جامعة
بنغازي الحديثة

# مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

مجلة علمية الكترونية محكمة

Journal of Benghazi Modern University of Sciences and Humanities

**العـدد الثامن عشر**

**لسنة 2022**

# شروط كتابة البحث العلمي في مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

**1-** الملخص باللغة العربية وباللغة الانجليزية (150 كلمة).
**2-** المقدمة، وتشمل التالي:
- ❖ نبذة عن موضوع الدراسة (مدخل).
- ❖ مشكلة الدراسة.
- ❖ أهمية الدراسة.
- ❖ أهداف الدراسة.
- ❖ المنهج العلمي المتبع في الدراسة.

**3-** الخاتمة. (أهم نتائج البحث - التوصيات).
**4-** قائمة المصادر والمراجع.
**5-** عدد صفحات البحث لا تزيد عن (25) صفحة متضمنة الملاحق وقائمة المصادر والمراجع.

## القواعد العامة لقبول النشر

1. تقبل المجلة نشر البحوث باللغتين العربية والانجليزية؛ والتي تتوافر فيها الشروط الآتية:

- أن يكون البحث أصيلاً، وتتوافر فيه شروط البحث العلمي المعتمد على الأصول العلمية والمنهجية المتعارف عليها من حيث الإحاطة والاستقصاء والإضافة المعرفية (النتائج) والمنهجية والتوثيق وسلامة اللغة ودقة التعبير.
- ألا يكون البحث قد سبق نشرة أو قُدم للنشر في أي جهة أخرى أو مستل من رسالة أو اطروحة علمية.
- أن يكون البحث مراعياً لقواعد الضبط ودقة الرسوم والأشكال - إن وجدت - ومطبوعاً على ملف وورد، حجم الخط (14) وبخط (Arial 'Body') للغة العربية. وحجم الخط (12) بخط ( Times New Roman) للغة الإنجليزية.
- أن تكون الجداول والأشكال مدرجة في أماكنها الصحيحة، وأن تشمل العناوين والبيانات الإيضاحية.
- أن يكون البحث ملتزما بدقة التوثيق حسب دليل جمعية علم النفس الأمريكية (APA) وتثبيت هوامش البحث في نفس الصفحة والمصادر والمراجع في نهاية البحث على النحو الآتي:
- أن تُثبت المراجع بذكر اسم المؤلف، ثم يوضع تاريخ نشرة بين حاصرتين، ويلي ذلك عنوان المصدر، متبوعاً باسم المحقق أو المترجم، ودار النشر، ومكان النشر، ورقم الجزء، ورقم الصفحة.
- عند استخدام الدوريات (المجلات، المؤتمرات العلمية، الندوات) بوصفها مراجع للبحث: يُذكر اسم صاحب المقالة كاملاً، ثم تاريخ النشر بين حاصرتين، ثم عنوان المقالة، ثم ذكر اسم المجلة، ثم رقم المجلد، ثم رقم العدد، ودار النشر، ومكان النشر، ورقم الصفحة.

2. يقدم الباحث ملخص باللغتين العربية والانجليزية في حدود (150 كلمة) بحيث يتضمن مشكلة الدراسة، والهدف الرئيسي للدراسة، ومنهجية الدراسة، ونتائج الدراسة. ووضع الكلمات الرئيسية في نهاية الملخص (خمس كلمات).

3. تحتفظ مجلة جامعة بنغازي الحديثة بحقها في أسلوب إخراج البحث النهائي عند النشر.

# إجراءات النشر

ترسل جميع المواد عبر البريد الالكتروني الخاص بالمجلة جامعة بنغازي الحديثة وهو كالتالي:

- ✓ يرسل البحث الكترونياً ( Word + Pdf ) إلى عنوان المجلة info.jmbush@bmu.edu.ly او نسخة على CD بحيث يظهر في البحث اسم الباحث ولقبة العلمي، ومكان عملة، ومجاله.
- ✓ يرفق مع البحث نموذج تقديم ورقة بحثية للنشر (موجود على موقع المجلة) وكذلك ارفاق موجز للسيرة الذاتية للباحث إلكترونياً.
- ✓ لا يقبل استلام الورقة العلمية الا بشروط وفورمات مجلة جامعة بنغازي الحديثة.
- ✓ في حالة قبول البحث مبدئياً يتم عرضة على مُحكِّمين من ذوي الاختصاص في مجال البحث، ويتم اختيارهم بسرية تامة، ولا يُعرض عليهم اسم الباحث أو بياناته، وذلك لإبداء آرائهم حول مدى أصالة البحث، وقيمته العلمية، ومدى التزام الباحث بالمنهجية المتعارف عليها، ويطلب من المحكم تحديد مدى صلاحية البحث للنشر في المجلة من عدمها.
- ✓ يُخطر الباحث بقرار صلاحية بحثه للنشر من عدمها خلال شهرين من تاريخ الاستلام للبحث، وبموعد النشر، ورقم العدد الذي سينشر فيه البحث.
- ✓ في حالة ورود ملاحظات من المحكِّمين، تُرسل تلك الملاحظات إلى الباحث لإجراء التعديلات اللازمة بموجبها، على أن تعاد للمجلة خلال مدة أقصاها عشرة أيام.
- ✓ الأبحاث التي لم تتم الموافقة على نشرها لا تعاد إلى الباحثين.
- ✓ الأفكار الواردة فيما ينشر من دراسات وبحوث وعروض تعبر عن أراء أصحابها.
- ✓ لا يجوز نشر إي من المواد المنشورة في المجلة مرة أخرى.
- ✓ يدفع الراغب في نشر بحثه مبلغ قدره (400 د.ل) دينار ليبي إذا كان الباحث من داخل ليبيا، و (200 $) دولار أمريكي إذا كان الباحث من خارج ليبيا. علماً بأن حسابنا القابل للتحويل هو: **(بنغازي – ليبيا - مصرف التجارة والتنمية، الفرع الرئيسي - بنغازي، رقم 001-225540-0011. الاسم (صلاح الأمين عبدالله محمد)**.
- ✓ جميع المواد المنشورة في المجلة تخضع لقانون حقوق الملكية الفكرية للمجلة.

