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Occurrence of *Vibrio cholerae* Non 01 and Their Dispersion Phenomena in the Coastal Waters at Mangalore

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Occurrence of *Vibrio cholerae* non 01 and their dispersion in the coastal waters of Mangalore for three seasons were studied. The near-shore stations recorded comparatively higher incidence of these bacteria while places with a depth of 10m, 2 to 3 kilometres away from the shore, showed a gradual diminishing trend and at the offshore stations, 5 to 6 kilo metres away from the shore, the abundance of the organism was very low. Environmental parameters like salinity, temperature and pH and their correlation with the occurrence of this species are discussed.

Key words: ***Vibrio cholerae*** **Non 01, Mangalore coast, temperature, dispersion, pH, salinity**

Vibrio cholerae non 01 is a non agglutinating group of Vibrios, which occur as a part of the *autochthonous flora* in estuarine and marine environment (Colwell, 1984). They are rod shaped, non spore forming, motile and Gram negative organisms and are pathologically significant. They have been implicated in diarrhoea as well as systemic infections in human beings (Colwell & Kaper, 1997; Blake *et al.*, 1980). *V. cholerae* non 01 have been isolated from seafoods (Karunasagar *et al.*, 1988; Mathew *et al.*, 1988; Iyer *et al.*, 1990). Published information on these bacteria from the estuarine and marine environments of Mangalore coast is scanty. Hence, such a study was initiated to examine the occurrence of these organisms in the coastal environment of Mangalore with particular emphasis on the dispersion and disappearance phenomena exhibited by them in the coastal waters.

Materials and Methods

The area of study was between Suratkal and Old Port at Mangalore and between 13° 10.414', 074°45.106'W and 12°50.8', 74°49.6'E. Sampling was seasonal, from 1996 March to 1997 June. The details of sampling are given in Table 1. Water samples were collected in sterilized glass bottles using ZoBell's modified water sampler and sediment, in sterilized petri dishes using a Van Veen grab. The samples were brought to the laboratory in iced and aseptic conditions.

Samples (50 ml water or 50 g of sediment) were mixed with 450 ml alkaline peptone water (APW) and incubated at 37°C for 6-8 h. A loopful of the inoculum was streaked on to thiosulphate citrate bile sucrose agar plates (TCBS) and incubated at 37°C for 24 h. Smooth yellow colonies, characteristic of *V. cholerae* were collected and inoculated into triple sugar iron agar (TSI) slants and incubated at 37°C for 18-24 h. Colonies giving typical reactions in the biochemical tests were kept aside for further study.

These colonies were subcultured on to nutrient agar slants and incubated at 37°C

Table 1. Presence of *Vibrio cholerae* non 01 at the two sampling stations during different seasons

Month & Year		Depth								
		5 m			10 m			20 m		
		SW	BW	SED	SW	BW	SED	SW	BW	SED
1996 March	S	++	++	++	+	+	+	-	-	-
	OP	++	++	++	+	+	+	-	-	-
1996 December	S	++	++	++	+	+	+	+	-	-
	OP	++	++	++	+	+	+	+	-	-
1997 February	S	++	++	++	+	+	+	-	-	-
	OP	++	++	++	+	+	+	-	+	-
1997 May/June	S	++	++	++	+	+	+	-	-	-
	OP	++	++	++	+	++	+	-	+	-

++ = High, + = Low, - = Absence, SW = Surface water, BW = Bottom water, SED = Sediment, S = Suratkal, OP=Old Port

for 24 h. Growth in the slants was tested for slide agglutination with cholerae polyvalent antisera 'O'.

Results and Discussion

The presence of *V. cholerae* non 01 in the different samples was recorded from the two stations and data are given in Table 2. The results show that *V. cholerae* non 01 was present in the near-shore stations (5 and 10 m depths) of both Suratkal and Old Port during all seasons, but the abundance was less at 10 m depth. These organisms were almost absent in the offshore (20 m) stations. *V. cholerae* non 01 is not a marine bacterium and chance of its survival in highly saline waters is low. Similar observations had been made during earlier studies also (Jameson & Claus, 1984).

The present study indicated high incidence of *V. cholerae* non 01 along the coastal areas of Mangalore. The significance of the occurrence of *V. cholerae* non 01 is that the frequent isolation of these organisms from an ecosystem indicates a possible health hazard.

The influence of salinity on *V. cholerae* non 01 is important because the ability of these organisms to survive in highly saline condition is very low. They are viable in 4 to 5‰ saline waters (Colwell & Kaper, 1997). During the period under study, the salinity ranged between 33.43 and 35.40‰ (Table 2) which was the upper tolerance limit for these organisms. It is known that these organisms survive at temperatures above 10°C only. The water temperature recorded during the period of study (Table 2) seems to be favourable to their survival in the ecosystem. The pH of the water during the period of observation also was favourable for the growth of this organism. The important point to note is that the incidence of *V. cholerae* non 01 is common in near-shore waters. Terrestrial influence and physico-chemical factors like temperature and pH were favourable for their growth and multiplication in this ecosystem. Their abundance was less in offshore waters where salinity was high.

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Table 2. Water quality parameters at the experimental stations during different seasons

Month & year	Station	Depth (m)	Temperature °C	pH	Salinity (‰)
1996 March	Suratkal	0	28.4	8.11	33.44
		5	28.4	8.11	33.49
		0	28.7	8.15	33.51
		10	28.4	8.16	33.58
		0	28.0	8.17	33.59
		20	28.0	8.19	33.61
	Old Port	0	29.6	7.75	34.61
		5	29.2	8.05	35.05
		0	29.5	7.15	33.67
		10	30.0	7.30	33.55
		0	29.7	8.15	34.96
		20	28.9	8.12	35.34
1996 December	Suratkal	0	28.4	8.16	33.75
		5	28.6	8.17	34.43
		0	28.2	8.10	33.61
		10	28.0	8.10	33.59
		0	29.0	8.10	33.43
		20	28.0	8.11	33.45
	Old Port	0	28.0	7.91	34.10
		5	27.0	8.00	34.87
		0	28.5	8.00	34.29
		10	28.5	8.01	34.89
		0	28.7	8.00	34.35
		20	28.5	8.02	34.35
1996 February	Suratkal	0	30.5	7.79	34.52
		5	30.4	7.89	34.56
		0	30.5	7.89	34.56
		10	30.0	8.09	34.54
		0	30.5	7.88	34.50
		20	30.0	8.00	34.52
	Old Port	0	30.4	7.72	34.51
		5	30.3	7.78	34.54
		0	30.2	7.82	34.56
		10	30.2	8.01	34.52
		0	30.5	7.87	34.52
		20	30.0	8.92	34.55
1997 May/June	Suratkal	0	30.2	8.10	34.50
		5	29.7	8.12	35.20
		0	30.5	8.12	34.70
		10	29.4	8.13	35.30
		0	30.4	8.13	35.30
		20	29.3	8.15	35.40
	Old Port	0	31.2	8.25	34.00
		5	30.3	8.21	34.95
		0	30.3	8.25	34.12
		10	29.6	8.24	35.10
		0	30.6	8.27	34.75
		20	29.3	8.25	35.18

Depth 'O' = Surface water

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