Research Article

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# Quality evaluation of chilled fish (orechromis nilotcus and bagrus bayad) at al-damer fish market-Sudan

## Abstract

The present study was conducted during the period from (January to March 2019) to evaluate the sensory characteristic and microbiological quality of chilled fish species (Orechromis Nilotcus and Bagrus Bayad) at Al-Damer fish market. In this study fish were classified into four categories depending on the freshness; excellent quality (E), very good grade (A), good grade (B) and undesirable grade (C). Hundred samples were taken randomly from the fish markets in Al-Damer City, (50) samples from each species drown from (6) tons were inspected according to (European scheme), and a total of (20) swabs samples were obtained, (10) samples from each species for microbial analysis results found that there was No significant difference P<0.05 in sensory evaluation between chilled fish species (Orechromis Nilotcus and Bagrus Bayad). As the average skin of fishes at respectively (1.98±0.89 and 1.98±0.91) outer Slime (1.96±0.86 and 2.04±0.83) eyes (1.88±0.75 and 1.84±0.87) gill Color (2.10±0.74 and 2.20±0.83) peritoneum (1.80±0.70 and 2.08±0.92) and gills odour (1.74±0.80 and 1.94±1.04). Also results indicates No significant difference P<0.05 in total bacterial count from the studied spp. the total number of bacterial load for both chilled fish Orechromis Nilotcus and Bagrus Bayad were (4.5×105±0.14×105, 4.1×105±0.09×105)cf/g respectively. Also specific fish pathogens were investigated such as *salmonella Spp* and *vibrio cholera*, and had found that *salmonella Spp* dominated on the sample inversely than *vibrio cholera* which was absent in all studied samples under investigation. Finally it can be concluded that the investigated chilled fishes in this time had acceptable sensory and microbial quality thus it is safe for human consumption.

**Keywords:** sensory evaluation, *salmonella Spp*, vibrio cholera, gills odour

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## Introduction

Sensory evaluation is one of the most important methods for assessing freshness and quality in the fishing sector and in fish-inspection services. Sensory methods performed in a proper way are a rapid and accurate tool providing unique information about the food.[1] They can be very fast, reliable, non-destructive on raw fish and no expensive instruments are needed. They give direct measurement of the perceived attributes and provide information assisting in better understanding of consumer responses. However the panelists need training and retraining under the supervision of experienced panel leaders using fish samples of known freshness stage.[2] The quality of our fish is of major concern to the food processors, consumers and public health authorities. Provisions of safe, wholesome and acceptable fish and its product as food to consumers and control of microorganisms are essential to meet these objectives. Microorganisms are found mostly on the skin, gills, operculum and intestines of live and fresh fish. The microbial loads vary enormously in the different parts of the fishes and reported the normal range of (10-2-107) on skin surfaces. Some pathogens may even become established in the processing plants from niches where they can survive for a long period of time. Fish contamination can also be linked to raw material, personnel, processing tools such as forklifts through leakage, opening in building and pests. The potential of seafood to harbor microbial pathogens and causing subsequent illness is well documented for both developed and developing countries.[3]According to the Center for Food Safety and Applied Nutrition in Washington (2001), most fish related food borne illness are traced to *Salmonella, Staphylococcus spp., Escherichia spp., Vibrio parahemolyticus, Clostridium perfringens, Clostridium botulinum E, and Enteroviruses*.

The main aim of this study is to evaluate the quality using sensory and microbiological evaluation of chilled fish from Ad-Damer fish market in order to predict the hazards for consumer's health from the presence of pathogenic bacteria. Specific Objectives is to determine the quality of the fish speices *Oreochromis s*pp and *Bagrus spp*, using sensory evaluation skin, outer slime, eye, gill, peritoneum, and gill and internal ordure by EU (European Scheme) and To determine total bacterial load and isolate the pathological bacteria *(Salmonila and Vibro)* from the studied Spp.

## Materials and methods

### Study area and samples collection

The study was carried out during the period (January to March 2019) in Ad-Damer City, which located in the State of River Nile in northern Sudan and north of the capital Khartoum south of Atbara. Extends on the eastern bank of the River Nile and south to the junction of the Atbara River with the main River Nile. Hundred specimen drawn from six tons of chilled fish (*Orecohromis niloticus* and *Bagrus bayad* (were examined. fifty specimen of each species were randomly collected subjected to inspection and rating according to European

scheme to evaluate the fish quality and level of freshness of the fish species . also a total of (20) swabs samples (10 from each species) were obtained by rubbing the sterilized cotton swab over the skin and gills placed on ice in polythene bag and conveyed to the laboratory for microbiological examinations.

## Total viable count (TVC)

The test was done according to Gaulin et al.[4]

## *Salmonella* isolated

1ml of sample had taken by micro pipette and added to surface of Petri dish contain SSA *(Salmonella/Shigella agar)* incubated for 24 hour at 37°C. *Salmonella* Show colonies with black color.

## *Vibrio cholera* isolated

1ml of sample had taken by micro pipette and added to surface of Petri dish contain Blood agar, incubated for 24hour at 37°C.

## Statistical analysis

Data were subjected to independent samples T. test at 0.05 significant level, also descriptive tabular were used including mean, standard deviation and mode of the studied organoleptic test.

# Results

Tables 1-5.

