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STUDIES ON FISH AS A SOURCE OF SOME OCCUPATIONAL INFECTIONS

BY

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SUMMARY

Bacteriological examination was carried out on samples taken from the surfaces of 93 fish: Tilapia nilotica (35), Mugil cephalus (40), Clarias lazera (18) and hands of 12 fish handlers.
The overall rate of isolation from the surface of fish amounted to Salmonella spp. (3.2%), Shigella (2.2%), Klebsiella (6.5%), E. coli (12.9%) and Erysipelothrix insidiosa (16.1%).

INTRODUCTION

Owing to the shortage of animal protein, particularly in developing countries, fish assume greater nutritive importance. Moreover fish are considered to be a relatively cheap source of animal protein. However, public health hazards associated with their handling and consumption are bound to increase, because of the perishable nature of the fish, contamination from aquatic environment or improper handling. Such hazard include fish-borne microbial infections. In warm climates there is great risk of enteric pathogens viz. Salmonella (Edwards, et al. 1948; Brunner, 1949; Janssen, 1970; Larry and Richard, 1977; Brown and Dorn, 1977), Shigella (Floyd, 1953; Reichenboch- Klinke, 1965 and Laila Ahmed et al., 1986), E. coli (Mushin and Ashburner, 1964; Edwards and Ewing, 1972 and Laila Ahmed et al., 1986). Klebsiella (Trast and Sparow, 1974).

Besides the contamination of fish with enteric pathogens, the slime of fish constitutes a good habitat for Erysipelothrix insidiosa, the cause of erysipeloid in man which makes up 34.5% of all occupational infections of fish-handlers (Puntigam, 1963).

As many infections occasionally of epidemic nature, have arisen from inadequate handling of market fish, or have been associated with fish caught in polluted water, the present study is a trial to assess the role of fish and fish-handlers in the cross transmission of bacterial pathogens of public health importance.

MATERIAL AND METHODS

A total of 93 stale fish specimens were collected from Giza market. These specimens included 35 Tilapia nilotica, 40 Mugel cephalus and 18 Clarias lazera.

Moreover, the hands of 12 persons actually handling such fish were subjected to bacteriological examination.

Samples of fish were taken from the surface slime and skin. Four swabs were used for each fish. Two from the slime and two from the skin. Each swab was moistened in sterile saline and rolled up on the surface of the fish, immersed in nutrient broth and the other in tetrathionate broth for the detection of Enterobacteriaceae (Al-Wakeel et al., 1982).

Samples of fish-handlers were taken from the hands of 12 persons. two sterile swabs previously moistened in sterile saline were rolled up over both hands and between the fingers. Each swab was then handled in the same manner as that described above.

After incubating the nutrient broth of all samples for 2 hours at 37°C; plates of nutrient agar, blood agar and MacConkey agar were inoculated (Merchant and Packer, 1975).

Loopfuls from tetrathionate broth were taken to inoculate SS-agar and MacConkey's agar incubated at 37°C for 24 hours. Pure colonies were picked up and transferred to slope agar for further identification according to Cruikshank et al. (1975).

Colonies on blood agar suspected of being Erysipelothrix insidiosa were tested for their pathogenicity by mouse inoculation (Cruikshank et al., 1975).

RESULTS AND DISCUSSION

rate of 27.2%. The discrepancy in these results may be attributed to the degree of pollution of the water in which the fish were raised. Whereas Salmonella species failed detection rate of Salmonella spp. Claris lazera, the highest recovery rate of Salmonella was recorded from the surface of Tilapia nilotica (5.7%). Only a single specimen out of 40 of Mugil cephalus was positive for Salmonella species giving a recovery rate of 2.5%. From the hands of fish handlers, Salmonella species could be isolated at a rate of 8.3% (Table 2). Isolation of salmonella from the surface of fish and the hands of fish handlers proves the occupational nature of such infection as well as the possibility of cross contamination.

Besides its role in food poisoning in man, Salmonella is inplicated in occasional complications and sequelae of enteric fever, acute

Table (1): Recovery rate of pathogens from fish specimens

Samples	No. of Samples	Salmonella sp.		Shigella sp.		Klebsiella sp.		E. coli		Erysepelothrix insidiosa	
		No	%	No.	%	No.	%	No.	%	No.	%
Tilabia nilotica	35	2	5.7	1	2.9	4	11.4	4	11.4	7	20
Mugil cephalus	40	1	2.5	1	2.5	2	5	3	7.5	6	15
Clarias lazera	18	-	-	-	-	-	-	5	27.8	2	11.1
Total	93	3	3.2	2	2.2	6	6.5	12	12.9	15	16.1

It is rare for species of bacteria which cause disease in man to be pathogenic for fish. However, fish may become infected with human bacterial pathogens and these organisms while not producing clinical disease in fish, may remain viable in fish for variable periods of time and this constituting a risk to fish handlers.

