

Parasite Burden of Traditional Water Well Some Areas of the City of Peripheral Conakry

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Abstract: In order to assess the impact of the parasitic water from traditional wells of some peripheral areas of Conakry town a prospective study has been conducted, covering 90 traditional wells of 6 overcrowded areas: Kagbelen, Km 36, Kountya, Gomboya, Sonfonia and Lansanaya. Parasitological tests performed on the waters from these wells by the modified method of Baileger have shown an infestation in the wells observed 68% and a large difference in concentration and the diversity of the parasites identified (helminth ova, cysts, amoeba, bacteria, etc.). The average concentrations of parasite eggs (cestodes, nematodes and few protozoa) vary depending on well and according to the zone and this mainly due the density of the population and the nature of their socio-economic activities. The concentrations in eggs of helminths found in well waters observed greatly exceed the standards recommended the norms by WHO.

Key words: Water, well traditional parasite load, peripheral areas, diversity, helminth, Conakry

INTRODUCTION

Conakry city and its suburbs record an annual population increase accompanied by a galloping urbanization of land for housing, industrial, commercial and agricultural purpose. All this leads to a larger increase of social services including the access to drinking water which is one of the main basic needs. But at the town center as well as the new or old suburbs the level of drinkable water of the water conveyance is low and people fill his gap with the waters from traditional wells dug without any social epidemiology and environmental standard. In addition to this, there are the lack of maintenance of the wells and their immediate environment: the presence of garbage, concrete latrine upstream and <15 m deep, manure pit or slurry not divided duct receiving wastewater, lots of silage, sewage directly discharged into the ground yard some rodents, snails and insects that die in water.

Unfortunately, these traditional wells are constructed without any epidemiological standard and social environment (the presence of latrines, soiled environments of human and animal waste), the geomorphological structure of the soil and distance to groundwater (deep or superficial). Also, it is rarely that the waters of these wells are subject to traditional qualitative studies except to the knowledge which already at that time of 1990 notes that the traditional wells in

Guinea were infected almost 100% (Program Solidarite Water, 1990). This trend has hardly changed since, the rapid population growth with the decrease in living standards in question is often accompanied by all kind of pollution of the environment (garbage, sewage, wild water runoff and toilets) which by infiltration, pollute groundwaters and therefore water from traditional wells. These become a source of ill health for the people, manifested by chronic diarrhea, intestinal parasites, bacterial infections, etc.

MATERIALS AND METHODS

Presentation of the application area: The application areas covered by the survey are: Kagbelen (prefecture Dubreka) Km 36, Kountya, Gombonya (Coyah prefecture) and Sonfonia, Lansanaya (Conakry town). All these areas are characterized suburban areas except Gombonya by a high population density. They are abundantly watered with an average annual rainfall of 4000 mm of water. The tropical climate is characterized by the alternation of 2 seasons: the dry season and rainy season. The main activities of the populations are growing vegetable crops, trading, breeding small livestock and handicrafts.

The urbanization is inadequate sanitation facilities and refuse dumps are almost nonexistent. Heaps of wild garbage, sewage stagnating in the gutters and dispersion of human and animal excrement are observed here and

there. The current water supply is insufficient and the main source of drinking water supply consists of traditional wells. These wells are dug in compound and very often close to latrines or toilets. They are more or less deep depending on the geomorphological feature of settlements. The holes are sometimes at the ground level and often than not have adequate covers, what results in the infiltration of storm water runoff from septic tanks, domestic used water, etc. They are often responsible for egg parasites, pathogens. Some wells are very old with superficial or deep degradations.

The data collection has been done after contact with local authorities followed by the awareness of the well owners. The sampling of well water has been done in 5 selected areas. Very early in the morning, samples of 2 L of water have been taken from each well and preserved by the addition of 10% formalin (2 mL^{-1}) in sterile bottles and transported to the laboratory for analysis.

Given the wide dispersion of parasitic helminths eggs particularly in the waters, their concentration is required to secure a better highlighted. For this reason, we have opted for the modified Baileger method strongly recommended by WHO for its easy, low cost and reliability. This method is summarized in a series of centrifugal water samples to be analyzed until a residue obtained a pellet. We used the following formula in order to calculate the number of parasite eggs per liter of water:

$$N = \frac{AX}{PV}$$

Where:

N = Number of eggs L^{-1} of sample

A = Number of eggs counted on the slide Mc master or the average of 2 or 3 blades Mc master

X = Volume of final product (mL)

P = Capacity blade Mc master (0, 3 mL)

V = Initial sample volume (L (s))

RESULTS AND DISCUSSION

The results for the wells examined reveal a heavy infestation of these wells with an average of 68% on 90 wells observed, 61 wells have infested with several parasites. The study of the infestation area by wells shows that the wells of Sonfonia, Km 36, Lansanaya,

Kountya zones are among the most infested one. In Sonfonia, for example on 15 wells examined, 11 are infested with the Km 36, these are 14 wells which are infested on 15 observed. Most of these areas are densely populated and characterized by lack of sanitation could be avoid the contact with well waters and even sewage runoff (Wethe *et al.*, 2003). There is also the danger if hydro stool what probably explains the infestation of a large number of wells in these areas (Table 1).

In the distribution of parasites per infested wells, 36.06% of wells are contaminated with ascaris and 27.87% of amoeba, other parasites are divided in a very small percentage ranging from 8-16% of trichomonas intestinalis 3, pinworm 28% and only 1.64% of schistosoma mansonii (as eggs).