info.jmbush@bmu.edu.ly

00218913262838

د. عزة ابوبكر المنصوري
رئيس تحرير مجلة جامعة بنغازي الحديثة
azzaabubaker@ymail.com

# ECTOPARASITIES AND BACTERIAL PATHOGENS INFECTIONS AND ITS EFFECTS ON LYBIAN FISH FARMS PROFITABILITY

**Enas Abdallah** **Atallah, S. T**

Enas.abdula@omu.edu.ly

**OMAR AL-MUKHTAR UNIVERSITY – LIBYA**

**Fac. of Vet. Med. Alex. Univ. Egypt**

## ABSTRACT

A bacterial and ectoparasitic study on cultured **O.niloticus** was conducted in one-year survey from November 2019 until November 2020. **O.niloticus** were collected from different Fish farms in different seasons. Various parasites have been recovered, along with Tricodina sp., Chillodenillae sp. and Monogenetic trematodes with excessive occurrence at some point of Spring and Summer seasons. In a bacteriological survey approximately 2 hundred bacterial isolates have been recovered, A.hydrophila (a hundred isolates) was the predominant bacteria, followed by P. fluorescens (60 isolates) then the Streptococcal spp (40 isolates).

The highest number of outbreaks occurred during Summer and Spring seasons. Sensitivity to different antimicrobials has been observed in this study. Experimental infection in apparently **O.niloticus** using one isolate of A. hydrophila showed recorded mortality rates 90%.upon I/P injection respectively.

**Key wards: Ectoparasites – Bacterial pathogens - Fish farms - profitability**

## INTRODUCTION

Aquaculture production (metric tons) in Libya was reported at 10 metric tons in 2018, according to the **World Bank collection of development indicators (2022).**

Libyan aquaculture enterprise has been grown with inside the previous couple of years; specifically that of freshwater fish. According to reviews of **Agriculture World Journal (2002).**

Libyan fish farm manufacturing accelerated about via way of means of 45% with inside the remaining years. Fish and fish merchandise are the wish to resolve human dietary troubles in Libyan . Fish is the number one supply of protein for people in lots of components of the arena and that is specifically proper in maximum growing countries. Interest of parasites and different microbial pathogens of tilapia keep

growing with the growing improvement of O. niloticus cultivation **(World Bank collection of development indicators, 2022).**

Diseases in wild fish population may have multiple economic and social impacts. Epidemics of infectious diseases, which are associated with the presence of some microbes or parasites, have recently been observed in several major culturing systems **(Noga, 2008).** On the other hand, several microbial pathogens are involved in epizootic outbreaks in fish cultures **(Zorrilla et al., 2010)**. Motile aeromonads, are among the most common and troublesome diseases of fish raised in pond. Whether acting alone or in mixed infections with other organisms, the motile aeromonads are responsible for significant financial losses annually.

**Atallah and El-Banna (2005)** concluded that, the most important diseases affecting fish under were Motile Aeromonas septicemia, Saprolegniasis infection, Aflatoxicosis, Icthyphonus infection, Trichodina and Costiasis infestations and the mixed infection between the Motile Aeromonas septicemia and Saprolegnia.

The **present work aimed** to survey the most common bacterial and ectoparasitic pathogens affecting the cultured **O.niloticus** among Libyan fish production farms.

## MATERIAL AND METHODS

**1-Sample collected:**

A total number of 400 **O. niloticus** were collected from November 2019 until November 2020, from **Um-Hufayan** lakes at different seasons. The fish were transported alive to the wet laboratory.

Fish were fed with pelleted diet containing (25-30%) protein two times per day by hand. Fish are handled very carefully to avoid stress-inducing manipulations as far as possible. Mortalities and any signs of disease were recorded.

**Um-Hufayan** a brackish lagoon with limited connection to sea (estuary of a temporal stream (**Wadi Al Sayd**)) and meager anthropogenic activity; **non polluted lake.**

**Umm Hufayan** is a brackish water Lagoon and wet land located near the Gulf of Bomba at latitude 32° 33' 13.5" N and longitude at 23° 05' 57.2" E, about 14.58km to the north of **Gulf of Bomba** and 80 km east of Darna in the direction of Tobrok (Fig. 1). The lagoon covers a surface area of about two $Km^2$ with a depth range between 0.5 and 3m. For a more elaborate description of the lagoon, **(Reynolds et al. 1995 and Badalamenti et al. 2011).**

