Some social determinants of urinary schistosomiasis in Northern Cameroon : implications for schistosomiasis control

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SUMMARY

The present study was designed to assess the perceptions of hematuria, the most conspicuous sign of urinary schistosomiasis, in selected communities of the sudano-sahelian zone of Cameroon. Study questionnaires related to knowledge, beliefs and stigma associated with hematuria were administered to 964 pupils from 15 randomly selected schools. In order to ascertain children perceptions, we interviewed 143 adults living less than 2 kilometers from the target school. School children provided urine samples that were examined using the dip stick and sedimentation methods. Exposure to sun was the most reported cause of hematuria (53% adult and 62% children respondents), followed by drinking of dirty water (18% adults and 41% children). Only 15% of adult and 26% school children could relate hematuria to wading, a common means of exposure to urinary schistosomiasis. More than half of the school children stated that hematuria was a sign of disease (56%). Few pupils perceived hematuria to be a sign of strength (6%), while others related it to puberty (30%). Most pupils (80%) reported that hematuria was preventable while others (20%) ascribed it to witchcraft. Pupils reported that hematuria could be cured in the hospital (65%), by the traditional healer (21%), or by reading Holy Scriptures (14%). Some respondents (35% of adult, and 40% of school children) stated that it was shameful to have blood in urine. Almost half of the adult respondents and 26% of the school children reported that hematuria was contagious. Boys and girls had similar levels of oviuria (OR=0.79 p>0.05), but boys were 4 times more likely to report hematuria (OR=3.62, p<0.001). There was a poor understanding of the means of exposure, transmission and treatment of hematuria. Some aspects of the perceptions of hematuria reported herein corroborate with previous studies carried out in Cameroon, Niger, Ghana, Kenya and Tanzania. They should be considered, together with other socioeconomic and cultural determinants in the design of educational messages applicable to the study region.

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Introduction

Schistosomiasis is a parasitic disease affecting 200 millions people in tropical and subtropical countries. The disease is estimated to be responsible for the loss of 1,5 million disability adjusted life years [1]. Urinary schistosomiasis can lead to iron deficiency, anaemia, protein-energy malnutrition, and reduced mental and physiological performance [2].

Control measures against schistosomiasis include chemotherapy, environmental sanitation and health education [3]. Disease control interventions are most effective when they are built upon lay knowledge and perceptions. Disease perceptions are imbeded in the common knowledge, meanings, traditions, and influenced by family members and peers [4]. Lay knowledge has received some attention within the social science community, but has not been emphasized among public health scientists [5].

Information and perceived seriousness of the disease can be the basis for treatment seeking decision making and community participation in interventions [6-7]. The importance of integrating local perceptions in disease control interventions has been repeatedly stressed, but few experiences have succeeded in integrating socio-cultural and economic framework to promote awareness and prevention [8,9]. In Egypt, the adoption of a method of collecting stool samples that was gender-sensitive led to increased participation in diagnosis and treatment of *S. mansoni* [10]. Adequate health education tools were developed based on results of focus group discussions, which revealed that preschool children water-contacts were related to the mothers' activities, while those of older children, was occupational [11]. The perceptions of hematuria and their implications for schistosomiasis control in endemic communities have received limited attention. The data available are from Nigeria [12], Cameroon [13] and Egypt [14]. In the community-based control of schistosomiasis reported in the Cameroonian study, only two ethnic groups were covered.

The present study was designed to determine the perceptions of hematuria in a wider geographic area of the sudano-sahelian zone of Cameroon, so as to include such informatrion in schistosomiasis control interventions.

Study design and methods

The sudano-sahelian zone of Cameroon has an annual rainfall of 500 - 900 mm. The rainy season extends from June to September. Small ponds and temporary rivers or "mayos" usually disappear a few months after the rains. Rice cultivation and large-scale irrigation are carried out in the Yagoua zone (Logone Plain). The Mokolo zone (Mandara Hills) is characterized by the predominence of hills. In the Kaele and Maroua zone (Diamaré Plain), there are a few dams. Schistosomiasis transmission occurs mainly in small dams and ponds. This area was selected because more than 80% of all cases of schistosomiasis in the country occur there, and the prevalence among school-aged children exceeds 35% (based on urianalysis) [15].

Social Surveys

The study questionnaire with open and close-ended questions was developed and pretested in a Yaoundé neighbourhood (Ecole Publique d'Ekoudou) where the majority of the population originates from the sudano-sahelian region of the country. One of the questionnaires was administered to school children, and the other to adult respondents living less than two kilometers from the selected schools, between April and June 1997. The adults' questionnaire was designed to assess community level perceptions.

In order to reach primary school children, we randomly selected 15 schools. In each selected school, we targeted children aged 9-17 years who could express themselves well in French, corresponding to Grades 5 and 6 (cours moyen I et II) of the francophone educational system. In selected classes, all consenting pupils were included in the study. The sample size was estimated at 960, based on a 35% prevalence of urinary schistosomiasis, a 20% increase to compensate for incomplete responses [16]. The

national ethics committee and local health and school authorities approved the study.

