Aeromonas</i>	
6.44	-5.77	-906	2.741	-333	<i>Staphylococcus</i>	Mouth
7.11	5.11	-723	2.741	1	<i>Streptococcus</i>	
5.21	5.21	1	2.338	0	<i>Aeromonas</i>	
2.11	10.11	175	2.741	-4	<i>Staphylococcus</i>	Brachial
8.11	4.11	482	2.74	2	<i>Aeromonas</i>	
2.4	19.29	0.02	3.87	10.667	<i>Staphylococcus</i>	Skin
0.38	17.62	0.042	3.87	9	<i>Streptococcus</i>	
15.52	0.52	0.0255	3.87	8	<i>Aeromonas</i>	

hemorrhagic lesions on the body and exophthalmos also Miyazaki<sup>[6]</sup> found that *Streptococcus* in cultured tilapia hybrids in Taiwan have similar clinical gross pathological sings, Eldar and Hubber<sup>[7]</sup> found *Streptococcus* in the spleen, kidney, ovaries, and test in farmed fish and they suggested that both a etiological agents and environment lead to the pathogenesis.

Amin<sup>[8]</sup> and Roberts<sup>[9]</sup> reported *Aeromonas hydrophila* Gram-negative bacteria from farmed tilapia in Nile in Egypt and Robert<sup>[9]</sup> recorded *Aeromonas* from *O. niloticus* in the Mombasa and Lip<sup>[10]</sup>-Po, 1983, and Paperna<sup>[11]</sup> reported cause characteristic chronic condition and mortality of carp infection with *Aeromonas hydrophila*, resulted in mortalities with 24–48 h old fry died at rate of 15% daily. *Mycobacterium fortuitum* Gram-positive bacteria infected freshwater fishes transmission through the brachial egg's, skin, and internal organ infected, *Mycobacterium* chronic disease caused the slow mortality rate in range 50% FAO,<sup>[12]</sup> Abdel Rahim.<sup>[13]</sup> Paperna<sup>[11]</sup> reported caused with deformations vertebrate the present finding confirmed with all above reported in some fishes *O. niloticus* family of *Tilapia* from freshwater, no observed caused of mortality or deformation that may refer to environment or this study done in Nile not in aquaculture pound in the present finding *Staphylococcus* recorded in the all organs were examined with prevalence rate 30.2% but no record before this in freshwater fishes, especially in *Oreochromis niloticus*.

## CONCLUSION

The study tends to determine *Oreochromis niloticus* fishes bacterial diseases distribution at all seasons, winter, summer, and autumn, no with general prevalence infection 78%, 30.2, 26.2, and 20.3, respectively, and the investigation found the skin was more infected from other organs with significant change ( $P \geq 0.05$ ). The study tend to determine *Oreochromis niloticus* fishes bacterial diseases distribution at all seasons, winter, summer and autumn. No bacterial necrosis, deformations, and mortality rate were recorded due to the infection in the present finding that confirms the normality infection for law of fishes leaving in water environment, the study offered some recommendation based on the results of the search.

## Recommendation

1. Study recommended follow-up – studies to Eva mate the changes in White Nile to protect economic resources and fish health.
2. Preparation technical qualified personal to work in fish diagnosis for aquaculture prevalence sector in the Sudan.

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