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EPIDEMIOLOGICAL PROFILE OF URINARY SCHISTOSOMIASIS IN THREE PRIMARY SCHOOLS IN THE CITY OF N'DJAMENA (CHAD)

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SUMMARY
Urinary schistosomiasis (*schistosoma haematobium*) is a major health problem in tropical environments by its constantly changing frequency with a large number of asymptomatic carriers. The study was done from February to July 2019 in three primary schools in N'Djamena (Chad). It aims to assess the prevalence of the infestation of urinary schistosomiasis and the risk factors in school milieu. The study population consisted of 333 school children where ages ranged from 6 to 17 years. The method of centrifugation of their urine permitted us to detect 88 pupils as carriers of eggs of *S. haematobium* or either a prevalence of 26.4%. Frequently (P<0.005) males were more infested (32.8%) than females (15.4%). The majority of pupils carrying this trematode have a notion of bathing (P<0.005) in pools (32.8%) or in rivers (9.1%). The most elevated prevalence was found in pupils aged 9 to 11 years old (36.8%, P=0.13%). School children presenting hematuria were infested. Among the school children who had turbid urines, 34.8% were infested, while those who had whitish urines, 15.2% were carriers of the eggs of *S. haematobium*. In our study, the pupils who carried trematodes *S.haematobium* came from all the primary schools studied . Among the pupils infested, 97% of them received treatment based on 40mg /kg of praziquentel. Bilharziasis caused by *S. haematobium* remains a veritable public health problem in Chad.

KEYWORDS: Urinary schistosomiasis, hematuria, *schistosoma haematobium*, pupils, N'Djamena, Chad.

INTRODUCTION
Schistosomiasis or bilharziasis is a chronic parasitosis provoked by a species of worms called Schistosoma. By its importance on socioeconomic plan and public health viewpoints, it constitutes the second endemic parasitosis in the world after malaria,[1] in the year 2017, WHO[2] estimated that 250 million individuals were affected in 52 countries throughout the world and 800.000 deaths registered yearly. Of all the cases 85% are concentrated in Africa and the number of individuals exposed to the risk of infestation will be around 800 million,[3] it is a chronic trematodiasis with a slow and insidious evolution caused by the species of worms called schistosoma. It is socioeconomic importance and the viewpoints of public health, schistosoma represents the seconds endemic parasitosis in the world after malaria.

This affection is classified amongst the tropical disease neglected. Among the five species of the genus schistosoma responsible for schistosomiasis, *schistosoma haematobium* in the caused agent of uro-genital bilharsiosis. It is the most frequent human schistosomiasis affecting about 100 million people in Africa.[4] The principal endemic zones are Nile valley and intertropical Africa.[4] For [5 and 6] almost 150 million persons infested by S. haematobium, a mortality of 280 000 persons was recorded yearly. The affections by S. haematobium cause considerable harm to human beings. The prognostic lies on vesiral damages (pathognomonic vesiral calcification among others) ureteral and renal (stenosis, dilatation of the ureters, hydronephosis). Uncommon physio pathological signs can be observed, especially genital: prostatitis, chronic andesitic, spermatorthea, hemospermia and perineal pains. In the literature, some authors think that there is a significant association between urinary bilharzia and bladder cancer, notably epidermoidal carcinoma. For other author this relationship is not justified.[7,8] In the context of the realization of the millennium development plan (MDP) the fight against neglected tropical disease (NTD) is of international concern and it is an important public health problem.

However, in Chad little epidemiological data concerning NTD exist and notably that of urinary bilharzia. Also this study has the objective to determine the importance of urinary schistosomiasis in three schools in the city of

N'Djamena (Chad) and to evaluate the biological perturbations on their carriers.

METHOD

Study site and study population

With an area of more than 100 km².[9] The city of N'Djamena (15° 12° of Eastern longitude and 12°42° of Northern latitude) is largely flooded during the rainy season. It is administratively divided into ten districts. Three primary schools were chosen at random but their distance were taken into account.

Respectively, one school in the: Ist district (Farcha), 7th districts (Boutalbagara) and 8th district (East Diguel) were retained as study sites. This research concerned pupils of two sexes aged 6 to 17 years.

The choice to launch this investigation in primary schools is because pupils are accessible due to their grouping.

The pick of the prevalence is encountered in this age group and on its report published in 1998 and renewed by.[10,11]

WHO suggests that data collected amongst pupils going to schools generally represent the situation in the community. Thus the target population to be investigated should be amongst primary school children.

