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RESEARCH ARTICLE

IMPACT OF MASS TREATMENT WITH PRAZIQUANTEL IN A RECENT OUTBREAK OF BILHARZIA IN GUEBO 2 IN SOUTHERN COTE D'IVOIRE

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Abstract

Bilharzia is a public health problem in Côte d'Ivoire, especially in rural areas. This study was conducted in the locality of Guébo 2 located 45.2 kilometres from Abidjan, northwest of Yopougon, with the aim of assessing the epidemiological status of bilharzia in the school environment where cases of urinary bilharzia had been reported in 2012 with a prevalence of 42.8%. 119 pupils were sampled in schools A and B, from Year 3, Year 4, Year 5 and Year 6 pupils. Urine and stool samples were taken. The urine was filtered and observed under a light microscope and the stool was analysed by Kato-Katz. The results gave a prevalence of 0% for urinary bilharzia and 2.52% for intestinal bilharzia. The results show that eight (8) years later, from 2012 to 2020, urinary bilharziasis has significantly decreased in Guébo 2. The low prevalence of intestinal bilharziasis could mean that it is incipient or has declined. However, these low prevalences demonstrate that the mass treatments carried out through deworming by the Bilharzia Control Programme since 2012 are effective. Thus, the results of this study made it possible to assess the level of endemicity of bilharzia in this locality eight years after its emergence. The malacological survey identified the two genera of mollusc intermediate hosts of schistosome in Côte d'Ivoire, *Bulinus* and *Biomphalaria*.

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Introduction:-

Bilharzia, also known as schistosomiasis, is an acute and chronic parasitosis WHO (2022) which is the second largest parasitic endemic in the world after malaria Bioalliance (2014) and for which 230 million people in 51 countries require annual treatment WHO (2022).

Nearly 800 million people are at risk of infection worldwide, with approximately 800,000 deaths per year, Pierre Aubry, Bernard AG (2021).

It was estimated in 2019 that at least 236.6 million people needed preventive treatment against schistosomiasis, while the number of people treated was 105.4 million. Approximately 90% of those in need of schistosomiasis treatment live in Africa WHO (2022).

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In Côte d'Ivoire, schistosomiasis exists as elsewhere in the world (Kouakou L, 2000; N'Guessan *et al.*, 2007). It is one of the countries where chemoprevention is necessary. Control strategies have been put in place to obtain satisfactory results and maintain its control in order to move towards elimination (Assaré *et al.*, 2016). In 2012, the locality of Guébo 2 was identified as an outbreak of urinary bilharzia, following a cluster of cases of haematuria among schoolchildren at EPP Guébo 2. The presence of egg in urine, confirmed by the Pasteur Institute of Côte d'Ivoire showed that this locality is a moderate focus of urinary bilharzia with a prevalence rate of 42.8% (Soumahoro *et al.*, 2014). During the said year, awareness raising and deworming with Praziquantel were carried out by the National Programme for the Control of Bilharzia. Since then, an integrated mass treatment is carried out by the said programme.

According to the investigators Soumahoro *et al* (2014) of the study conducted in Guébo 2 in 2012, in order to alleviate the burden of this disease in the long term, it is necessary to combine treatment with measures to control the vectors and to improve the living environment of the populations. However, only awareness-raising and mass deworming with Praziquantel have been carried out. In view of what has been done eight (8) years ago, it seemed appropriate to determine the current prevalence of this disease in the said locality and to carry out a malacological survey in the various water points in order to know the situational analysis of schistosomiasis.

Study Area

The study was carried out in Guébo 2, a non-communal village in the Songon sub-prefecture of Abidjan. It is located 45.2 kilometres from the city of Abidjan, to the northwest (5°35'20.24"N, 4°17'58.18"W) of Yopougon. It has roads, electricity and drinking water. The climate is hot and humid with an average annual temperature of 26.7°C and a more or less abundant rainfall of 1466.4 mm per year. The vegetation is essentially made up of rubber plantations surrounding the village. Guébo 2 has watercourses, namely the Codi 1 and 2 rivers, the Agofi river, as well as some pools of water found in the rubber and cocoa plantations. The extension of each river is such that the water points are connected, forming a belt around the village. The number of inhabitants is about 2736, mostly male planters and female traders.

Material and Method:-

Data collection methodology

Prior to any investigation, we received permission from the village authorities, the Songon preschool and primary school inspector and the consent of the teachers at Guébo 2 primary school. Consent forms were given to the parents of the pupils who volunteered to give urine and stool samples.

Collection and analysis of samples

For the collection of urine and stool samples, two teams of three (03) people were formed. One team collected the samples from school group A and another team collected the samples from school group B. The choice of classes was based on the children's ability to go to the various water points. It was therefore the Year 3, Year 4, Year 5 and Year 6 pupils of each school group that were targeted. Each selected pupil received two (02) collection pots. They had to urinate in one and put the stool in the other and close them well before bringing them back; knowing that they should not mix with the urine and stool of their classmates. They were given identifying codes and these codes were glued to their pots of deposited samples.

