CONTAMINATION OF DRINKING WATER DURING COLLECTION AND STORAGE

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Abstract. Drinking water contamination during abstraction, storage and use was determined in a suburban community in Rangoon, Burma, by detecting faecal coliforms (FC) with membrane filtration method. Increasing contamination during water collection, from the source to home storage, was found in all the studied households using 4 different types of drinking water. The implications of the findings are discussed.

Key words: Water; contamination; faecal coliforms; Burma

Introduction

A large proportion of the population in developing countries drink water from natural sources which are exposed to contamination [1]. Even when uncontaminated improved water is supplied, contamination usually occurs by the time it is stored in home containers or when it is consumed [2, 3]. The present study was conducted in a suburban community in Rangoon, Burma, to actually determine the contamination points in the drinking water collection process.

Materials and Methods

Drinking water samples were collected from 20 random households (5 each using municipal pipe, tube well, pond and shallow well water sources). Samples were collected from each source on two different days. On each collection day, a sample was collected from the source and 2 samples from each household, one from the bucket used for abstracting water and the other from the home storage container. However, samples from the storage containers were collected for the second day in succession to monitor contamination during use. A standard procedure was used in collecting all the samples. They were subjected to membrane filtration method of analysis to detect faecal coliforms (FC) [4]. An attempt was also made to isolate *Vibrio cholerae*, salmonellae and shigellae from all the samples using standard methods.

Results

Mean FC counts of samples collected from water sources, buckets for abstracting water and home storage containers are given in the *table. Vibrio cholerae*, salmonellae and shigellae were not isolated from the total 60 samples. *Escherichia coli* which were positive in 17% of samples were all from abstraction and home storage samples. Of these, 2 were ST enterotoxin producers. Other enteric bacteriae such as

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Table. Contaminat source

Points in collection proces

Source
Collection
Home storage: Day
Home storage: Day

[1]Mean of 2 days res
[2]FC = faecal colifor
[3]CFU = colony forn

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Table. Contamination of drinking water at source, during collection and home storage by water source

Points in collection proces	*Mean[1] FC[2] counts (CFU[3]) per 100 ml*			
	Municipal	*Tube well*	*Shallow well*	*Pond*
Source	1.5	0.0	1.0	2.0
Collection	1.8	3.4	1.4	2.1
Home storage: Day 1	1.4	6.6	13.4	25.6
Home storage: Day 2	5.2	1.8	4.8	2.0

[1]Mean of 2 days results
[2]FC = faecal coliforms
[3]CFU = colony forming units

Enterobacter cloaca, Citrobacter freudii and saprophytes such as actinobacillus spp etc, were isolated from the remaining 83% of samples.

Discussion

The results of this study confirm the impressions of earlier ones in that drinking water contamination usually occurs during collection, storage and use [2, 3]. The pattern of increasing contamination during water collection, from the source to home storage is well portrayed by the households using tube well water. This FC free water became contaminated during collection (3.4 colony forming units (CFU)) and even more so at home storage (6.6 CFU). Likewise, for the other water types which were already contaminated at the sources, contamination continued to occur during abstraction and also during home storage and use (*table*). However, the mean FC counts on storage day 2 were lower than on storage day 1 in 3 instances. This was probably due to very little or no fresh contamination and to dying off of bacteria already present in the water on day 2. If the home storage samples could be tested for a longer period, we might be able to show fluctuations in the FC isolation reflecting the degree of contamination occurring from day to day. We believe this study is the first to show how this process occurs in a developing country. The isolation of 2 enterotoxigenic *E. coli* strains underscores the importance of this contamination. The study also indicates the importance of providing health education on personal hygiene together with water supply improvement schemes.

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References

1. World Health Organization. Community water supply and sewage disposal in developing countries. World Health Stats Rep 1973; 26: 720–83.
2. Rajasekeran P, Dutt PR, Pisharati KA. Impact of water supply on the incidence of diarrhoea and shigellosis among children in rural communities in Madurai. Indian J Med Res 1977; 66: 189–9.

3. Shiffman MA, Schneider R, Faigenblum JM, et al. Field studies on water, sanitation and health education in relation to health status in Central America. Prog Water Tech 1978; 11: 143–50.
4. World Health Organization. Guidelines fot drinking water quality vol. 3. Drinking water quality control in small community supplies. Geneva: WHO 1984.

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