MICROBIOLOGICAL QUALITY OF RETAIL FRESH FISH IN CAIRO

A THESIS PRESENTED
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النوعية الميكروبيولوجية للأسماك الطازجة المعروضة للبيع في القاهرة

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From the results achieved, it is cleared that most fish samples showed high microbial contamination indicating unsanitary condition and one may safely conclude that fishes have been subjected to contamination from different sources during harvesting, transportation, and marketing.

The presence of Enterococci, Coliforms, Staphylococci, mould and yeast in varying counts, prove no doubt that the hygienic measures adopted in harvesting and handling of the fish were underway, a finding that constitutes a public health hazard .

The hygienic significance of isolated microorganisms reported and discussed in this text reveals their importance as spoilage organisms or induce certain elements from which man may suffers.

With the tune of increasing of population, and as fish constitutes an important source of animal protein, full filling partly the deficiency in meat production.

Therefore, the following suggestive hygienic measures should be taken in consideration to control growth of naturally occurring spoilage microorganisms and prevent contamination with food poisoning bacteria:

1- The catching area:

a. Authorities must offer rules and regulations to control fishing areas.

b. Contamination with bacteria from the animal / and human reservoir can be limited by monitoring the fishing areas and control of fishing if gross pollution from polluted centers or industry is evident and it must be conveniently carried out by specialized laboratories and must be responsibility of the government.

c. Fishing must be only from unpolluted waters.

2- The catching process:

a. Equipments and tools should be kept clean and off floor .

b. Working surfaces should be washed down and thoroughly every day using clean water and disinfectant.

c. All working surfaces should be of materials, which don't soak up water (To avoid growth of bacteria).

3 - Handling and transportation of the catch :

a - Rapid catches handling on board and storage by suitable available methods (the simplest effective and even cheapest method is surrounding the fish with crushed ice).

b - Fish must be protected from direct radiation from the sun, hot surface or heating application.

c - As can as possible fish should not be crushed by equipment, ice, human feet or themselves. d - Boxes should be clean and free enough surfaces, thoroughly cleaned, disinfected and rinsed before use and labeled.

e - The period between catching and marketing must be short as can as possible.

4 - At market:

a - Preferably fish should be handled in covered areas with floors that easily cleaned.

b - Fish must be well protected against animals and insects.

c - Fish must be inspected when reach the market.

d - Fish should be kept off the floor and should be kept in boxes with ice if possible and keeping them in shade .

5 - Personal sanitation:

a. people who handle fish must be disease free

b. Workers with wounds or abrasions never handle fish.

c. Hands should be kept clean, washed and scrubbed.

d. Clean towels should be used.

e. Protective clothes should be kept clean.

5. Discussion

Literature extended over many years pointed out that fish and its products are liable to contamination with various kinds of micro-organisms from different sources. Such contamination may render the fish unsafe to the consumers or impair its utility, especially in undeveloped countries, where the hygienic measures are still underway. Many efforts were done to keep the fish free from pathogens of public health hazard.

Fish from catch to consumption are prone to contaminations with several types of micro-organisms. The high perish ability to the commodity is attributed to intrinsic factors, which favor microbial growth, namely low collagen and lipid contents and comparatively high level of soluble nitrogen compound in the muscle. The factors which influence microbial contamination include, method of catch, on board handling, fishing vessel sanitation, processing and storage conditions (Ward and Baj, 1988).

5.1. Total Aerobic Bacterial Count

Total bacterial count is described as an important parameter for the sanitation and hygienic importance of fish.

It is evident from **Table (1)** that the total bacterial count of the examined fishes CFU/g. ranged from 1.2×10^6 to 3.6×10^6 with an mean of $2.49 \times 10^6 \pm 3.51 \times 10^5$ for Tilapia nilotica; 1.04×10^6 to 2.8×10^6 with an mean of $1.85 \times 10^6 \pm 3.3 \times 10^5$ for Bagrus Bajad;

7.2×10^4 to 1.6×10^6 with an mean of $3.54 \times 10^5 \pm 8.1 \times 10^4$ for Mullus species and 3.4×10^4 to 1.8×10^6 with an mean of $2.6 \times 10^5 \pm 3.4 \times 10^4$ for Chrysophyres. There is no significant difference between the mean values of both Tilapia nilotica and Bagrus Bajad, also there is no significant difference between Mullus species and Chrysophyres ($P<0.05$). But there is a significant difference between the mean values of (Tilapia nilotica and bagrus bajad) in one side and (Mullus species and Chrysophyres) in the other side ($P<0.05$).