Each urine sample was examined directly by the filtration technique, which is a qualitative technique that allows the presence of *Schistosoma haematobium* eggs to be confirmed in the urine Maïssane Mehadji (2022). The Kato kartz technique was used for stools to search for *Schistosoma mansoni* eggs Pierre Aubry, Bernard AG (2021).

The survey of water points consisted of searching for intermediate host molluscs present in the environment using two collection methods: manual collection and collection of molluscs with a dip net OMS (2020). The intermediate host molluscs collected were tested in the laboratory by exposure to the light of a 60 watt bulb for 4 hours in order to observe cases of cercarial emission in infested molluscs.

Data analysis

We compared two percentages of the number of molluscs harvested at the beginning and end of the rainy season using STATISTICA software and the Fisher test.

Results:-

Participation

Out of a total number of 300, the total number of pupils enrolled in Guébo2 primary school, 121 pupils were selected (40.33%). And out of the 121, 119 students agreed to give urine and stool, a participation rate of 98.34%.

Of the 119 participants, a total of 60 students were from school A, of which 32 were female (53.33%) and 28 were male (46.67%). In school B, the total number of students was 59, consisting of 22 female students (37.29%) and 37 male students (62.71%). Their ages ranged from 06 to 16 years. The infestation rate was 0% for urinary bilharzia and 2.52% for intestinal bilharzia. This prevalence of urinary bilharziasis is significantly lower than that obtained in 2012 by Soumahoro *et al* ($\chi^2 = 45.02$; $p = 0.0001$).

Numbers of molluscs sampled

The numbers of *Bulinus globosus* collected (34) were statistically significantly greater than the numbers of *Biomphalaria pfeifferi* (26) ($\chi^2 = 0.33$; $p = 0.056$). The total number of molluscs sampled when the sites were in full water was significantly greater than the number obtained at the beginning of the rainy season, when the water level in the sites was low, i.e. ($\chi^2 = 16.10$; $p = 0.0001$).

The number of *Bulinus globosus* collected at the beginning of the rainy season was statistically lower than the number of *Biomphalaria* ($\chi^2 = 3.68$; $p = 0.05$). However, after both sites were full of water, the number of *Bulinus* relative to *Biomphalaria* was greater ($\chi^2 = 2.84$; $p = 0.09$).

The infestation test revealed that only one mollusc (*Schistosoma haematobium*) was infested, a rate of 1.74%.

Discussion:-

The results obtained show that the schoolchildren of Guébo 2 Primary school do not present any case of infestation with *Schistosoma haematobium* eight years after the emergence of the disease. On the other hand, the *Schistosoma mansoni* infestations detected, which gave a prevalence of 2.52%, could mean that Guébo 2 has been a hotbed of intestinal bilharzia for previous years. Thus, these low or almost non-existent prevalences for both forms of bilharziasis indicate that the awareness-raising activities carried out in the village of Guébo 2 and the deworming with praziquantel carried out by the National Programme for the Control of Bilharziasis have proved effective (Soumahoro *et al.*, 2014). These results are in line with the objectives set out in the National Master Plan for the Control of Neglected Tropical Diseases 2016-2020.

The presence of intermediate host molluscs of *Schistosoma haematobium* and *Schistosoma mansoni* at high intensity confirms that the different rivers of Guébo 2 constitute favourable sites for the proliferation of these species.

The intermediate host mollusc (*Bulinus globosus*) tested positive, thus infested by *Schistosoma haematobium* thus confirms the hypothesis that Guébo 2 was and still is a focus of urinary bilharzia as indicated by Soumahoro *et al.*, (2014). Although we had a low rate of infested molluscs. From the results obtained, it appears that site 1(Agofi) could be the potential transmission site for both forms of bilharzia and site 2 (Codi 1), the potential site of transmission of intestinal bilharzia.

Partial conclusion

The current situation of urinary bilharziasis among school children in Guébo 2 and the low rate of infested intermediate mollusc hosts (1.74%) correlates with the level of endemicity, which is zero. The existence of intermediate hosts of the genus *Biomphalaria* as well as the few cases identified mean that many cases of intestinal bilharzia could occur if provisions are not made for the control of intermediate host molluscs. It will therefore be necessary to sensitise children in schools in particular to avoid frequenting the various water points. As far as the research community is concerned, it would be better to control the intermediate host molluscs while continuing to provide treatment against the disease to the population.

Limitations

One of the limitations of our study is that the survey was conducted only in schools. However, this study allowed us to update the current situation of urinary bilharziasis in Guébo 2 and also to know that intestinal bilharziasis exists and that Guébo 2 needs to be monitored epidemiologically by the national bilharziasis control programme. Thanks

to the malacological survey, we were able to identify the two species of intermediate host molluscs responsible for bilharziasis in Côte d'Ivoire.

Conclusion:-

This parasitological survey allowed us to know the current situation of bilharziasis in Guébo 2 eight years after its emergence. Given that Guébo 2 is a seasonal transmission centre, it would be important to encourage the interruption of the transmission of this disease by continuing preventive chemotherapy and by raising awareness through communication tools and sanitation as well as the fight against intermediate host molluscs. To be sure of the current prevalence of bilharzia, it would be better to extend the survey to the population of this village as well as to the surrounding villages.

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