The analysis of these parasites detected has identified some of helminths and protozoa in water samples from wells: nematodes, cestodes and protozoans with predominance of nematodes. The prevalence of intestinal nematodes is related to their resilience in the water, even wastewater (Bouhoum, 1996). Helminth parasites isolated from well water are represented mainly by ascaris, the whipworm, the pinworm, hookworm, strongyloides, the tapeworm with a predominance of ascaris eggs. This parasite diversity in the waters shows that the sources of contamination are of human and animal origins.

The average parasite load parasite eggs found in well water vary according to them and the study areas (Belghyti *et al.*, 1994). The comparison of the results of the parasitologic analyses of water of various wells by zone makes it possible to note that the average parasitic loads out of egg L^{-1} , highest are observed in water of the wells of the zones of Sonfonia, Km 36, Lansanaya and Gomboya.

The parasite load with the highest average 19.96 eggs L^{-1} for nematodes and only 1.27 eggs L^{-1} for Cestodes was 14.21 Km 36 eggs L^{-1} for *Ascaris* sp., 1.12 egg L^{-1} hookworm, 2.12 eggs L^{-1} pinworm, 0.82 eggs L^{-1} and 1 eelworm, 69 egg L^{-1} whipworm. A Sonfonia parasite load average of 17.22 eggs L^{-1} of nematodes, 0.87 eggs L^{-1} cestodes or 13.54 eggs L^{-1} ascaris, 1.08 eggs L^{-1} hookworm, 0.19 eggs L^{-1} pinworm, 0.19 eggs L^{-1} eelworm, 0.45 eggs L^{-1} and 1 fluke, 77 oeuf L^{-1} whipworm.

Table 1: Rate the infestation of the wells observed by area

Wells	Harvesting areas						Total
	Sonfonia	Km 36	Kountya	Lansanaya	Kagbelen	Gomboya	
Observed numbers	15.00	15.00	15.00	15.00	15	15	90.00
Number infested	11.00	14.00	10.00	11.00	6	9	61.00
Percentage	73.33	93.33	66.66	73.33	40	60	67.77

Table 2: Load averaged well parasites by parasites (expressed in number of egg L⁻¹)

Parasites	Harvesting areas					
	Sonfonia	Km 36	Kountya	Lansanaya	Kagbelen	Gomboya
Amoeba	7.04	8.88	3.15	6.25	4.02	5.72
Ascaris	13.54	14.21	4.23	12.09	3.52	4.55
Taenia	0.87	1.27	-	-	-	0.96
Hookworm	1.08	1.12	-	0.87	1.06	-
Threadworm	0.19	2.12	-	-	-	-
Eelworm	0.19	0.82	-	-	-	-
Schistosome	0.45	-	-	-	-	-
Whipworm	1.77	1.69	0.82	2.12	-	0.96
Trichomonas	0.54	0.78	-	1.17	0.79	1.17

The lowest average parasite load comes from kountya wells with 5.05 eggs L⁻¹ of nematode eggs at 4.23 L⁻¹ and 0.82 ascaris egg L⁻¹ whipworm. The difference in content of these areas can be explained by the fact that areas of Km 36, Sonfonia are old town with high population density and one also characterized by the lack of sewerage and waste as well as the faeces (Wethe *et al.*, 2003).

Besides some researchers claim that the content of helminth eggs in wastewater or well water is strongly linked to the demographic growth factor. In addition to that well waters may contain protozoan cysts as demonstrated by the investigation. The protozoan parasite load average is the highest in the amoeba which varies in the study of 8.88 cysts L⁻¹ at Km 36-3.15 cysts L⁻¹ at Kountya (Table 2).

CONCLUSION

The results show that the traditional water wells are rather poor in quality with some heterogeneity in their composition. The wells suffer from the bad influence of waste in the city. The comparison of results obtained in the different areas with variously samples shows the direct impact of the presence of latrines and water runoff on water quality parasitological well with the occurrence of intestinal nematodes and cestodes. The comparison of the contents recorded in studied water and those fixed by the World Health Organization (WHO) are much higher than the limits for the water intended for the food. It

seems clear that the abundance of the parasite load in well water originates on the various demographic and socio-economic statutes of the populations (Uner and Ozel, 1991).

REFERENCES

- Belghyti, D., K. El-Kharrim and J. Bachikh, 1994. Parasitologic characterization of waste water, the lake Fouarat (Kenitra_Maroc) and evaluation of the epidemiologic level in a rural population in contact with this water. Proceedings of the Acts 4th International Conference of the limnologists of French expression, (LFE'94), Marrakech, pp: 25-28.
- Bouhoum, K., 1996. Epidemiological study of intestinal helminthiases in the children of the zones of spreading of waste water of Marrakech to become cysts of protozoa and eggs of helminths in the various extensive systems of treatment of waste water. Doctorate Thesis, University of Marrakech, Marrakech.
- Program Solidarite Water, 1990. Drinking Water and Health in the Rural Projects in West Africa. Burgeap, Boulogne-Billancourt, pp: 25.
- Uner, A. and M.A. Ozel, 1991. The research of the intestinal parasites in the children in two villages of Cukurova. Acta Parasitologica Turcica, 15: 92-96.
- Wethe, J., M. Radoux and E. Tanawa, 2003. Cleansing of socio-medical and environmental waste water and risk in zones of habitat planned of Yaounde (Cameroun) Vertigo. Review Sci. Environ., 4: 1-12.