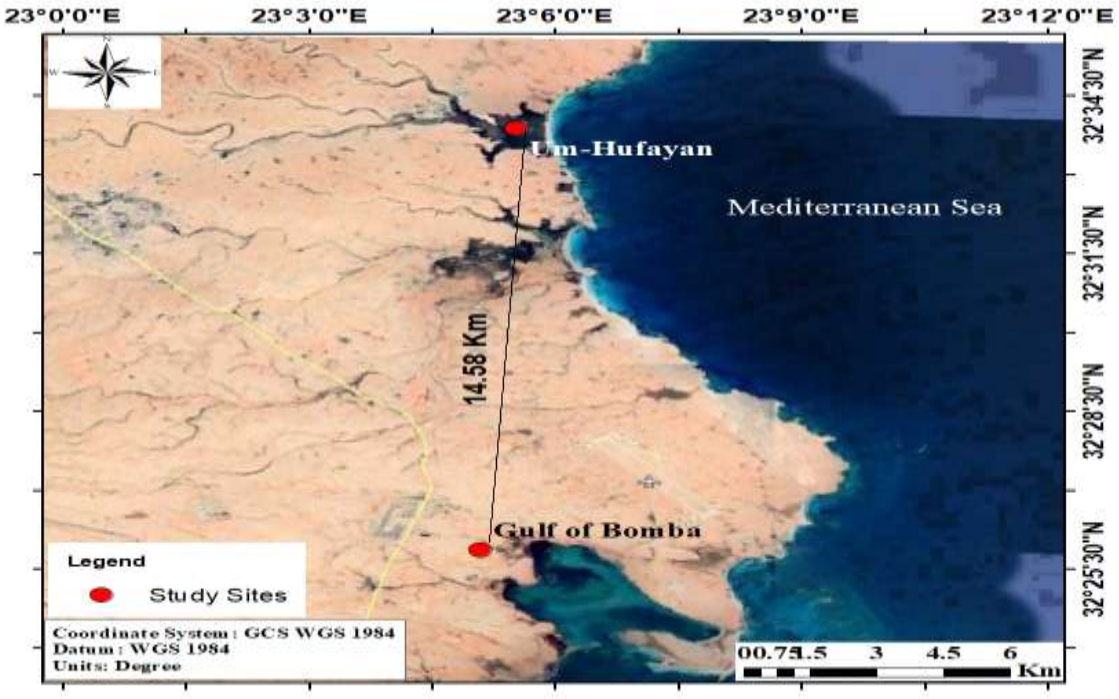


**Figure (1): Lybian Um-Hufayan** lak

**2-Sampling procedure and diagnosis**

Fish were necropsied. Bacterial swabs from liver, kidney and spleen were plated on the following media: Nutrient agar (Oxoid), Rimler-Shotts agar **(Shotts and Rimler, 1973)**, Tryptic soy agar (Difco) with 3% Nacl. All the inoculated media were incubated at 25C° for 18-24hr. All different types of colonies present on the plates were picked up and biochemically tested for identification.

**3-Identification of bacterial strains**

Pure culture was obtained by repeated plating on the previous media. Cultures were maintained in agar slant and stabbed, semisolid trypticase-soy-agar (TSA) tubes. Pure culture isolates were then identified by biochemical characterization following the criteria described in the **Bergy's Manual of systemic bacteriology(1984)** and **Finegold** and **Martin (1982).**

**4-Antimicrobial susceptibility**

Susceptibility to several antimicrobials was determined using disc diffusion technique (**Lenette et al. 1980**). The following antimicrobial agents (supplied by Oxoid) were used: ciprofloxacin 5 µg, rifampicin 5 µg, sulphamethazole (trimethoprim) 25 µg, Colstin sulphate 25 µg, Gentamycin 10 µg, ofloxacin 5 µg, and enrofloxacin 5 µg. One ml of 24hr. broth culture of **Aeromonas hydrophila** and **P. flourescens** incubated at 25ºC was evently distributed on surface of agar plate, and examined for inhibition zone.

### 5-Pathogenicity assays

Pathogenicity of the **A. hydrophila** strain isolated from naturally infected **O.niloticus** was determined following the methodology described by **Vasilkov et al. (1978).** One group of 15 apparently healthy **O.niloticus** with average body weight of 30.0 (± 10.0) gm. were inoculated intraperitoneally at dose of 0.1 m/24hr broth culture containing $3x10^7$ viable cells and the other control group were provided using the same number of fish inoculated with 0.1 ml PBS **Viola Zaki (1991)**. Fish kept for 14 days, during which clinical signs, mortality and postmortem lesions were recorded. Inoculated bacteria were considered pathogenic when more than 50% of inoculated fish were died showing abnormal characteristic clinical signs, postmortem lesion and the organism was reisolated.

### 6-Identification of parasites

Parasite diagnosis was based on the morphological character under microscopic examination of giemsa stained and fresh mount smears of skin, fins and gills.

### 7-Statistical analysis:

The statistical analysis was made according to **(SAS, 2004),** where we used the $Chi^2$-test for detection the significance of the incidence of bacteria, moulds and yeasts among different organs of the fish as well as the differences in mortalities among different infection.

## RESULTS

### A-Gross pathology

Diseased fish showed signs of pale skin coloration with excess mucus with an overall dark grey slimy, patchy, or mottled grey appearance. Uncoordinated swimming was also observed. The scales were detached from the body. The gills were pale in some fish, hyperemic in others and covered with mucous secretion forming cloudy film of slime. Congestion and redness of the body fins especially the caudal and dorsal fins, inflammation as well as edema of the vent region, hemorrhagic patches allover the body as well as abdominal dropsy had been noticed. Necropsy of diseased fish revealed reddish-yellow ascetic fluid, the liver ranged from pale anemic or yellowish in some cases to deep brown. The gall bladder was distended with bile and the spleen appeared congested and enlarged. The kidneys were congested, enlarged and edematous in most cases. (Fig. 2-3).

**Fig ( 2 )**

***O. niloticus*** naturally infected with bacterial and parasites showing congestion of the

**Fig ( 3 )**

***O. niloticus*** naturally infected with bacterial and parasites showing congestion of all internal

## B-Parasites

Table (1) shows the seasonal prevalence of parasitic infestations from naturally infested ***O.niloticus.*** The peak of total parasitic infestations was recorded during summer (90 %) and springs (80 %) seasons, while lower level of infestations were recorded during in Autumn season (50 %). ***Tricodina sp***., ***monogenean*** and mixed infestation with both ***Tricodina sp.*** and ***monogenean*** were detected in high number during Autumn season as it level were 20 (40 %), 10 (20 %) , respectively; however, ***Chillodenillae sp.*** was detected only during summer season as its level reached to 40 (44.45 %) and lower level of mixed infection was 10 (25 %) and in winter season. (Fig. 4-5, 6 and 7).

**Table ( 1 ) :** Seasonal prevalence of parasitic infestations from naturally infested ***O. niloticus*** .

| Season | No. of fish | No. of infested fish | | Protozoa | | | | Monogenea | | Mixed Monogenea and trichodina | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Trichodina | | Chillodenillae | | | | | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % |
| **Winter** | 100 | 40 | 40 | 20 | 50 | - | - | 10 | 25 | 10 | 25 |
| **Spring** | 100 | 80 | 80 | 30 | 37.50 | - | - | 25 | 31.25 | 25 | 31.25 |
| **Summer** | 100 | 90 | 90 | 50 | 55.56 | 40 | 44.45 | 30 | 33.34 | 10 | 33.34 |
| **Autumn** | 100 | 50 | 50 | 20 | 40 | - | - | 10 | 20 | 20 | 40 |
| **Total** | 400 | 260 | 65 | 120 | 46.16 | 40 | 15.39 | 75 | 28.84 | 65 | 25 |

$Chi^2 = 18.55^{**}$ ** = Significant at ($P < 0.01$).

