



## EVALUATION OF THE POLLUTION LEVEL OF WATER FROM THE WELLS IN THE PERIPHERAL AREA OF TIRANA, BY MICROBIOLOGICAL PARAMETERS

Rozeta HASALLIU<sup>1</sup>, Elvira BELI<sup>2</sup> and Jorinda TERPOLLARI<sup>2</sup>

1 Faculty of Biotechnology and Food, Agricultural University of Tirana. E-mail: hasalliur@yahoo.com

2 Department of Food Control, Institute of Veterinary Food Safety, Tirana, Albania

### SYNOPSIS

**Key words:**  
fecal coliforms,  
water quality,  
well,  
Tirana,  
Albania.

The aim of this study is to evaluate the pollution level of water in wells, in order to determine if it is of the right microbiological level for using as drinking or bathing water. The samples were taken from 5 peripheral areas of Tirana, and we have taken 6 samples from each of them. The microbiological examination of water samples is made to determinate the quantity of thermo-tolerant coli forms as an indicator of fecal pollution.

The analyses are made by the multiple-tube fermentation method and the results are evaluated as most probable number (MPN). We have used the method ISO 11866 for coli forms.

### INTRODUCTION

In some peripheral areas of Tirana, the deficiency of drinking water, notably in summer, forces people to open wells. The aim of this study is to evaluate the pollution level of this water, and determine if it is in the right microbiological level to be used as drinking or bathing water. The microbiological examination is used worldwide to monitor and control quality and safety of water. Microbiological examination of water samples is usually undertaken to ensure that the water is safe for drinking or bathing (ANDERSON & DAVIDSON 1997; BARREL et al, 2000; BITTON, G.2005).

The indicator microorganisms such as *E.coli* type I, coliforms and fecal streptococci are supposed to indicate unhygienic handling of foods. They are widely used in microbiological quality of foods and water (FAO, 1979).

Coliform bacteria, which normally live in the intestines of humans and warm-blooded animals, although were not known to cause any illness, are referred as indicator organisms since a quantity of their presence is used to indicate the potential presence of pathogens in water (ZENELAJ & HILA, 2008).

### **MATERIAL AND METHODS**

The samples are taken from 5 peripheral areas of Tirana, and we have taken 6 samples from each of them.

The quantity of water was 0.5 liters. Sample bottles are sterilized in an autoclave for 20 minutes at 121°C (BORRELL FONTELLES & WINKLER, 2006).

Transport and the storage of samples before analyses were carried in a cool box or refrigerator at temperature 4-7°C. The samples were analyzed during the same working day (FIGUERAS & BORREGO, 2000).

The microbiological examination of water sample is made to determine the total charge of aerobic mesophilic bacteria and the quantity of thermo-tolerant coliforms as an indicator of fecal pollution.

The analyses are made by the multiple-tube fermentation method and the results are evaluated as most probable number (MPN). We have used the method ISO 11866 for coliforms.

For each individual sample, coliform density is estimated in terms of most probable number (MPN) in 100 ml of water, known as "MPN index". The use of MPN index is recommended as the basis of quantitative estimation of coliform density after full recognition of its limitations.

After the dilutions we have inoculated each of the three tubes of LST broth (containing inverted Durham tubes) with 1ml of water. The incubation was done at 37°C for 24 and 48 hours. We have recorded tubes showing gas production then we have found the MPN from the table of MPN index.

### **RESULTS AND DISCUSSIONS**

Bacteriological standards for drinking water recommended by WHO for untreated water is: in 90% of samples examined throughout any year, the MPN index of coliform

or microorganisms should be less than 10. None of the samples should show an MPN index greater than 20. An MPN index of 15 or more should not be permitted in consecutive samples. With the examination of five 10ml portions of a sample, this would preclude four of the five 10ml portions (an MPN index of 15) being positive in consecutive samples. If the MPN index is consistently 20 or greater, application of treatment to the water supply should be considered (FAO, 1979).

The results of our analyses for water from the wells from 5 areas in peripheral area of Tirana are shown in table 1.

**Table. 1 The MPN index for water from the wells of 5 areas for coliform bacteria.**

Area	Number of positive tube			MPN /ml	95% confidence limits	
	1:10	1:100	1:1000		Lower	Upper
1	3	2	1	150	30	440
2	3	1	2	120	30	380
3	3	3	0	240	36	1300
4	3	2	2	210	35	470
5	3	3	1	460	71	2400

## CONCLUSIONS

The results of our analyses of the water from the wells are higher than bacteriological standards for drinking water recommended by WHO. From this point of view this water should not be used as a drinking water. We suppose that this water is infected by urban discharged wastewaters.

The use of the chlorine in this water is a preventive measure in order to avoid infections or illnesses like diarrhea caused by coliforms.

## REFERENCES:

- ANDERSON, K., and DAVIDSON, M. 1997: Drinking water & recreational water quality: Microbiological Criteria. - *University of IDAHO*, College of Agriculture, pp: 2-4.
- BARREL, R., HUNTER, P., NICHOLS, G. 2000: Microbiological standards for water and their relationship to health risk. - *Communicable Disease and Public Health*, 3(1): 8-13.

- BITTON, G. 2005: Microbial indicators of fecal contamination; Application to microbial source tracking. Report submitted to the Florida Storm water Association, June 2005; pp 4-11.
- BORRELL FONTELLES, J. & WINKLER, H. 2006: DIRECTIVE 2006/7/EC of the European Parliament and the Council of 15 February 2006, concerning the management of bathing water quality and repealing Directive 76/160/EEC. - *Official Journal of European Union*, 04 March 2006, 64:37-51.
- FAO 1979: Manuals of Food Quality Control. ROME.
- FIGUERAS, M.J., BORREGO, J. J. 2000: "Sanitary inspection and microbiological water quality" selected from the book "Monitoring Bathing Water". -A practical guide to the Design and Implementation of Assessment and Monitoring programmers, pp 22-84.
- ZENELAJ, R. & HILA, F. 2008: Impact of urban wastewater to the microbiological pollution of some coastal waters of Adriatic and Ionian Sea in the Albanian area. - *Proceedings of International Conference on Biological and Environmental Sciences*, Tirana; pp 670-677.

Received: 26 April 2010.