

The impact of drinking water on the prevalence of *H. Pylori* in humans in Elbasan, Albania

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Abstract: Many studies are carried out about the *Helicobacter pylori* in different countries these three last decades, but this is the first one in Albania. In some of them the authors are focused on its biology and in some others on the impact of environmental conditions in the persons affected by it. The aim of this paper is to present the impact of drinking water consumed by humans on the prevalence of *Helicobacter pylori* in the district of Elbasan in Albania. The study concerns the period from January 2011 to May 2014. In order to find out the presence of this bacteria in these persons, some analyzes based on the "Sandwich Elisa Test" are carried out. During this period of time are analyzed 886 blood samples taken from 886 persons and resulted that 74 % of them were affected by *Helicobacter pylori*. The data show that there is different number of persons affected by this bacteria based on the different type of drinking water consumed by them. Some other data about the prevalence of *Helicobacter pylori* regarding the age and their dwelling-place are presented too. In conclusion, some very important recommendations in order to decrease the value of this prevalence are given.

Key words: *Helicobacter pylori*, drinking water, dwelling-place, Elbasan

1. INTRODUCTION

The contaminated drinking water has the greatest impact on human health worldwide, especially in developing countries (WHO/UNICEF, 2000, 2004; WHO, 2003). The World Health Organization (WHO) reported that 80% of diseases and one-third of deaths in developing countries are due to consumption of contaminated water (WHO, 1996). It is estimated that 538 species of bacteria are human pathogens (Woolhouse, 2006). *Helicobacter pylori*, is one of many bacterial agents on the U.S.EPA drinking water contaminant list. This *bacterium* was found in the majority of surface water and shallow groundwater and although *it can't* grow up in the environment, it can survive for 3 weeks in biofilms and up to 20–30 days in surface waters (Hegarty et al., 1999). More than 50 % of the world population is infected by *Helicobacter pylori* and 80 % of them are asymptomatic (Pounder, 1995). It causes peptic ulcers, stomach cancer, lymphoma and adenocarcinoma (Cardenas et al., 2006; Muhsen and Cohen, 2013). Some studies show the presence of *Helicobacter pylori* in feces, saliva, dental plaque and gastric juice.

According to some others studies *Helicobacter pylori* is transmitted mostly via person-to person route, and potentially via the waterborne and food borne routes and it may infect both humans and animals, especially domestic cats (Brown, 2000). Consumption of contaminated drinking-water has been suggested as a potential source of infection, but further investigation is required to establish any link with waterborne transmission (Hulten et al., 1996).

2. MATERIALS AND METHODS

In this study 886 blood samples of persons aged from 20 to over 60 years old are carried out. All these persons went by chance to see the physician after some general symptoms such as nausea, cough, septum, sore throat, mouth bad smell and larynx's edema, but the majority didn't have

stomach pain. The period of study concerns from January 2011 to May 2014. Beside the blood test all these persons filled up a questionnaire with some questions about the dwelling-place, type of drinking water, wastewater treatment, water disinfection and distance of septic tanks from the water well. The technique for the *Helicobacter pylori* detection in the blood based on the serological method named “*Sandwich Elisa Test*” is implemented (Frank, 2005). Based on this method the presence of IgG and IgM in blood samples is proved.

3. RESULTS AND DISCUSSIONS

The data in Table 1 show that 53 % is the highest percentage value of persons infected by *H.pylori* which belongs to the persons who have used the well water, not only as drinking water, but for other needs as well. All these persons live in rural areas. During the interview they declared that the majority of the septic tanks are so close to the water well. Also they use the farm and domestic manure without any preliminary treatment. Furthermore, for many years they didn't use the chlorination for the water well disinfection. According to some authors, water, wastewater, food, or soils can also harbor infectious agents and serve as reservoirs (Berger and Oshiro, 2002; Woolhouse, 2006). The lower percentage value of infected persons, 17 % is as a result of the continuous tap water chlorination. In this case, some other sources of *H. pylori* infection need to take into account.

Table 1. The number of infected persons by *H. Pylori*, based on the type of drinking water

| Drinking water type | Persons infected by <i>H. Pylori</i> | % of infected persons |
|-----------------------|--------------------------------------|-----------------------|
| Tap water | 117 | 17 % |
| Plastic bottled water | 204 | 30 % |
| Well water | 341 | 53 % |
| Total | 662 | 100 % |

Table 2. Some data about spreading infection of *H. pylori* based on the dwelling-place

| Dwelling-place | Persons infected by <i>H. Pylori</i> | % of infected persons |
|----------------|--------------------------------------|-----------------------|
| Rural area | 372 | 56 % |
| Urban area | 290 | 44 % |
| Total | 662 | 100 % |

Based on the data shown in Table 2 the prevalence of *Helicobacter pylori* is higher in the rural area than in the urban area. This is as a result of absence of preliminary treatment of well water. According to some authors the untreated municipal water was considered as a main source of the increased *H. pylori* prevalence (Goodman et al., 1996; Lu et al., 2002). Also a recent study from Japan supports the idea of river water-associated incidence (Fujimura et al., 2008).

In addition, Azevedo (2005) strongly argues that drinking water can pose a substantial threat of *H. pylori* infection based on the ability of *H. pylori* to adhere to different materials and to co-aggregate with other bacteria and form complex structures on pipes or other surfaces in contact with water. In these circumstances this bacterium can't survive alone in running water, but it can develop a symbiotic relationship and form complex structures on contact surfaces. Based on that groundwater is a reservoir for *H. pylori* due to its stagnant nature (Azevedo et al., 2006).

Table 3. Some data about spreading infection based on the age group

| Aged-group (years) | Number of persons infected by <i>H. Pylori</i> | % of infected persons |
|--------------------|--|-----------------------|
| 20-40 | 84 | 12 % |
| 40-60 | 234 | 35 % |
| >60 | 344 | 53 % |
| Total | 662 | 100 % |

Among 886 persons analyzed in our study 662 or 74 % of them are infected by *H. Pylori*. The IgG was present in 371 infected persons, while IgM in 291 ones. Based on the data in table 3 is shown that, 53 % of infected persons by this bacterium belongs to the age group older then 60, meantime the less one is 12 % and belongs to the aged group 20-40. Both two last values are approximately with those in the developed countries, where 50 % of infected persons belongs to those older than 60 and 10 % to those from 10 to 30 years old (Goodman et al., 2005). According to Brown, (2000), there is a correlation between the *H. pylori* infection prevalence and the socioeconomic status, human races in different countries. In the USA the probability ≥ 50 % of being infected belongs to > 50 years old, for African American minorities 40-50%, for the Latino American emigrants from the developing countries is > 60 %, and for the emigrants from the East Europe this probability is > 50 %.

4. CONCLUSIONS

- a) The value 74 % of infected persons by *Helicobacter pylori* in the district of Elbasan of Albania is higher then average values of infected persons in developed and developing countries presented by the other authors.
- b) Based on the data of this study the higher prevalence of *Helicobacter pylori* in humans belongs to the persons who use the water of the well.
- c) The data of this study support the hypothesis, supported by many other authors that the polluted drinking water is one of the main routes of *Helicobacter pylori* human infection, but more studies need to carry out in the future.

4.1 Recommendations

- a) A good management of wastewater, manure and a continuous disinfection of well water, especially in rural area is a necessity.
- b) The improvement of hygienic conditions of the population, especially in rural area.
- c) More deep studies regarding the drinking water as a main source of *Helicobacter pylori* human infection, especially in the rural area in Albania need to be carried out in the future.

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