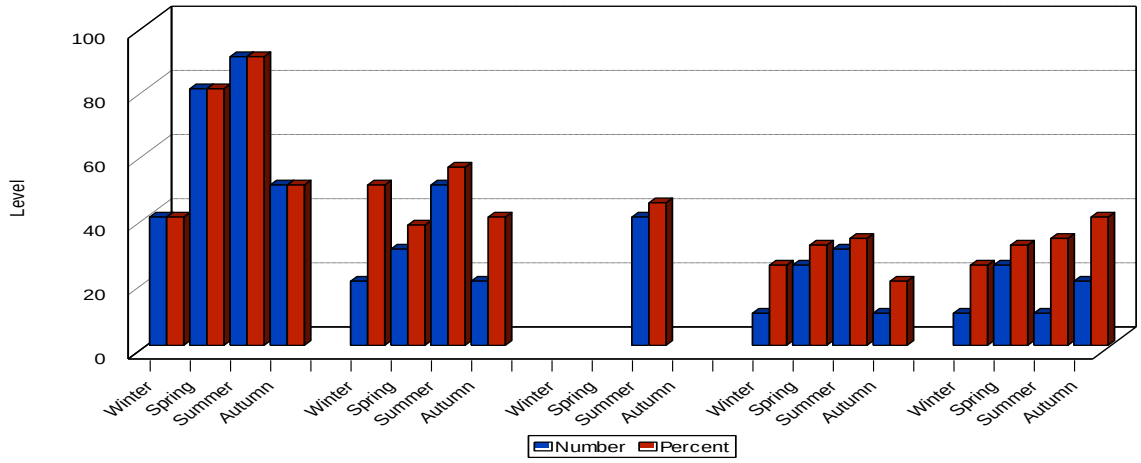


**Figure ( 4 ) :** Seasonal prevalence of parasitic infestations from naturally infested ***O. niloticus*** .

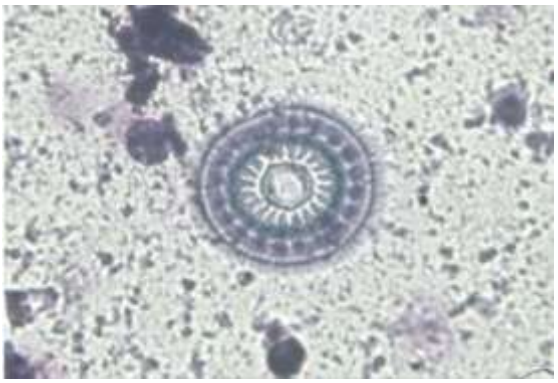

**Fig ( 5 )**

Trichodina in summer-in O.niloticus

**Fig ( 6 )**

Monogenia and trichodia in spring in ***O. niloticus*** .

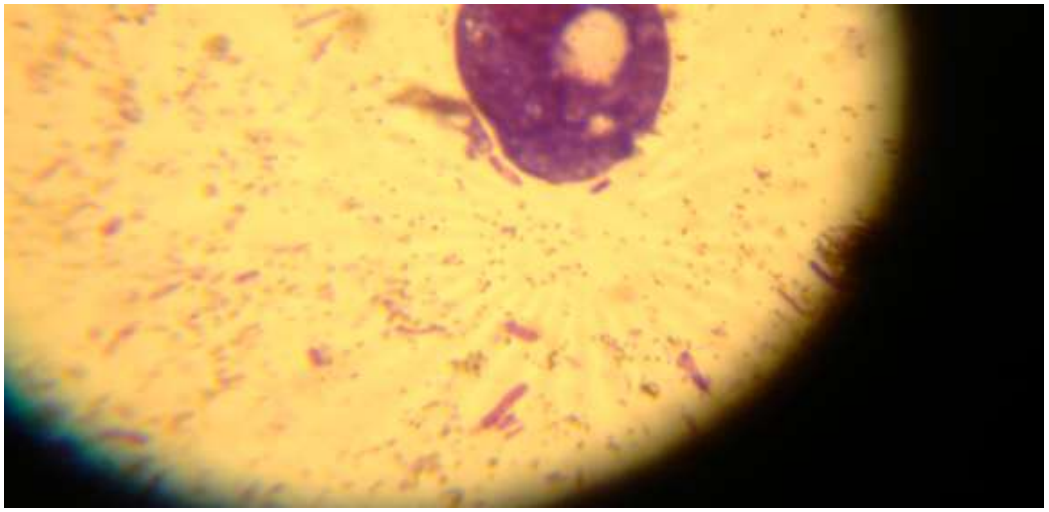

**Fig ( 7 ):** Chillodenilla in winter in ***O. niloticus***

Benghazi Modern University
info.jmbush@bmu.edu.ly azzaabubaker@ymail.com
Mobile +218945429096

## C-Bacteria

230 isolates were recovered from samples of diseased fish including 100 isolates identified as ***A.hydrophila,*** 60 isolates identified as ***P. flourescens*** and 40 isolates identified as ***Streptococcus sp.*** these were the dominant strains. Table 2 shows seasonal prevalence of bacterial infections from naturally infected ***O.niloticus***. The peak of infestation was recorded in spring and summer seasons (Figure 8).

**Table ( 2 ) :** Seasonal prevalence of bacterial infections from naturally infected ***O. niloticus*** .

| Season | No. of diseased fish | Tot. No. of bacterial isolates | | Types , No. and percentage of bacterial isolates | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A. hydrophila | | Pseudomonas flourescens | | Streptococcus spp | |
| | | No. | % | No. | % | No. | % | No. | % |
| **Winter** | 100 | 30 | 30 | 10 | 33.33 | 10 | 33.33 | 10 | 33.33 |
| **Spring** | 100 | 70 | 70 | 40 | 57.15 | 20 | 28.57 | 10 | 14.28 |
| **Summer** | 100 | 80 | 80 | 30 | 37.50 | 25 | 31.25 | 25 | 31.25 |
| **Autumn** | 100 | 50 | 50 | 20 | 40 | 15 | 30 | 15 | 30 |
| **Total** | 400 | 230 | 57.50 | 100 | 43.47 | 70 | 30.44 | 60 | 26.08 |

$Chi^2 = 15.44^{**}$ ** = Significant at ($P < 0.01$).