Investigation of pupils

The necessary authorization for conducting the investigation were requested and obtained from the responsible institution, after haven studied our project which was clearly formulated. This longitudinal and prospective work was carried out on 333 pupils of both sexes. The conditions of acceptance included those aged 4 to 17 and who were registered in primary school. Data collection is a necessary step which accounts for quality of the results. The day of sample collection, nominative calling of names was done and each of the candidates gave his or her age mentioned on the investigation sheet. Then each candidate received an identification number and a sterilized and well closed jar. The labelled jars received after collection of urine were put in an icebox and immediately transported to the laboratory of the faculty of human health sciences of N'Djamena for examinations.

Parasitological examination of urine

Two analytical techniques were used during study. Macroscopic examination of urine and examination of urine after centrifugation.

Macroscopic examination

During our research, urine samples were examined:
Clearing urine (urine with normal aspect, translucent); cloudy urine (urine with abnormal aspect, not translucent but with clots or suspended elements) and urine that is past ally blood with stones (abnormal urine, not translucent and has red color).[12]

Microscopic examination

Microscopic examination permits the detection of egg of *schistosoma haematobium* (terminal poon eggs).

This analysis consists in the centrifugation of urine and the elimination of supernatant. The urine pellet obtained is placed on a microscope slide with the corresponding number of the candidate (corresponding number with the jar of the urine), covered with a coverslip. This preparation is read with the objective of X10 thereafter with the objective of X10 in order to better observe the parasitic contrast.[13]

Data analysis

Data analysis and processing was done using the following software: SPSS 18.1 which permits to compare the frequencies by the CHI² (χ^2) test and sometimes with correction with yoks a significant threshold P fixed at 0.05.[14]

RESULTS AND DISCUSSIONS

During our study 333 pupils were registered in three primary schools in the city of N'Djamena. We discovered that 88 of the pupils were carriers of trematode eggs of *Schistosoma haematobium* or 26.4% (table 1).

Table 1: Pupils *S. haematobium* infestation rate by gender.

Sex	n (%)	n'(%)	P value
Masculine	*210 (63,1)*	69 (32,8)	0,0005
Feminine	123 (36,9)	19 (15,4)	
Total	**333 (100)**	**88 (26,4)**	

Legend: n= number of pupils examined; n': number of pupils carrying at least one egg of *S.haematobium*.; (%)= percentage

This result confirms the presence of uro-genital bilharzia in the city of N'Djamena. This place the city of N'Djamena as the average endemic zone.[15,16,17,18,19] Our result is superior to that of Ndir,[20] who obtained a prevalence of 15%. Contrary, it is inferior to those of Seck *et al*[21] who obtained 30.2% and of Senghor[22] who reported 57.6%. This differences seem to be essentially do to the technics of analysis. Also on the condition of environmental hygiene, climatic, economic and the educative statue of subjects studied. Indeed, we used the method of centrifugation meanwhile other authors used our method and also that of filtration. The prevalence of the infestation of *S. haematobium* is higher ($P<0.05$) in boys than in girls or either 32.8% versus 15.4%. The male predominance is also reported in the literature by Senghor,[22] and Akiana.[23] Frequently boys are infested more than girls because in Chad and Sahelian countries cultural education given to boys is quite different from that given to girls. For examples, during the day the girls

remain with their mothers doing domestic work while the boys are either taking care of cattle in the field, playing out in the playground or middy area. During these activities the risk of parasitic contamination are higher.[24] Hence boys undertake various activities that being them in contact with stagnant water or rivers. In our research, boys wash themselves with stagnant water or rivers than girls because during recreation, girls do not play as much as boys. Moreover, after school, most of the girls return to their homes while many boys go playing. It was also noted that a majority of girls wash themselves with fountain water contrary to boys.

We observed that ages ranging from 9 to 11 were the most infested with *S.haematobium* (36.8%) followed by 15 to 17 years or 25% (table 2). Our result is different from that of Senghor[22] who reported that children from 13 to 15 years were the most infected or either 67.7% followed by 10 to 12 years (64.4%). The predominance of *S.haematobium* infestation within ages of 9 to 11 (Table 2) can be explained by their frequent bathing in stagnant water and dirty streams. Children less than 7 years are always under parental care and do not get into contact with dirty water. All the pupils declared having an hematuria were carriers of the eggs of *S.haematobium* (P<0.05). Thus, we can deduce that the zone with high risk of endemicity is Eastern Diguel where the prevalence is more than 50%. Urinary bilharzia should be suspected on any child who hematuria.

Table 2: Pupils *S.haematobium* infestation rate by age group (year).

