



The Epidemiology of Diseases Transmitted by Water

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Introduction

The diseases that are transmitted through contaminated water are known as waterborne diseases. Water contaminated by faecal matter is the commonest mode of transmission of the offending microorganisms to man. Some of the important waterborne diseases/pathogens are Cholera, Shigellosis, and Enterotoxigenic *E. coli*, *Vibrio parahaemolyticus*, *Salmonella*, *Giardia lamblia* and *Cryptosporidium*. *Entamoeba histolytica*, Enterohaemorrhagic *E. coli*, and Enteroinvasive *E. coli* cause bloody diarrhoea (dysentery).

Transmission

A severe cholera outbreak occurred in London in 1854. John Snow, a physician, was in charge of the investigation of the outbreak. He observed that the people of the area, who drank water from a hand pump situated at the corner of the broad street, were mostly affected in contrast to those who did not drink water from the hand pump. This study for the first time demonstrated that cholera is transmitted by water. Further, when the mouth of the pump was sealed, transmission completely stopped and cases came down sharply [1,2].

Sanitation

Sanitation and safe water are two pillars for prevention of waterborne diseases. Their implementations are most likely to cut down the transmission of pathogens to a reasonable level. To implement these measures will require long term activities and allocation of large funds and considerable time. Handwashing will further reinforce the strategy of reduction of waterborne diseases [3].

Vaccine

To boost up the individual immunity, it is required to use vaccines. An injectible cholera vaccine was available. The vaccine was highly reactogenic and provided protection in only 40-50% of vaccinated individuals (two shots at two weeks interval) for 4-6 months only. Of late two Oral cholera vaccines were developed, but they are no longer used much except for travellers' going to cholera endemic areas. Recently, a heat-killed Oral Cholera Vaccine has been developed that gives protection in upto 66% of the vaccinated people for 5 year [4]. This vaccine is available in the market. Hepatitis A vaccines are available and confer immunity. Ty21 and Vi-lipopolysaccharide typhoid vaccines are available and used for vaccination against typhoid [5].

Handwashing

Handwashing is a simple method that stops transmission of pathogens. Although it is simple, it is difficult to adhere to by illiterate people. Improvement of personal hygiene helps in dispelling pathogenic organisms from the body. Chlorination of water kills the pathogens and water becomes safe. Hepatitis A and E vaccines are useful and effective. Breast feeding up to 2 years of age is recommended for protection against diarrhoea. Boiling of water before drinking is good, but cost of fuel is prohibitive. Besides sanitation and safe water, a number of other methods will be useful in controlling waterborne diseases. These methods are adjunct to sanitation and safe water including oral cholera vaccination [6].

Hygiene

Improvement of personal hygiene helps in dispelling pathogenic organisms from the body. Trimming of nails prevents carrying germs through contaminated fingers.

Chlorination

Chlorination of water kills the pathogens and water becomes safe. During epidemic of diarrhoeal diseases or hepatitis, super chlorination at source is recommended that prevents growth of microorganisms. However, it must be ensured that at the user end there is sufficient chlorination.

Vaccinations

Hepatitis A and E, typhoid and oral cholera vaccines are useful. Breast feeding up to 2 years of age is recommended for protection against diarrhoea. Boiling of water before drinking is good, but cost of fuel is prohibitive.

Mass chemoprophylaxis

At one time in the past, on the presumption that killing the *V. cholerae* will stop transmission, but this approach was found to be wrong and there in a limit to use tetracycline for a reasonable period. The appearance of drug resistance was also feared and chemoprophylaxis is no longer recommended.

Conclusion

It is therefore evident that besides sanitation and safe water, a number of other methods will be useful in controlling waterborne diseases. These methods are adjunct to sanitation and safe water. Vaccination will be particularly useful [7].

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