

ENTEROVIRUS SEARCH IN HYDROUS MEDIUMS IN MARRAKECH CITY

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ABSTRACT

The aim of our study was to search for enteroviruses in the water samples. For this, a total of 225 liters of tap water coming from the national network office for drinking water and 18 samples of waste water originating from Marrakech city were studied. These samples were concentrated and analyzed by RT-PCR. Only two samples were found to be positive for Enteroviruses by RT-PCR among the 18 waste water samples analyzed, which gives a rate of 11.11%. On the other hand no positive samples were found in the tap water. This study made it possible on the one hand to apply for the first time RT-PCR for the detection of Enteroviruses in water samples originating from Marrakech city, and on the other hand to show that tap water of this city does not present any risk of contamination by this type of germ.

Keywords: Drinking water, Waste water, Enterovirus, RT-PCR, Marrakech.

1. INTRODUCTION

Enteric viruses can be present naturally in aquatic environments. These viruses can be transported into the environment through groundwater, estuarine waters, sea water, rivers, aerosols, sewage, inadequately treated water, drinking water, wells, ... ,Fong and Lipp(2005). The risk of infection by enteroviruses in water is 10 to 10 000 times greater than bacterial infections (Bosch, 1998).

The virus excreted in feces are found in sewage, the viral concentration of wastewater is subject to variation depending on many factors, geographic, socio-economic, seasonal and especially health. Thus, the higher the proportion of children is a great community, the higher the level of hygiene is low and the amount of virus found in wastewater is important.

All enteroviruses are transmitted by fecal-oral route and their effects may exceed gastroenteritis, because some travel from the intestinal tract to other organs. The enteric virus infections are primarily associated with diarrhea in humans, Kocwa-Haluch (2001). Thus the United States, cases of acute gastroenteritis diseases recorded exceeded 50% of all waterborne diseases recorded from 1946 until 1980, Lippy and Waltrip (1984), viruses were identified as the cause of 12% cases registered during this period.

2. MATERIAL AND METHODS

The concentration of virus in samples of tap water and wells has been done by filtration through membranes of cellulose nitrate sterile porosity of 0.22 microns and eluted centrifugation.

2.1. Extraction and Concentration from Wastewater

We adapted the protocol described by Gerba et al. (1979), based on the adsorption of virus to acidic pH and elution at basic pH. We adopted RT-PCR, a method considered sensitive in the detection of enteroviruses in both environmental and clinical samples, Zoll et al. (1992), using reverse transcriptase (Moloney-Murine Leukemia Virus) and two primers from the conserved non-coding region of the viral genome. The product of amplification gives a band of 154 bp.

2.2. Detection of the viral genome

We adopted RT-PCR, a method considered sensitive in the detection of enteroviruses in both environmental and clinical using reverse transcriptase and two primers from the conserved non-coding region of the viral genome. The product of amplification gives a band of 154 bp.

3. DISCUSSION AND RESULTS

During the study a total of 41 samples were collected including 18 samples of wastewater. Using RT-PCR enabled the detection of enterovirus in 2 samples of wastewater; this gives a rate of 11.1% (2 / 18) (Table 1). These two positive samples were collected in July, known as the driest month of the year 2008 in the city of Marrakech. However, no positive result was obtained with treated wastewater, tap water and water wells.

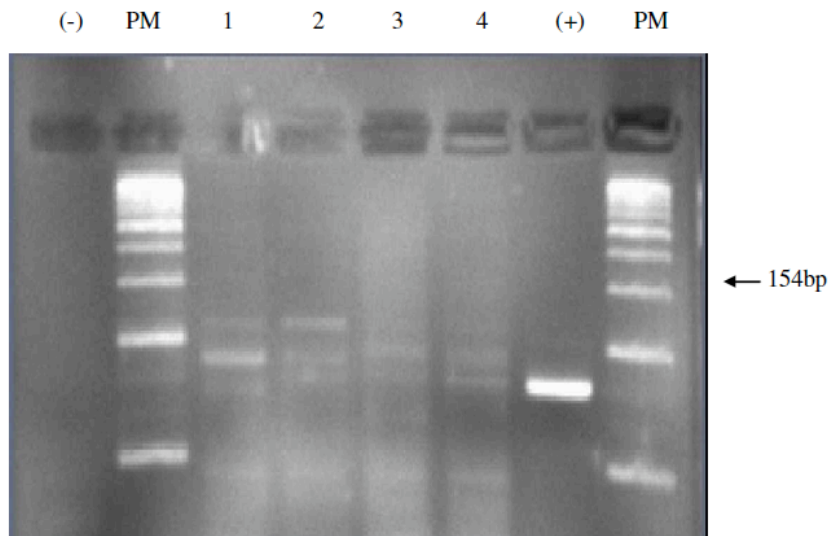


Figure 1. Results of electrophoresis of amplification products by RT-PCR of gene 5'NC enteroviruses from samples of waste water.

(-): negative control; (+): positive control (Coxsackievirus B Nancy); 1, 4: positive samples; 2, 3: negative samples; PM: Size Marker 100 bp.

The results of virological analysis of wastewater from the city of Marrakesh by RT-PCR revealed the presence of enterovirus RNA with a detection rate of 11.1% (2 / 18). We noted that no positive sample of treated wastewater to the treatment plant has been detected. This can be explained by the fact that much of the suspended matter is removed during the treatment; viruses adsorbed on this material under the influence of surface physical properties. Some authors argue that the setting of virus particles suspended in the water environment is linked not only to the species and serotype but also to the strain itself .

Regarding the tap water, 225 liters of water were analyzed without any positive result. This could be explained by the efficiency of the process water treatment away in Marrakech making water contaminants during their course of treatment plant to the consumer.

The fact that the methods used in environmental virology are limited by the low concentration of virus in drinking water, the techniques of adsorption / elution using filters electropositive or electronegative methods are most recommended by APHA "American Public Health Association". Nevertheless, our study has demonstrated the effectiveness of treatment technologies for water consumption, the technique used and the volume of samples analyzed to meet international quality standards.

Regarding groundwater, we have made samples in 8 wells and none was found positive. These non-deep wells (between 6 and 10 meters) are located approximately in agricultural fields irrigated with wastewater and not far from the site of the city of Marrakech which suggests that contamination is very likely. It is better to spread the study out of a well broader and larger volumes. In other studies, conducted between 1971 and 1982, groundwater accounted for 51% of waterborne diseases (Craun, 1986).

The present work allowed us to detect for the first time enteroviruses in wastewater of the region of Marrakech. This encourages us to continue the search for these viruses in a larger number of water samples and the level of human biological samples.

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