**Table 1** Descriptive statistics of sensory evaluation of *Oreochromis niloticus* fish

| Fish organs | Mean | Mode | Standard deviation | Evaluation |
|---|---|---|---|---|
| skin | 1.98 | 1 | 0.89 | Very good |
| Outer slim | 1.96 | 2 | 0.86 | Very good |
| Eyes | 1.88 | 2 | 0.75 | Very good |
| Gills | 2.1 | 2 | 0.74 | Good |
| Peritoneum | 1.8 | 2 | 0.7 | Very good |
| Odour | 1.74 | 1 | 0.8 | Very good |

**Table 2** Descriptive statistics of sensory evaluation of *Bagrus spp* fish

| Fish organs | Mean | Mode | Standard deviation | Evaluation |
|---|---|---|---|---|
| skin | 1.98 | 1 | 0.91 | Very good |
| Outer slime | 2.04 | 2 | 0.83 | Good |
| Eyes | 1.84 | 2 | 0.87 | Very good |
| Gills | 2.2 | 2 | 0.83 | Good |
| peritoneum | 2.08 | 2 | 0.92 | Good |
| Odour | 1.94 | 1 | 1.04 | Very good |

**Table 3** Shows comparison between *Orechromis Nilotcus and Bagrus Bayad* in regard of sensory evaluation (M±SD) at Ad-Damr fish market

| Fish organs | *Oreochromis Nilotcus* | *Bagrus Bayad* | Significance |
|---|---|---|---|
| Skin | 1.98±0.89 | 1.98±0.91 | NS |
| Outer slime | 1.96±0.86 | 2.04±0.83 | NS |
| Eyes | 1.88±0.75 | 1.84±0.87 | NS |
| Gills color | 2.10±0.74 | 2.20±0.83 | NS |
| Peritoneum | 1.80±0.70 | 2.08±0.92 | NS |
| Gills odour | 1.74±0.80 | 1.94±1.04 | NS |

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**Table 4** Total Viable Bacterial Count (TVC) in the studied fish species

| Fish species | Nu.S | TVC (logCFU/ml)M+SD |
|---|---|---|
| *Orechromis Nilotcus* | 10 | 4 .5 ×105 ± 0.14 ×105 |
| *Bagrus Bayad* | 10 | 4.1×105 ±.09 ×105 |
| Significance | | NS |

**Table 5** Shows the pathological bacteria isolated and identified from the skin and gills of chilled fish (*Orechromis Nilotcus and Bagrus Bayad* ) from Ad-Damr fish market

| Fish species | Nu.S | *Salmonella* | | Vibrio cholera | |
|---|---|---|---|---|---|
| | | + | - | + | - |
| *Orechromis Nilotcus* | 10 | 3 | 7 | 0 | 10 |
| *Bagrus Bayad* | 10 | 2 | 8 | 0 | 10 |
| Significance | | NS | | | |

## Discussion

Sensory evaluation is currently the most important method used for freshness evaluation in the fish sector.[5] In Europe today, the method most used and recommended for quality assessment of raw fish in the industry and the inspection service is the European scheme.[6] The result in Table 3 is agreed[7] which found that the mean skin values of sensory evaluation for the two types of fish Orechromis sp and Bagrus sp were (1.5±.7,1.8±.9),outer slime (1.5±.8, 2.2±1), eyes (1.8±.8, 2.3±.9), gill color (1.7±1, 2±.7), peritoneum(1.7±.1, 2.1±.9)and gill odour (1.1±.7, 2±1) respectively. Aerobic plate count on fishes generally do not relate to food safety hazards, but sometimes can be useful to indicate quality, shelf life and post heat processing contamination. The maximum microbiological limit for the TVAC which separates the good quality products from bad quality mentioned[8] is $5\times10^7$cfu/g, whereas in this study the TVAC of the studied chilled fish samples *Orechromis sp and Bagrus sp* in Table 4 was below the maximum acceptable limit. So all the samples of each type of the fish meet the acceptable limit specified by ICMSF which points out the good quality of the frozen fishes. This is agree with[9] who recorded that the TVC of the examined samples with an average value of $4.80\times10^5$ $\pm0.16\times10^5$, for the examined samples of Orechromis nilotica. Considering chilled Orechromis nilotica samples higher results when compared elsewhere[10] who recorded that the average value of TVC of Orechromis nilotica samples were $3.08\times10^5$ $\pm1.31\times10^5$. In addition, this value was in the normal range estated[11] which was $10^2$ to $10^7$cfu\g for fish meat. This is an acceptable limit in comparison.[12] who recorded that the total aerobic bacterial counts over $10^6$.cfu/g was regarded as accepted limit for sea foods. The quality and freshness of fish are rapidly deteriorated through microbial and biochemical mechanisms.[13] The bacterial growth in the frozen fishes is one of the main causes of food spoilage or contamination of fish. Hence, the microbiological analysis of the frozen fish acts as the indicator of fish quality determination. *Salmonella* is highly pathogenic and this is the major reason for isolation of such bacteria from fish samples. In the present study, *Salmonella* was examined and found dominated on the studied species when compared with the Presence of vibrio cholerae which found negative on the samples of the studied species. However, there are several reports concerning the etiological role of V. *cholerae, V. vulnificus, and V. parahaemolyticus* in foodborne diseases.[14] The present study did not find any incidence of the major Vibrio species such as V. cholera, in chilled freshwater fish samples, and these is similar to previous studies reported elsewhere.[15,16]

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## Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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