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Case report

A preliminary report on the Mycobacteriosis-like infection among the fish handlers of West Bengal, India

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ABSTRACT

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Mycobacterium marinum, an environmental pathogen, has a worldwide distribution and causes Mycobacteriosis in human and fishes. The present study evaluated the possible involvement and public health challenge of **Mycobacterium** infections among the fish handlers of West Bengal. A total number of 155 fish handlers were examined, of which 72 male and 29 female fish handlers were found to have mycobacteriosis-like infections on their hand. The infection was more prevalent among the fish handlers of Jalpaiguri district followed by Murshidabad district, where the basic sense of hygiene was lacking. The isolates from human samples grew well on Lowenstein-Jensen medium and were acid-fast positive. This documentation on mycobacteriosis-like infection is the first of its kind in West Bengal.

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1. Introduction

Mycobacterium marinum and other *Mycobacterium spp.* are free living bacteria found in a wide variety of water sources. *M. marinum* is the most important species of *mycobacterial* pathogens among marine microorganisms. They are aerobic, Gram-positive, pleomorphic rods belong to the members of the order Actinomycetales and family Mycobacteriaceae. It can cause skin lesions in fish and humans [1]. The infection can be transmitted to human beings by direct contact with infected fishes. The people who work in fishing, aquaculture and related activities are at a greater risk of infection. Fish handlers can often be infected with these organisms while handling the infected fish or contaminated water. Several studies on *M. marinum* reported its ability to cause nodules on the exposed areas of the body with oozing pus and further necrosis in infected human subjects and mycobacteriosis/fish tuberculosis/ swimming pool granuloma/ fish tank granuloma in aquatic organisms [1-6]. The present study was aimed at to evaluate the possible involvement and public health challenge of *Mycobacterium* infection among the fish handlers of West Bengal.

2. Material & method

The study was carried out in various fish markets in the districts of Jalpaiguri, Murshidabad, North 24 Parganas and Kolkata in West Bengal for two consecutive seasons' viz., winter (December 2011 - January 2012) and summer (March 2012 - April 2012).

Geographically, Jalpaiguri and Murshidabad districts are relatively in the northern region of West Bengal where temperature is relatively low during the major part of the year, and only freshwater fishes are available in various fish markets. While, the North 24 Parganas and Kolkata districts are in the southern region of West Bengal and the temperature is relatively high. These districts get marine, estuarine and freshwater fishes grown and/or caught either locally or brought from other districts and states of India. Even fishes from northern West Bengal are brought in to these districts. The survey work was done on the two hosts of *Mycobacterium spp.* i.e., fish handlers and fishes. A total of 155 fish handlers were interviewed for gathering relevant information on their profession and examined for the possible infection through fish handling. Symptoms of the infections that were looked for on human objects include painful reddish and purplish nodular lesion, ulceration with secretion of pus on the right and left upper limbs and fingers. Besides these, the market fishes (n=363) were also visually screened for infections such as ulcerations mainly on the base of the fins, lateral line, head and other regions of the body.

The swab and pus samples were taken from the infected fish handlers of different locality for the screening pathogen that has possibly caused the painful swelling and nodular lesions. Both swab and pustules were collected aseptically, placed in sterile leak proof containers separately and brought to the laboratory in sealed plastic bags. Swab samples from fish with ulcerations were also collected aseptically and placed in sterile leak proof containers separately. All the samples were examined by streaking on nutrient agar, MacConkey agar and basal blood agar and incubated for 48 hours to enable the growth of suspected

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pathogens. The suspected positive cultures were purified on nutrient agar. All bacteriological investigations, Gram staining and acid fast staining were done as per standard protocol [4,7-9]. The acid fast positive cultures were segregated, transferred to Lowenstein-Jensen (LJ) agar and incubated for 6-8 weeks. The bacterial growth on L-J agar was then transferred to Gieckes solution and stored at -20°C [4, 7] for further investigation.

4. RESULTS AND DISCUSSION

The present study was an attempt to investigate the possible involvement of *Mycobacterium* spp. in causing skin ulceration of fishes and fish handlers. The fish handlers investigated during this study in all four districts of West Bengal were mainly from poor socio-economic and educational status, and they lack the basic sense of hygiene. Of the 155 fish handlers investigated, 101 fish handlers were found to have infections on their hand (Figs. 1, 2, 3, 4 and 5). Among the infected fish handlers, 72 were male and 29 were female. Symptoms of the mycobacterial infections that are found in the human beings include painful reddish and purplish nodular lesion, ulceration with secretion of pus and swab on the right and left upper limbs and fingers [4, 5, 10, 11]. The observed signs and symptoms such as red sores, painful swelling, nodular lesions, ulceration with secretion of pus on the fish handlers of West Bengal were similar to that of the signs and symptoms caused by *M. marinum* [4,5,10,11], thus revealing fact that these fish handlers are probably infected with *Mycobacterium*. Most of the infections were noticed at the right and left upper arm and fingers of the fish handlers who are frequently exposed to contaminated water. The fish handlers of Jalpaiguri district had reddish nodules with secretion of pus cells on the fingers similar to those of Beli et al [7]. The male fish handlers of Murshidabad and North 24 Parganas districts had ulceration on the forearm, reddish and purplish nodular lesion with pustules that resembled the descriptions of Ramautarsing et al [11].