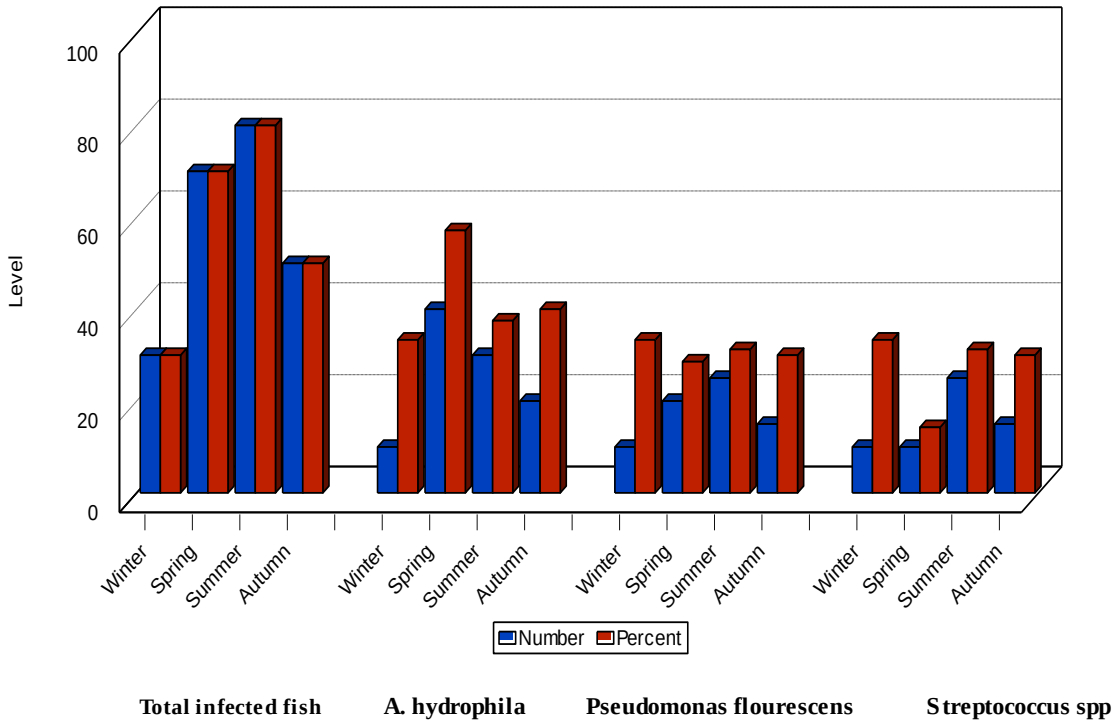


**Figure (8 ) :** Seasonal prevalence of bacterial infections from naturally infected ***O. niloticus*** .

## D-Antimicrobial susceptibility

Table (3) shows the sensitivity of the isolated ***A. hydrophila*** and ***P. flourescens*** to different antimicrobial agents. It was noticed that Ciprofloxacin was the effective antimicrobial in case of ***A. hydrophila*** , Rifampcine in case of ***P. flourescens*** .

**Table ( 3 ) :** Antimicrobial sensitivity test of ***A. hydrophila*** and ***P. fluroscens*** .

| Drug | Company | Concentration | A. hydrophila | P. fluroscens |
|---|---|---|---|---|
| **Ciprofloxacin** | Oxoid | 5 µg | S | S |
| **Rifampcine** | Oxoid | 5 µg | S | S |
| **trimethoprim** | Oxoid | 25 µg | R | S |
| **Colistin** | Oxoid | 25 µg | S | S |
| **Gentamycin** | Oxoid | 10 µg | S | S |
| **Ofloxacin** | Oxoid | 5 µg | S | S |
| **Enrofloxacin** | Oxoid | 5 µg | S | S |

**S = Sensitive** **R =Resistant**

## E-Pathogenicity test

Table (4) shows the mortality patterns of both inoculated and control experimental fish in different fish groups were recorded within 14 days (the experimental time).

**Table ( 4 ) :** Experimental infection of ***O. niloticus*** with ***A. hydrophila*** .

| Fish group | No. of fishes | Route injection | Dead Fishes during 14 d. after injection (day posting) | | | | | | | | | | | | | | | No. of dead fish | No of survived fishes | Mortality % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | | |
| 1 | 20 | 1/P | - | 6 | 2 | 2 | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | 14 | - | 90 |
| 2 | 20 | Control 1/P | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | - |

**The clinical abnormalities and deaths began** 24hr post-inoculation; these included sluggish movement, poor appetite, and impairment of equilibrium and finally loss of reflexes just prior to death. Moreover, there were hemorrhagic patches as spots on the skin especially on the ventral abdominal area, caudal peduncle and on the body fins especially at their bases. As the disease progressed, whitish patches were distributed allover the body surface. In addition to these symptoms, there were also abdominal distention of varying degrees and severely inflamed edematous vent was seen. (Fig. 6).

**F-The postmortem findings of the experimentally inoculated fish in the first two groups** showed yellowish serous fluid, the liver enlarged and showed patches of congestion and hemorrhagic spots or sometimes pinpoint whitish foci. The gall bladder was mostly distended with bile. The spleen was enlarged and congested. The kidneys appeared hemorrhagic, swollen, sometimes covered with whitish sheath. The intestine showed severs hemorrhagic inflammation, while the gills varied from pale anemic in some cases to congest in others with excessive mucus. Re-isolation of inoculated ***A.hydrophila*** was carried out from experimentally infected fishes. (Fig. 9).

**Fig ( 9 )** ***O. niloticus*** experimentally infected with A.hydrphillae showing congestion of all internal organs especially liver and gall bladder .