The obtained results are in accordance with that reported **by Mahmoud (1994), El-shabasy (2005) and El-Kareh (2005).**

The obtained results illustrate the relatively high bacterial count somewhat over the expected which indicate that possibilities of the contamination of surfaces and materials which the fish come in contact with, besides unsatisfactory sanitary measures during catching of fish, handling, processing and distribution as well as storage which includes inadequate chilling and/or freezing.

FAO, (1992) reported that fish of good quality will have counts of less than 10^5 CFU/g. of tissues at 20ºC. High counts should be considered as an evidence of a potentially hazardous situation. Also **ICMSF (1974)** recommended that, for fresh seafood standard plate count less than 10^6 CFU/g. to be considered of good quality, whereas those having standard place count in excess of 10^7 CFU/g. are unacceptable.

In conclusion, counts and type of Micro-organisms recovered from fish varies significantly according to the mode of life, degree of water pollution, season and method of sampling. Moreover, subsequent handling of fish during catching, transportation, storage and marketing add new contaminations which may render the fish unsound constituting a public health hazard **(Hackney et al.1980).**

5.1 Enterobacteriaceae Count

Members of Enterobacteriaceae are of potential public health importance as it causes diseases for human. Also this group contains members of food poisoning micro-organisms as Enteropathogenic and Enterotoxigenic E-Coli, Salmonella, Shigella and others. Furthermore, it is used as water pollution indicator.

Table (2) revealed that the total Enterobacteriaceae Count CFU/g. for Tilapia nilotica varied from 1.6×10^5 to 1.1×10^6 with a mean of $7.8 \times 10^5 \pm 6.4 \times 10^4$, for Bagrus bajad varied from 2×10^5 to 1.6×10^6 with a mean value of $6.24 \times 10^5 \pm 8.1 \times 10^4$ as well as for Mullus species, varied from 5×10^4 to 1.1×10^6 with a mean value of $2.6 \times 10^5 \pm 6.2 \times 10^4$, also for Chrysophyres varied from 3×10^3 to 8.5×10^5 with a mean value of $1.2 \times 10^5 \pm 5.2 \times 10^4$. There is no significant difference between the mean values of Tilapia nilotica and Bagrus bajad, also there is no significant difference between the mean values of Mullus pecies and Chrysophyres. But there is a significant difference between the mean values of (Tilapia

nilotica and Bagrus bajad) in one side and (Mullus species and Chrysophyres) in the other side $P<0.05$.

These results were agreed with that reported by **Thatcher and Clark (1978), El-Shabasy (2005) and El-Kareh (2005)** whom referring to the Enterobacteriaceae contamination to polluted water from which fish was caught.

Most of the Enterobacteriaceae are considered as a causative agent of disease problem in fish and little of it were considered as spoilage agent, however, if they are present in high count it can result in public health problem **(Mahmoud, 1999)** wherever, there is no indication that seafood is an important source of E. Coli infection. Most infections appear to be related to contamination of water or handling of food under unhygienic conditions **(Mahon and Manuseils, 1995).**

According to the results presented in **Table (3),** it is evident that different Enterobacteriaceae organisms could be isolated in variant percentages from Tilapia nilotica samples. These organisms were identified as Enterobacter Cloceae (4%), Escherichia Coli (8%), Citrobacter diversus (4%), Klebsiella pneumonia (12%).Klebsiella oxytoca (16%), Shigella Sonnei (8%), Providencia spp. (4%), Serratia spp. (24%) and Salmonella spp. (0.0%). From Bagrus bajad as Escherichia Coli (8%), Citrobacter diversus (8%), Klebsiella pneumonias (16%) Klebsiella oxytoca (12%), Shigella Sonnei (4%), Serratia spp. (12%). From Mullus species as