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Original Research Article

Impact of Bilharziasis on Public Health in the Urban Community of Tchiamba Nzassi Around Cayo Lake

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Abstract: ***Background & Objective***: Schistosomiasis remains a public health problem, particularly in sub-Saharan Africa. The disease is closely linked to poverty and environmental factors. Populations who are highly exposed to the fresh water of Cayo Lake on a daily basis are likely to sustain the transmission of the disease. It is therefore necessary to investigate their frequencies in order to combat the perpetuation of schistosomiasis. ***Methods***: This was a cross-sectional study carried out in August 2024 around Lac Cayo, among the inhabitants of Sandza and Tchianda in the urban community of TChiamba Nzassi in Pointe Noire. Schistosoma haematobium was systematically tested in urine samples. ***Results***: This study revealed a 13.6% prevalence of bilharziasis among the 110 individuals tested. The frequency of Schistosomiasis in SANDZA was 05(11.10%) positive out of 45 screened, and 10(15.40%) positive out of 65 screened in Tchianda. ***Conclusion***: Populations living along the shores of Lac Cayo are exposed to and maintain Schistosomiasis caused by Schistosoma haematobium.

Keywords: Schistosomiasis, prevalence, Tchiamba Nzassi.

1-INTRODUCTION

Bilharzia, a neglected parasitic disease, is the world's second parasitic endemic after malaria, with a prevalence of 180 million affected individuals, for around 11792 deaths each year, posing a growing public health problem in many parts of the world, including Africa (WHO. Schistosomiasis). It is estimated that at least 90% of people requiring treatment for schistosomiasis live in Africa (OMS Lignes directrices 2023). Schistosomiasis is counted among the twenty diseases that the World Health Organization (WHO) considers to be neglected tropical diseases (NTDs). However, since the advent of the COVID-19 pandemic, chemoprevention interventions against this parasitosis have declined significantly (Laken EK; 2024). In Congo, mapping carried out in 2011 at national level among school-age children showed prevalences in excess of 20% in most districts of the Kouilou department, as well as in the districts of Mouyondzi and Nkayi in the Bouenza department. Traditionally associated with rural areas, this disease is gradually spreading to urban areas due to rapid urbanization, inadequate sanitation infrastructure and climate change (OMS Plan MTN Congo; 2018).

As a growing urban community in the Congo, it is particularly exposed to this risk, as a combination of factors such as: - Proximity to waterways: The presence of waterways, potentially contaminated with schistosome eggs, favors the transmission of the disease. - Poor hygiene conditions: Limited access to drinking water and adequate sanitation facilities increases the risk of exposure to parasites: Lack of epidemiological data: The absence of precise data on the prevalence of

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bilharzia in this community prevents an accurate assessment of the situation and the implementation of appropriate control strategies. An in-depth study of bilharziasis in the urban community of Tchiamba-Nzassi is therefore warranted.

An extraordinary pair-living parasite, S. haematobium seems perfectly adapted to its human host and its environment (Aline Ferandel; 2001). Let's try to understand why, despite years of struggle, this parasite is still so present today. To do this, we'll look at the epidemiological aspect of urinary bilharziasis, studying current data and trying to explain the factors that have led to this state of affairs. These data could guide public health interventions and improve the quality of life of the inhabitants of Tchiamba-Nzassi.

The aim of this survey was to determine the prevalence of urinary bilharziasis in the urban community of Tchiamba-Nzassi.

2-MATERIALS AND METHOD

2-1-Population and Study Sites

We carried out a cross-sectional study in August 2024, under the supervision of the Pointe-Noire Departmental Directorate of Health Care and Services and with the support of Perenco-Congo's Local Relations and Impact Department**.** The study population was made up of inhabitants of all ages from the localities of Tchianda and Sanza, part of the urban community of Tchiamba-Nzassi in the Pointe-Noire department. The 02 villages are located along Lac Cayo. Subjects who were unavailable or disabled and who had not given their consent were not included in the study.

2-2-Investigation Method:

The work was organized into three stations:

- A census station, which was responsible for identifying and numbering the study volunteers and providing urine jars (white) for men;
- A census station for identification, numbering of study volunteers and provision of (white) urine jars for women.
- A parasitology station for the collection and treatment of urine by filtration.

2-3-Biological Survey:

Laboratory analyses were carried out in the Laboratoire de Biologie Médicale at the Clinique Guenin in Pointe Noire.