The recovery rates of pathogens from the surface of fish samples are illustrated in table (1). The overall incidence of Salmonella spp. recovered from the surface of fish amounted to 3.2%. This result is much lower than that claimed by Edwards et al. (1984), who reported an isolation

suppurative periostitis, abscesses in the kidneys bronchopneumonia and endocarditis (Machie & Macartney, 1978).

The overall isolation rate of Shigella species recovered from the surface of fish figured up to 2.2%, where it could be isolated from a single specimen of each of Tilapia nilotica and Mugil cephalus. Claris lazera was free from Shigella. This applies also to hands of fish handler (Table 2). These results are lower than those recorded by Trust (1975), who recovered Shigella species from 13 % of the examined fish samples. On the other hand, El-Monela (1981) did not isola

Table(2): Recovery rate of pathogens from the hands of fish handlers

Samples	No. of Samples	Salmonella sp.		Shigella sp.		Klebsiella sp.		E. coli		Erysipelothrix insidiosa	
		%	%	NO.	No.	No	%	No	%	No	%
Hands of fish handlers	12	-	8.3	-	1	1	8.3	5	41.5	2	16.7

Shigella species form freshly caught Tilapia nilotica. It is well-known that Shigella is a strict human pathogen, and the isolation from fish is doubtless of human source (Khan, 1968). The failure of detection in the hands of the fish handlers, however, does not exclude the human factor. The examined fish are marketed and subject to contamination from the hands of purchasers or clients or mechanically by flies or roaches (Merchant and Packer 1975).

The overall rate of isolation of klebsiella species from the surface of fish was 6.5 % (Table 1). This enteric pathogen was recovered from Tilapia nilotica and Mugil cephalus at a rate of 11.4 and 5 %, respectivily. The surface of Clarias lazera however, was free from this pathogen. The hands of fish handlers, on the other side evidenced an isolation rate of 8.3 %. The recovery of Klebsiella at a rate of 6.5 % from the surface of fish is higher than that reported by frust (1974) 1.0 % and Laila Ahmed et al. (1986) - 3.4 %. The difference in these results may be ascribed to the fact that the fish examined in the present study are stale while those examined by the other authors are freshly caught fish. The public health importance of Klebsiella lies in the assumption of being a member of the food poisoning organisms (Merchant and Packer, 1975) and a cause of respiratory as well as urinary affections in man (Marchant and Packer, 1975).

The isolation rate of E. coli from the surface of fish evidenced the highest record compared to the other enteric pathogens, where its overall figure amounted to 12.9 % (Table 1). In a decreasing order of frequency, E. coli was isolated from the surface of Claris lazera, Tilapia nilotica and Mugil cephalus at rates of 27.8, 11.4 and 7.5 %. E. coli is a commensal in all fecal metter and the highest isolation rate in Claris lazera is correlated to its made of living in water being bottom feeders and the possibility of surface contamination with coarse fecal particles is not uncommon. However, the overall incidence of E. coli recovered from the surface of fish in this study is still much lower than that reported by Larry and Richard (1977) - 18.7 % and Laila Ahmed et al. (1986) - 26.0 %. On the other hand, Trust (1975), gave a lower incidence of E. coli isolation (6.0 %). These results may reflect the fecal contamination rate of the water in which the fish were caught, as it is a usual practice to raise fish on treated siwage in aqua-culture.

The hands of fish handlers were proved to be contaminated with E. coli at a rate of 16.7 %, a finding which confirms the possibility of cross contamination and occupational infection. The enteropathogenic and enterotoxigenic strains of E. coli are among the important causes of food poisoning in man, besides their implication in cases of infantile diarrhea and urinary infection in adults (Machie & McCartney, 1978).

Erysipelothrix insidiosa was recovered from the surface of fish with an overall rate of 16.1 %. The highest isolation rate was that of Tilapia (20 %), followed by Mugil cephalus (15 %) and then Clarias lazera (11.1 %) (Table 1). Fish handlers were contaminated at a rate of 16.7 % (Table 2). These results are much lower than those reported by El-Monela (1981) from Tilapia nilotica and fish handler with respective rates of 48 % and 44%.

Erysipelothrix insidiosa is a saprophyte and its presence in the surface of fish is attributed to the fact that the slime on the surface of fish has an attractive effect to this agent and presence of this

microorganism in the aquatic environment due to its presence in refuse matter thrawn in water. This agent is the cause of Erysipeloid in man which constitutes 34.8 % of all occupational infections of fish handlers (Puntigam, 1963).

From the results recorded in this study, it is evident that fish surface is a lodging harbour of many enteric pathogens of public health importance. Moreover, the causative agent of Erysipeloid in man is proved to be present in the surface of fish and thus occupational infection with this pathogen is a possible. The cross contamination is also not nucommon, where fish handlers, clients and purchasers may play a role together with that of fish.

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