**G-Economic losses:-**

The higher financial losses resulted from parasitic infestation have been discovered in Trichodina as its losses reached to 600 LE, while, the losses from trichodina in winter, spring, summer and autumn were 100, 150, 250 and 100 LE/1000 cultivated fish, while, in Monogenia the total losses resulted from it reached to 375 LE/1000 cultivated fih and its levels were 50, 125, 10 and 20 LE/100 cultivated fish (Table, 5).

The lower return losses observed mixed monogenis as its losses reached to , Mixed contamination among Monogenia and Trichodina as its level reached to 325 LE/1000 fish and losse among different monthes reached to 50, 125, 50 and 100 for Winter, Summer and Autumn , respectively.

The least losses observed in Chilodenella and the losses in Monogenia because of their infestation reached to 200LE/1000 fish as its incidences losses were 50, 125, 150 and 80 respectively, while, the lower losses in return observed in Chillodenillae as it s llosses were 200 LE especially in summer season (Table, 5).

While table (6) indicated that the higher financial losses of bacterial contamination discovered in A. hydrophila , Pseudomonas flourescens and Streptococcus contamination and the losses in go back resulted from their contamination to the fish have been 500, 400 and 260.68 LE/1000 cultured fish respectively

**Table ( 5 ) :** Economic losses of parasitic infestations from naturally infested ***O. niloticus*** .

| Season | Protozoa | | | | | | | | Monogenea | | | | Mixed Monogenea and trichodina | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trichodina | | | | *Chillodenillae* | | | | | | | | | | | |
| | No. | Wt/100 fish/ gm | * Wt/1000 fish/Kg | Return losses/ 1000 cultured fish | No. | Wt/100 fish/ gm | * Wt/ 1000 fish/ Kg | Return losses/ 1000 cultured fish | No. | Wt/100 fish/ gm | * Wt/1000 fish/Kg | Return losses/ 1000 cultured fish | No. | Wt/100fish/ gm | * Wt/1000 fish/Kg | Return losses/ 1000 cultured fish |
| Winter | 20 | 1000 | 10 | 100 | - | - | - | - | 10 | 500 | 5 | 50 | 10 | 500 | 5 | 50 |
| Spring | 30 | 1500 | 15 | 150 | - | - | - | - | 25 | 1250 | 12.50 | 125 | 25 | 1250 | 12.50 | 125 |
| Summer | 50 | 2500 | 25 | 250 | 40 | 2000 | 20 | 200 | 30 | 1500 | 15 | 150 | 10 | 500 | 5 | 50 |
| Autumn | 20 | 1000 | 10 | 100 | - | - | - | - | 10 | 500 | 5 | 50 | 20 | 1000 | 10 | 100 |
| Total | 120 | 6000 | 60 | 600 | 40 | 2000 | 20 | 200 | 75 | 3750 | 37.50 | 375 | 65 | 3250 | 32.50 | 325 |

**Means of different litters are significantly different at (P < 0.05)**

***Weight losses / 1000 cultured fish** ***Price of Kg/Fish = 10 L.E**

**-Weight of the fish 50 gm**

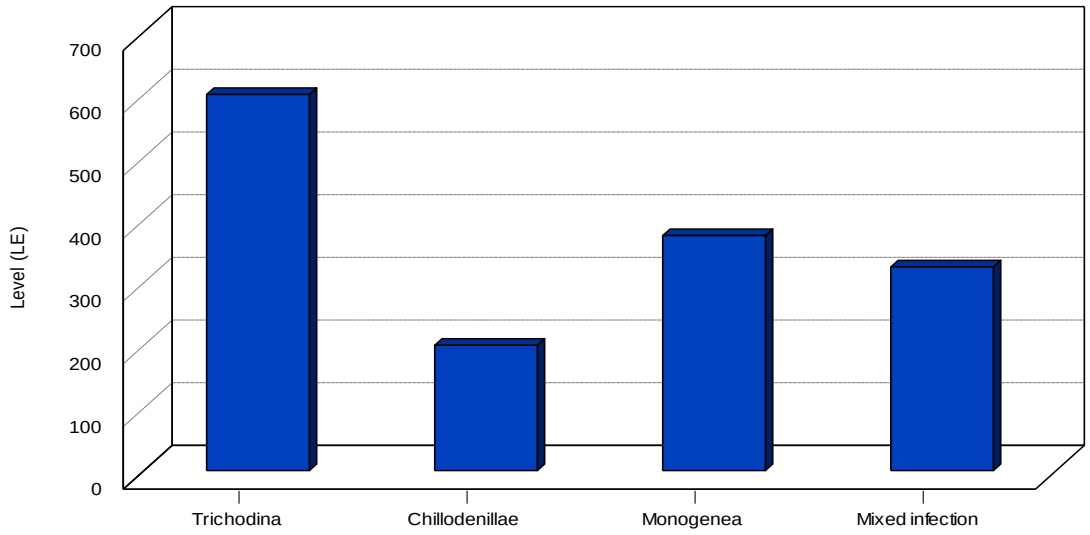


**Figure (11):** Economic losses of parasitic infestations from naturally infested ***O. niloticus*** .

**Table ( 6 ) :** Economic losses of bacterial infection in ***O. niloticus***

| **Season** | **Types , No. and percentage of bacterial isolates** | | |
|---|---|---|---|
| | **A. hydrophila** | **Pseudomonas flourescens** | **Streptococcus spp** |
| **Total losses (LE)*** | 500 | 400 | 260 |