On the other hand, of the 507 fish samples drawn in different fish markets of Jalpaiguri, Murshidabad, North 24 Parganas and Kolkata districts of West Bengal, 316 fishes had lesions resembling skin ulceration and mycobacteriosis described by Christine et al [12]. The infected fishes (Table 2) were from hill streams, freshwater and estuarine origin. A large variety of infected fishes were mainly of minor carps and weed fishes which had ulcerations on the fin base, lateral line, head and lower parts of the body similar to earlier studies [3,12]. Of the total fish samples, 38.86% were positive for acid fast reaction and apparently mycobacterial infection. The mycobacterial infection was observed to be more common in *Colisa fasciatus* (67.80%), *Puntius sophore* (58.82%), *Amblypharyngodon mola* (55.71%), *Chanda nama* (53.49%), *Chela cachius* (40.74%) and *Cyprinus carpio* (40%). All the samples (n=101) taken from infected fish handlers yielded acid-fast positive reaction (Fig. 6) and the bacterial growth in Lowenstein-Jensen (L-J) medium was positive (Fig. 7), thus revealed the presence of *Mycobacterium* sp. and possible mycobacteriosis among the fish handlers.

In general, the present study revealed that mycobacteriosis-like infection among fish handlers is more prevalent in Jalpaiguri followed by Murshidabad and other regions of West Bengal. No study has so far been made earlier in this state to document mycobacterial infection and it is the first of its kind in West Bengal. Further studies are required to understand the species involved, molecular characterization, mode of infection and severity of the disease both in humans and aquatic organisms and the subsequent remedies, which are currently in progress.

Table. 1 District wise distribution of infected fish handlers and fishes

District	Total fish handlers (n=155)		Male (n=103)		Female (n=52)		Fish samples (n=507)	
	Infected	%	Infected	%	Infected	%	Infected	%
Jalpaiguri	45	44.55	31	43.05	14	48.27	172	54.43
Murshidabad	37	36.63	25	34.72	12	41.37	99	31.32
North 24 Parganas	13	12.87	11	15.27	2	6.89	34	10.75
Kolkata	6	5.94	5	6.94	1	3.44	11	3.48
Total	100	65.16	72	69.90	29	55.76	316	62.33

***On the basis of visual observation on ulceration**

Name of the fish (common name)	Total fish screened	Number of fish with ulcers (%)	Number positive for Acid fast reaction (%)
<i>Amblypharyngodon mola</i> (Mourola)	70	58 (82.86)	39 (55.71)
<i>Chanda nama</i> (Chanda)	43	34 (79.07)	23 (53.49)
<i>Chanda ranga</i> (Lal chanda)	32	12 (37.50)	4 (12.50)
<i>Gudusia chapra</i> (Khaira)	68	42 (61.76)	22 (32.35)
<i>Channa punctatus</i> (Lata)	22	9 (40.91)	6 (27.27)
<i>Esomus danricus</i> (Darke)	12	4 (33.33)	3 (25.00)
<i>Mystus vittatus</i> (Tengra)	21	3 (14.28)	1 (4.76)
<i>Monopterusuchia</i> (Kuche)	11	3 (27.27)	1 (9.09)
<i>Chitala chitala</i> (Chital)	34	7 (20.59)	4 (11.76)
<i>Colisa fasciatus</i> (Kholse)	59	49 (83.05)	40 (67.80)
<i>Chela cachius</i> (Chela)	27	20 (74.07)	11 (40.74)
<i>Channa orientalis</i> (Chang)	12	3 (25.00)	2 (16.67)
<i>Danio devario</i> (Lal punti)	15	7 (46.67)	5 (33.33)
<i>Puntius sophore</i> (Jal punti)	51	48 (94.12)	30 (58.82)
<i>Aspidoparia morar</i> (Peoli)	9	5 (55.56)	1 (11.11)
<i>Notopterus notopterus</i> (Falui)	11	4 (36.36)	1 (9.09)
<i>Cyprinus carpio</i> (Koi carp)	10	8 (80.00)	4 (40.00)
Total	507	316 (62.33)	197 (38.86)

***On the basis of visual observation on ulceration**

5. CONCLUSION

The above study reveals that Mycobacterial infection is prevalent in the state of West Bengal specially in the Northern Districts like Jalpaiguri and Cooch Behar. Pathogenic Mycobacterial species esp. *M. marinum* has been found to cause skin nodules and lesions resembling the infection reported elsewhere in the world. Fish handlers including fishes of the cooler regions are shown to be more prone to the infection. It can be inferred that

M. marinum and related species involved have an aquatic origin and may of zoonotic nature. Further molecular characterization is required to specify the mode of infection and sub varieties that may be involved. The present study is the first of its kind in the state of West Bengal and reports *M. marinum* infection in human and aquatic organisms for the first time in the eastern region of India.

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