

**THE EFFECTS OF SEA-WATER QUALITY ON  
HEALTH**

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## **Introduction**

It has been known, at least since the middle of the last century and particularly since the first study on ocean microbiology in 1874, that pathogenic bacteria and a good many parasites survive very well in natural sea-water (Brisou 1976).

These pathogenic bacteria may give rise to infections in one of three main ways:

- a) Ingestion of sea-water while bathing;
- b) Ingestion of contaminated sea-foods;
- c) Forced entry of bacteria into breaks or tears in delicate membranes in the ear or nose, as a result of diving into the sea-water (Shuval 1986).

Besides, commensal bacteria, which are often found in man, may give rise to disease when the resistance of the individual who harbours them is lowered, as might occur in the case of extended periods of bathing in cold water. (Hood and Moore 1976).

## **Methodology**

### **Laboratory analysis of sea-water quality**

Two beaches were selected - Maghtab bay and Armier - and monitored, in an attempt to correlate levels of bacterial water quality indicators to:

- a) Time of the day;
- b) Day of the week;
- c) Number of bathers.

Enumeration of indicator organisms was performed by the Mean Probable number method (MPN). The indicator organisms used were: Total coliforms; Faecal coliforms and Faecal streptococci. Sea-water samples were collected from the selected beaches every 2 hours on various days - 3 weekends and 3 weekdays - for each beach. After collection, the samples were immediately placed in a cooling box and analyzed within 24 hours of collection.

## Survey 1

Several copies of a questionnaire were handed out to a number of randomly selected general practitioners. The question forms were filled in for those patients (seen by the GPs) who had infections which could, in theory, have been acquired as a result of bathing in sea-water.

Information on the patients' bathing exposure and related activities was collected from the survey. Symptoms and treatments of the infections encountered were also recorded.

## Results

### Laboratory analysis of sea-water quality

The results obtained showed a progressive increase in one of the bacterial indicator used (Total coliforms) when time and increasing number of bathers in both beaches studied.

Brisou (1976) and Volterra (1990) state that micro-organisms discharged from waste water sewers, sediment with time following processes of dilution, dispersion and flocculation. Natural turbulence created by the bathers during recreational activities is considered as one plausible mechanism by which these organisms are eventually re-suspended. This theory could explain the trend obtained above where the indicator organisms dejected increased with time and number of bathers.

A comparison of average indicator counts taken on weekends and weekdays showed higher values on weekends. This difference could probably be attributed to a larger number of bathers frequenting the beaches on these days.

## Survey 2

Out of 250 patients interviewed, 85.6% (n=214) had been to the beach in the previous week before symptoms of their infection appeared. Infections were more common in the 0-4 years age group, the most common infection being otitis externa. In fact otitis externa was diagnosed in 56% (n=120) of the patients, followed by conjunctivitis (22.4%, n=48) and Impetigo contagiosa (9.3%, n=20). Other infections such as URTI, wound infections and gastroenteritis were also encountered.

Patients participating in the survey were asked about the approximate time actually spent in the water each time they entered the sea. A large proportion of the patients (65%) had spent more than 30 minutes in the sea. This could imply that spending more time in the water, may predispose to infection. Hood and Moore (1976) have related this increased incidence to a lowering of the individual's resistance to infection as a result of extended periods of bathing in cold water.

Immersion of the head in water while swimming, seemed to be highly associated with infections such as otitis externa and conjunctivitis. In fact 86.7% and 75.0% of patients with otitis externa and conjunctivitis respectively had immersed their head in water while swimming.

Skin infections seemed to be related to contact with sand, as 60% (n=12) of patients had played in the sand during their visit/s to the beach. Such an activity is usually associated with minor abrasions which may serve as part of entry for pathogenic micro-organisms causing the infection.

### Conclusions

The various limitations associated with the above mentioned studies, led to the conclusion that it was not possible to establish actual theories on the epidemiology of sea-acquired infections.

Therefore it was deemed necessary to conclude with various suggestions and guidelines which could be found useful in the design and conducting of a large scale controlled epidemiological-microbiological study in the local setting. Such a study would be useful in determining the relationship between the concentration of specified micro-organisms in sea-water and defined symptoms of disease among swimmers and non-swimmers.

## References

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