***Calculated according to:**

**-Weight of the fish 50 gm -Weight losses / 1000 cultured fish** **-Price of Kg/Fish = 10 L.E**

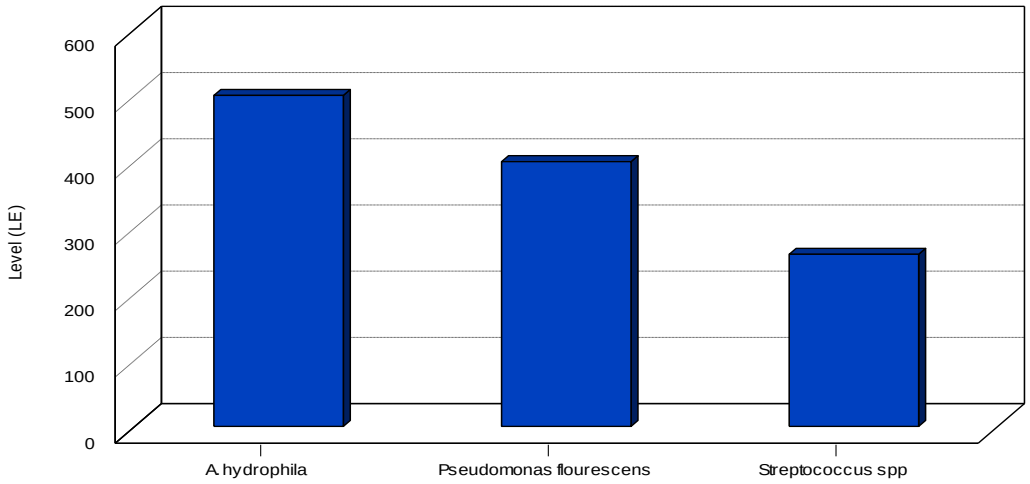


**Figure (12):** Economic losses of bacterial infection in ***O. niloticus*** .

## DISCUSSION

Different parasitic types recovered from naturally infected **O. niloticus** including, **Tricodina sp., Chillodenillae sp., monogenetic trematodes** and mixed infestation with **Tricodina** and **monogenean** were in concordance with **(Company et al., 1999; Callahan et al., 2002),** who reported the wide spread of ectoparasitic protozoa on gills and skin of most cultured fishes. The seasonal prevalence of the recovered parasites in this study was high during spring and summer seasons.

These results was in agreement with those obtained by **Company et al. (1999),** who, in a bacteriological and parasitological survey reported a relationship between peaks of mortalities and high water temperatures.

Chillodenillae turned into detected and identified; the parasite seemed as ciliated unicellular parasite with its feature flicking motion. These identity characters are in settlement with the ones defined via way of means of **Callahan et al. (2002).**

**Trichodina sp**. were identified and described as ciliated protozoa with saucer or bill-shaped with adhesive disc. These identification characters are in concordance with those described by **Estes et al. (1997).**

Regarding **monogenetic trematodes, Dactylogyrus sp.** was identified and described as gill worm provided with two pairs of pigmented eyespots, with anterior conical projections and disc-like opisthaptor with two pairs of hamuli and 14 marginal hooks. These identification characters are similar to those reported by **(Lim, 1995; Woo, 2002).**

Several bacterial isolates were obtained. The most common isolated bacteria were **A. hydrophila, P. fluorescenc**s and **Streptococcus sp.** The highest prevalence of

bacterial infection was in summer and spring season. This may be due to rising water temperature in soring and summer combined with stress **(Post, 1987)**. Moreover, **Osborne et al. (1989)** who correlated high denesities of motile aeromonads within the environment during midsummer when sedimentary chlorophyll sub (a) and water temperature were highest with the highest prevalence of dermally ulcerated striped mullet (**O. niloticus**) that also contain large concentration of the bacteria within their stomachs and on their skin. Also, they added that mullet graze on bacteria laden sediment for algae which, in turn, enhances disease. Motile aeromonas septicemias are generally mediated by stress, elevated water temperature. In addition, increased water temperature resulted in increase feeding responses, decreased dissolved oxygen levels and increase ammonia and nitrite levels that favored spread of streptococcal infection **(Eldar et al., 1995).**

The result of studies on gross lesions and postmortem findings of naturally infected **O. niloticus**, are supportive to those described by **(Cipriano et al., 2001; Woo, 2002).**

The antimicrobial sensitivity of **A.hydrophila** strain was sensitive to Ciprofloxacin and resistant to Sulphamethazole/trimetheprim. This result are in concordance with **Mirand and Zemelman (2002)** who mentioned that a high number of bacteria resistant to amoxicillin, ampicillin, erythromycin, and furazolidone, as well as an important frequency of bacterial resistant to florofenicol, chloramphenicol, cefotaxim and trimethoprim-sulfamethoxazole was found. On contrary, the proportion of bacteria resistant to gentamucin, kanamycin, flumequine and enrofloxacin was rather low. On the other hand, he isolated strain of **P. fluorescens** was sensitive to Rifampicin and Ciprofloxacine, although, **Zorrilla et al. (2003)** reported that the isolated strains of **Pseudomonas Spp.** showed a percentage of resistance to Ampicillin and Amoxicillin (20%) and high susceptibility to (Oxytetracyclin, tetracycline, sulphamethazole/trimethoprim) and flumequine with 0% resistance.

Regarding to the pathogenicity of **A.hydrophila** it was found that, the mortality rate within 14-days post infection was (100%) among **O. niloticus** infected by I/P routes . The obtained result of the clinical signs and postmortem findings are in agreement with **(Eissa et al., 1994 and Cipriano et al., 2001).**

**Our results concluded that,** the bacterial infection and parasitic infestation causes severe economic losses especially in cases of Trichodina, Monogenia , Mixed

infection between Monogenia and Trichodina and the least losses observed in Chilodenella and the higher economic losses due to bacterial infection observed in A. hydrophila , Pseudomonas flourescens and Streptococcus infection and the losses attributed to decreasing fish weight and increasing fish mortality that causes decreasing of economic returns of fish production farms.

## REFERENCES


- **Agriculture World Journal. (2002):** Egypt is the first rank in fish farm production among African and Mediterranean Sea countries. Volume 86:p9.

- **Atallah, S. T. and El-Banna, S. A. (2005):** Effect of fish diseases on economic and productive efficiency of fish farms under Egyptian conditions. 4th Int. Sci. Conf. Monsoura University. April 5 – 6 2005. 87 - 104.

- **Bergy, D.H. (1984) :** Bergy's Manual of Systemic Bacteriology

- **Bruno, D.W.; Collins, C.M.; Cunningham, C.O. and Mackenzie, K. (2001) :** Gyrodactyloides bychowskii (Monogenea: Gyrodactylidae) from sea-caged Atlantic salmon Salmo salar in Scotland: occurrence and ribosomal RNA sequence analysis. Dis Aquat Organ. 2001 Aug 2; 45 (3): 191 – 6.