Age group (year)	n (%)	n'(%)	P value
6-8	28 (8,5)	6 (21,4)	0,13
9-11	76 (22,8)	28 (36,8)	
10-14	165 (49,5)	38 (23)	
15-17	64 (19,2)	16 (25)	
Total	**333 (100)**	**88 (26,4)**	

Legend: n= number of pupils examined; n': number of pupils carrying at least one egg of *S.haematobium*.; (%)= percentage

Abdominal pains and heat burns while urinating are also symptoms declare by the children (P>0.05). All urine with bloody aspect are carriers of eggs of *S.haematobium* or either 100%, followed by turbid urine 34.8% and finally using with clear aspect 15% (P<0.05%). As in the literature, bloody urine remains the principal clinical symptom[25,26,27,28,29] of urinary bilharzia. If there is urine with a turbid or bloody aspect from pupils schooling within an endemic zone, we may suggest an infection with urinary bilharzia (table 3).

Table 3: Rate of infestation by *S. haematobium* of pupils according to symptoms.

Symptoms	n (%)	n'(%)	P value
Hematuria	24 (7,2)	24 (100)	1,16
Abdominal pains	68 (14,7)	2 (2,9)	
Urination Burns	49 (20,5)	4 (8,1)	
Asymptomatic	192 (57,6)	58 (30,2)	
Total	**333 (100)**	**88 (26,4)**	

Legend: n= number of pupils examined; n': number of pupils carrying at least one egg of *S.haematobium*.; (%)= percentage

During our research, no school was found to be free from urinary bilharzia (table 4).

Table 4: Rate of infestation by *S. haematobium* of pupils school.

School	n (%)	n' (%)	P value
Eastern Diguel	121 (36,3)	66 (54,5)	1,6
Boutalbagara	109 (32,7)	12 (11)	
Farcha	103(31)	10 (9,7)	
Total	**333 (100)**	**88 (26,4)**	

Legend: n= number of pupils examined; n': number of pupils carrying at least one egg of *S.haematobium*.; (%)= percentage

The different rates of infestations in the different study sites allowed us to classify following the standard of WHO.[15,16,17,18,19] Thus the different schools have three levels of endemicities. Eastern Diguel with a prevalence of 54.5% is in the highest endemic zone. During the rainy season the quarter is always flooded. The presence of swarms of water around schools in this quarter persist until the end of dry season, the wet swampy areas favor the development of mollusks the intermediate hosts for bilharzia. The school of Boutalbagara which has an infestation rate of 11% is in a zone with a moderate endemicity. This can be explained by the reason that the area of the school is flat. Rains that fall dry quickly. Hence pupils of the school do not frequently get in contact with stagnant water. Finally, the school of Farcha is classified as a low endemic zone, 9.7% infestation.One year before our research, the school of Farcha benefited from medication distributed to pupils. Anthelmintic medication notably praziquentel was given to the pupils of the school. The school is equally situated on a flat terrain. The pupils do not get in contact with swampy water but with river Logone. The low endemicity can be due to the fast current of the river that slows the penetration of cercaires as compared to swampy water.[30]

Following table 5, the presence of blood in urine is the main indicator of urinary *S. haematobium* in children but other macroscopic aspects do not exclude the presence of eggs of *S. haematobium* in urines. (15.20%). Similar studies have confirmed this result; however macroscopic aspects may be considered as good sign for the collective

diagnosis of urinary *S. haematobium* in school milieu.[31] Contrary, this is different for student and parents.

Table 5: Infestation rate by *S. haematobium* in pupils according to the macroscopic aspect of urine.

Macroscopic aspect	n (%)	n' (%)	P value
Clear	*223 (67)*	34 (15,2)	4,9
Turbid	86 (7,2)	30 (34,8)	
Hematic	24 (25,8)	24 (100)	
Total	**333 (100)**	**88 (26,4)**	

Legend: n= number of pupils examined; n': number of pupils carrying at least one egg of *S.haematobium*.; (%)= percentage

According to studies carried out in West Africa, 88.17% of students and 99.4% of parents consider urine with blood as a problem do to veneral disease. In Nigeria a third of 230 students investigated think that bloody urine is caused by veneral disease.[32]

CONCLUSION

All the end of the research carried out within the primary school milieu, urinary bilharzia has a prevalence of 26.4%. This prevalence places the city of N'Djamena in the zone of medium risk of endemicity. No school within the study zone is save from urogenital bilharzia. It is really a public health problem. Even though it is well known that the intermediate host of the parasite is Biomphlaria but it is essential for research to be done to determine the real species responsible for infections in N'Djamena. Clinical studies should also be undertaken to determine the destructive nature of lesions caused by the eggs on the pupils. The diagnosis of cancer related urogenital bilharzia on adults should be carried out in N'Djamena. Finally, the creation of a programme to fight against NTD is necessary in Chad.

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