2-3-1-Sampling:

Sampling was carried out before any treatment. Urine was collected in the morning and at the end of micturition, after asking the patient to make a moderate effort by jumping on the spot or going up and down stairs (to detach the eggs from the wall). Samples were stored at +4°C in the refrigerator prior to analysis.

2-3-2-Biological Analysis:

- **Pre-analysis**: In all cases: direct examination of urine after centrifugation.
  (Pre-requisite and necessary). The urine is centrifuged at 2,500 rpm for 10 minutes, the supernatant is discarded and the urine pellet retained.
- **Microscopic examination of the pellet**: Place a drop of urine pellet between slide and coverslip and examine at x10 and x40 magnification.
- **Positive results**: An ovoid embryonated egg with a thin shell, 150µ by 60 µ, with a terminal spur.
- **Miracidian vitality test:** We used the vital dye technique.
  Vital dye technique: “Trypan Blue”. Result: - If the egg turns blue: dead egg. - If it doesn't: live egg. - With water: live egg: miracidium released. - With Trypan Blue: -Unstained live egg: Bilharzia evolutive. - Stained egg: chronic bilharziasis.

Qualitative egg count method Aims: to assess parasite load.

- Collect 10 ml of urine after micturition.
- Fit the filter holder to the syringe,
- Gently empty the syringe until the 10 ml has passed through the egg-retaining filter. The filter is recovered and placed on an object slide;
- Add a drop of Lugol's;
- Cover with a slide and observe under a microscope at x10 magnification, counting the number of eggs. W= the number of Schistosoma haematobium eggs per 10ml (test sample).
- In the case of haemorrhagic urine, 20ml of acetic water is added to the centrifuged pellet (this will cause haemolysis of the red blood cells), then the pellet is centrifuged and observed;
- In the case of urine with abundant crystals, acetic acid was added to the pellet;
- If the test is negative, and the pellet is rich in polymorphs, red blood cells and cell agglomerates, the test is repeated.

2-4-Statistical Analysis

Categorical data are expressed as percentages. All analyses were performed with SPSS software (version 26.0; IBM).

3-RESULTS

3-1- Sociodemographic Data

The study population comprised 110 subjects, 70% (77) of whom were male and 25% (33) female. The sex ratio (M/F) was 2.40 (fig. 1 and Table I). The average

age was 29.60±18.4, ranging from 2 to 75 years, and the most represented age group was >24 years for both villages (Table II).

Table I: Distribution of study subjects by sex and village

Age Range	SANDZA		TCHIANDA		Total	
	N	%	N	%	N	%
<5 ANS	03	6.7	05	7.7	8	7.3
[5-14]	08	17.7	17	26.2	25	22.7
]14-24]	7	15.6	13	20	20	18.2
>24	27	60	30	46.1	57	51.8
Total	**45**	**100**	**65**	**100**	**110**	**100**

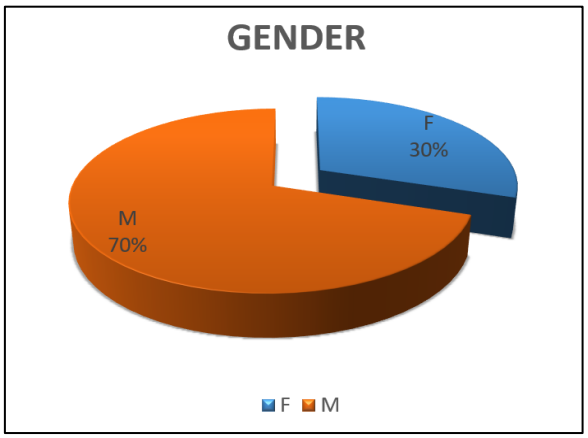

Figure 1: Gender distribution of the study population

Table II: Distribution of subjects by age group and study village

Sex	SANDZA		TCHIANDA		Total	
	N	%	N	%	N	%
Female	13	28.8	20	31	33	30
Male	32	71.2	45	69	77	70
Total	**45**	**100**	**65**	**100**	**110**	**100**

3-2- Prevalence of Schistosoma Haematobium Bilharziosis

The overall prevalence of *S. haematobium* infection is 13.6%. In the village of chianda (15.40%), this is significantly higher than in the village of Sanza (11.10%) (Table III). The age group most affected was [5-14], representing 08 cases out of 15 positives (Table IV). The prevalence of infection in the female group (3.6%) was not comparable to that in the male group (10.0%) (Table V).

