

A strange correlation between water quality indicators and incidence rates of inflammatory bowel diseases derived from Norwegian Waterworks Registry and IBSEN Study

Alexandru BURLACU, MD

Cardiology Department, Emergency University Hospital, Bucharest, Romania

Inflammatory bowel disease comprises a cluster of chronic diseases of unclear etiology correlated with two different groups of factors: environmental and genetic. The main pathologic entities included in this definition are ulcerative colitis and Crohn's disease. There is an hypothesis which sustains the infectious etiology of these diseases, causality analysed in several studies and seldom linked with drinking water provided by national waterwork system.

This study evaluated the link between the content and quality of drinking water and the incidence of inflammatory bowel disease. The authors used Norwegian Waterworks Registry which included statistics regarding purified water quality for 35 municipalities in southeastern Norway in 1994. Median values for iron, aluminum, pH, number of coliform bacteria, color, and turbidity were extracted from the registry and used in the analysis performed by the authors. They used data regarding the

incidence rates of inflammatory bowel diseases from a 1990-1993 population-based cohort study performed in four southeastern counties of Norway. The overall incidence rate of ulcerative colitis was 13.6 per 100,000 population, and for Crohn's disease it was 5.8 per 100,000.

The authors performed a multivariate analysis and found that the risk of developing ulcerative colitis and Crohn's disease was associated with high iron content. The relative risk of developing inflammatory bowel disease increased by 21% (95% CI: 9, 34) when the iron content in the drinking water increased by 0.1 mg/L. Also, for the same incremental increase in iron, the relative risk for ulcerative colitis increased by 23% ($p = 0.003$) and for Crohn's disease by 25% ($p = 0.023$). Dr Aamodt's group found no association between the diseases and aluminum in the water, color of the water or its turbidity.

Also, according to the authors there could be two mechanisms involved in the pathophysiology

of this corellation. First, high iron concentration works as a catalyst for oxidative stress, which will cause inflammation and/or increase the rate of cell mutations. Second, iron content stimulates the growth of bacteria and increases the likelihood of inappropriate immune responses in genetically predisposed individuals. The main sources of iron

from drinking water are soil and bedrock, as well as corrosion of water pipes. Thus, we can conclude that the quality parameters of drinking water need to be readjusted in order to exclude the possible pathogenesis involved in unknown origin diseases.



Comment on the paper:

Aamodt G, Bukholm G, Jahnsen J and the IBSEN Study Group – The Association Between Water Supply and Inflammatory Bowel Disease Based on a 1990–1993 Cohort Study in Southeastern Norway, *American Journal of Epidemiology* 2008; 168(9):1065-1072