- **Callahan, H.A.; Wayne Litaker, R. and Noga, E.J. (2002) :** Molecular Taxonomy of the Suborder Bodonina (Order Kinetoplastida), Including the Important Fish Parasite, Ichthyobodo necator. J. Eukaryot. Microbiol., 49 (2), 2002 pp. 119-128.

- **Cipriano, R.C.; Bullock, G.L. and Pyle, S.W. (2001) :** Aeromonas hydrophila and Motile Aeromonad Septicemia of Fish.

- **Revision of fish disease leaflet 68 (1984)**. United States Department of the interior fish and Wildlife Service Division of Fishery Research Washington, D.C. 20240.

- **Company, R.; Sitja-Bobadilla, A.; Pujalte, M.J.; Garay, E.; Alvarez-Pellitero, -**

- **P. and Periez-Sanchez, J. (1999) :**Bacterial and Parasitic Pathogens in cultures common dentex, Dentex dentex L. Journal of Fish Diseases 22 : 299 – 309.

- **Eissa, I.A.M.; Badran, A.F.; Mostafa, M. and Fetaih, H. (1994) :** Contribution to motile aeromenas septicemia in some cultured and wild fresh water fishes. Vet. Med. J., Giza, Uz : 63 – 69

- **Eldar, A.; Benjerano, Y.; Livoff, A.; Hurvitz, A. and Bercovier, H. (1995) :** Experimental streptococcal meingo-encephalitis in cultured fish. Veterinary Microbiology, 43 : 33 – 40.

- **Estes, A.M.; Reynolds, B.S. and Moss, A.G. (1997) :** Trichodina ctenophorii n. sp., a novel symbiont of ctenophores of the northen coast of the Gulf of Mexico. J. Eukayot. Micrbiol. 44 (5) : 420 – 426.

- **Fingold, M.S. and Martin, J.W. (1982) :** Diagnostic Microbiology. The C.V. Mosby Company St. Louis. Toronoto. London.

- **Lennette, E.H.; Balows, A.; Housler, W.J. and Traut, J.P. (1980) :** Manual of clinical Microbiology. Amer. Soc. Micro. ; Washington, D.C.

- **Lim, L.H.S. (1995) :** Two new species of pseudodactylogyrides Ogawa, 1986 (Monogenea) from two species of eleotridid fishes of peninsular Malaysia. Systematic Parasitology 31 : 25 – 32.

- - **Li-Wenkuan; Yn, Xiang; Wen, Xiurong; Ren, Changlin; Pei, Lixing and Fan, Shixun (1994) :** Studies on the gills histopathology, of silver Carp, Hypophthalmichthys molitrix, infected by Dactylogyriasis (Dactylogyrus vaginulatus zhang et Niu, 1996) and its treatment. J. Fish. China Shuichan Xuebao 18 (4) : 305 – 311.

- **Libya - Aquaculture production (metric tons)** - actual values, historical data, forecasts and projections were sourced from the World Bank on March of 2022.

- **Mirand, C.D. and Zemelman, R. (2002) :** Antimicrobial multiresistance in bacteria isolated from freshwater Chilean salmon farms.

- **Sci Total Environ. 2002** Jul 3; 293 (1-3) : 207 – 18.

**Miyashita, T.; Kubota, S.S. and Miyashita, T. (1984) :** A histological study of pseudomonas fluorescens infection in tilapia. Fish Pathology 19: 161 – 166.

- **Miyazaki, T.; Kageyama, T.; Miura, M. and Yoshida, T. (2001) :** Histopathology of viremia-associated ana-aki-byo in combination with Aeromonas hydrophila in color carp Cyprinus carpio in Japan. Dis. Aquat. Organ. 2001 Mar 9; 44 (2) : 109 – 20.

- **Noga, E.G. (1988) :** Deterimining the relationship between water quality and infectious diseases in Fishery populations. WATER RESOURCES BULLETIN. Vol. 24, No. 5 pp. 967 – 973. AMERICAN WATER RESOURCES ASSOCIATION.

- **Osborne, J.A.; Fensch, G.E. and Charba, J.F. (1989) :** The abundance of Aeromenashydrophila L. at lake Itarney on the st. Johns River with respect to red sore disease in striped mullet (Mugilcephalus L.). Floride Scientist. 52 : 171 – 176.

- **Post, G. (1987) :** Text book of Fish Health. T.F.A. puplication Inc. Ltd. 2nd, 204-214.

- **Saad, T. T.; Atallah, S. T. and Safinaze G. Mohamed. (2006):** Economic losses due to Ochratoxicosis in cultured fish farms and the economic importance of biogen in its prevention. 4th Scientific Congress- Faculty of Vet. Med. Sadat City.

- **Minufia University- 26 - 27 April- 2006. In Minufia Vet. Journal. - April 2006. 4 (1): 135 - 147.**

- **Shotts, E.B. and Rimler, R. (1973) :** Medium for the isolation of Aeromonas hydrophila. APP. Microbiol., 26 (2) : 550 – 553.

- **Vasilkov, G.V.; Grishenko, L.T.; Engashev, V.G.; Kanaev, A.I.; Larkova, A.I. and Asetov, V.S. (1978) :** Guide to fish disease (Russ). Isdatevo, Kolos, Moskva USSR 119 – 126.

- **Viola Zaki, H. (1991) :** Some Studied on motile aeromenas in fresh water fish with special emphasis to their toxigenic profile. M.V.Sc. Thesis. Fac. Of Vet. Med. Alex. Univ.

- **Woo, P.T.K. (2002) :** Diseases and Disorders of Finfish in cage culture.Part III (Infections Diseases of Warm Water Fish in fresh water). CAB international, (2002).

- **Zorrilla, I.; Chabrillo`n, S. Arijo; Di´az-Rosales; Marti´nez-Manazanares, E.; Balebona, M.C. and Morin˜igo (2003) :** Bacteria recovered from diseases cultured gilthead seabream (Sparus Aurata L.) in southwestern Spain. Aquaculture 218 (2003) 11 – 20.