Table III: Prevalence of *S. haematobium* infection in the villages of Sandza and Tchianda

Village	Positive	Topics of Interests	Prevalence
SANDZA	05	45	11,10%
TCHIANDA	10	65	15,40%

Table IV: Prevalence of *S. haematobium* infection by age group and study village

Age range	SANDZA		TCHIANDA		Total	
	Positive	%	Positive	%	Positive	%
<5 ANS	0	0	0	0	0	0
[5-14]	02	25	06	35.3	8	7.3
]14-24]	03	43	2	15.4	5	4.5
>24	0	0	2	6.6	2	1.8
Total	**05**	**11.11**	**10**	**15.4**	**15**	**13.6**

Table V: Prevalence of *S. haematobium* infection by sex and study village

Sex	SANDZA		TCHIANDA		Total	
	Positive	%	Positive	%	Positif	%
Female	01	7.6	03	15	04	3.6
Male	04	12.5	07	15.5	11	10
Total	**05**	**11.11**	**10**	**15.4**	**15**	**13.6**

4-DISCUSSION

Schistosomiasis is the most important infection caused by trematodes. *Schistosoma*, the only trematode that penetrates the host through the skin; other trematodes infect the host only by ingestion. More than 200 million people are infected worldwide (CDC. Shistosomiasis). In our study, the aim was to determine prevalence thresholds and target age groups.

In our study, males predominated 77 (70%) compared with females 33 (30%), with a sex ratio (M/F) of 2.40. These data are contrary to those of the study carried out in Mali by Bintou LY *et al*., 2019, where there was a predominance of women. This can be explained by the fact that the villages on the shores of Cayo Lake have only fishing as their main source of income, a job done mainly by male subjects.

The distribution of subjects by age group showed that 08 subjects were aged 5 years or less; 25 individuals were aged between 5 and 14 years; 20 individuals were aged between 14 and 24 years; 57 subjects were aged 24 years or more. It is clear that the subjects most vulnerable and most susceptible to schistosome infection are those aged between 5 and 14. From the age of 24 onwards, awareness-raising and various forms of sensitisation can help to reduce the risk of infection in subjects aged over 24. This result corroborates those of other authors (Ibikounlé *et al.*, 2013; Bintou LY *et al.*, 2019) who also found that subjects under the age of 14 were more parasitized than those over 14. Young age therefore appears to be a factor in exposure to high ovarian burden.

The prevalence of S. haematobium infection between subjects of different sexes was significantly different. The prevalence of infection in the female group (3.6%) was much lower than in the male group (10.0%) (Table V). This result does not corroborate that of Garcia *et al.*, 2013, who found that in Cameroon, men and women in a hydro-developed area had a similar S. haematobium infestation rate. It is true that the level of transmission goes hand in hand with the practice of hydro-anthropic activities whatever the season and the absence of latrines, except that in our case we have a low proportion of female subjects.

Carried out in the urban community of Tchiamba Nzassi in the department of Pointe, this survey revealed a prevalence of 13.6% of bilharziasis among the 110 individuals tested. This prevalence is relatively high and indicates a strong presence of the Schistosoma parasite in the local population. Species of the genus *Schistosoma* are mainly found in freshwater, where snails act as intermediate hosts (*Schwartz C et al., 2018)*. Rural and disadvantaged communities are at risk; children are particularly vulnerable to infection when they play in water contaminated with cercariae, the form of the parasite that evolves in open water and can penetrate human skin tissue *(Gryseels B et al., 2006)*.

According to PIEKARSKI *et al.*, 1987, this chronic disease '...considerably affects the victim's general condition and may cause intellectual and physical retardation'. Early detection and treatment of bilharziasis are therefore of the utmost importance, as are hygiene awareness programmes, improved access to clean water and mass treatment campaigns with antiparasitic drugs (such as praziquantel) are crucial to reducing the prevalence of the disease (OMS Lignes directrices 2023).

5- CONCLUSION

The study carried out in the urban community of Tchiamba Nzassi in the villages of Tchianda and Sanza revealed a 13.6% prevalence of bilharziasis among the 110 individuals tested, with 15 positive cases, the majority of which were males (11/10%) and children aged between 5 and 14 years (8/7.5%). The populations living along the shores of Lac Cayo are exposed to and maintain schistosomiasis caused by Schistosoma haematobium. This prevalence is significant and underlines the importance of ongoing surveillance and public health interventions in the region. Further large-scale studies are needed to understand the transmission dynamics and risk factors specific to the region.

6-Conflict of Interest: None.

7-Contribution of Authors: All authors contributed equally to this study.

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