One of the investigators (TI) conducted a group interview of school children of the selected classes. The questionnaires were distributed to all the target pupils. Each pupil was allowed to write his/her name on the questionnaire. The investigator read each of the questions in French and explained their content. The pupils were then given two minutes (or more when necessary) to circle the corresponding item of the close-ended questions or fill in the information required for the open-ended questions. The questions were based on the health belief model [17] and related to the causes, attitudes and beliefs related to hematuria. Key questions were: *what causes somebody to have blood in urine? What do you do when you have blood in your urine?, Do you keep away from friends who have blood in their urine?*

Following the interviews, each participant was given an identification number. Labeled urine preservation vials were thereafter handed to interviewed pupils after the collection procedure had been explained. The pupils were given 30 minutes (or more as necessary) to supply urine samples. Urine collection generally occurred between 11 AM and 3 PM. The fresh urine samples were examined for hematuria (reagent strip) in a field laboratory, using medi-test combi 7. The reagent end of the test strip was dipped into fresh, well mixed, uncentrifuged urine for 40 seconds. Upon removal, the test area was compared with a standard color chart. Readings were made by one of the investigators and rated as negative «-», traces «TR», light «+», moderate «++» or large «+++». The urine samples were then preserved by adding 0.1 g of sodium azide, and transported to our laboratory and examined microscopically using the sedimentation technique. The sample was then left to rest for 30 minutes, the supernatant was then siphoned and the full fresh sediment collected and examined. *Schistosoma haematobium* eggs were identified.

All infected school children were treated with Praziquantel 40 mg per kg body weight at the end of the study.The questionnaires were logged into a computer and analysed using EPI INFO version 6. Frequency tables and descriptive statistics were carried out on each of the study parameters. Key social and behavioural variables were evaluated as determinants of infection using logistic regression models. For that purpose, the variables were transformed into binomial forms when necessary.

Results

The present study involved 143 adult informants and 964 school children from 15 schools in the Kaélé (4), Mokolo (4) and Yagoua (7) areas.

The predominant ethnic groups were the Mafa, Massa, Moudang, Guiziga, Foulbe and Toupouri. Most (56%) adult informants were christian. Others were moslems and animists. Informants were generally married (83%) while few were widowed, single or divorced. Most married informants lived in a monogamous household (56%) and were parents of 1-5 children. Few had more than 10 children. With regard to formal education, almost half of the adult informants (51%) had never attended school. Few had attended primary or secondary school. Most of the school children respondents were boys (61%). The age of the pupils ranged from 10 to 22 years; the mean age was 13.7 years with 78% falling within the 12-15 years age-bracket

Experience of hematuria

Forty five percent of the adult informants reported having a child reporting hematuria. Likewise, 43% of the school children declared that they had blood in urine.

Knowledge of causes of hematuria

Most adult informants (81%) associated blood in urine with bilharziasis, while few school-aged children (9%) did. Hematuria was believed to be caused by exposure to the sun (53% adult and 62% children) and drinking dirty water (18% adults and 41% children). Only 15% of adult and 26% school children respondents could relate hematuria to wading, a common means of exposure to urinary schistosomiasis

Most pupils (79%) believed that having blood in urine was specific to some individuals. School children explained that walking under the sun, having a sexually transmitted infection, reaching puberty, having sexual intercourse,

eating uncleaned food or drinking dirty water caused hematuria. A few pupils and adult respondents stated that the condition could be contracted by crossing over a sick person's urine.

Awareness of the disease

Fifty six percent of the adult respondents stated that they instruct their children to watch their urine for the presence of blood. Some males believed it was the duty of the mother. A 58-year old polygamous man narrated: *"When a child is very young, the mother observes the urine for the presence of blood. When he is old and can play with friends, he takes care of himself. I only intervene when the situation is critical."*

More than half of the school children stated that hematuria was a sign of disease (56%), or that individuals with hematuria were weak (33%). Few pupils perceived hematuria to be a sign of strength (6%). Some children associated blood in urine with puberty (30%).

Knowledge of the prevention of hematuria

Most pupils (80%) reported that hematuria was preventable while others (20%) ascribed it to witchcraft or providence. Respondents who reported that hematuria was avoidable (35%) said it could be done by avoiding contact with sick persons (13%), avoiding sexual intercourse (13%), taking drugs (35%), not eating unripe fruits, not drinking dirty water, not walking under the sun, or not crossing a sick person's urine. Avoiding baths in dirty water as a preventive measure against hematuria was mentioned by 23% of the school children respondents.

Treatment of hematuria

Most pupils (87%) reported that hematuria can be cured (Table 1). When asked what would be done if they have blood in urine, 65% of the children reported that they would be taken to the hospital, while 21% would consult the traditional healer[1]. Others stated that no treatment could be given because the disease was believed to originate from providence. Or that is *"it would go away by itself"*. Others believed it could be cured by reading Holy scriptures (14%), taking traditional medicines (10%), or wearing *"gris gris*[2]*"*.

Attitude towards hematuria

Most pupils (86%) reported that they watch their urine during urination. This was done to find out if there was blood and for curiosity. Some reported that they only look at their urine if they have pain while urinating. Others (10%) did not look because it is "...a dirty thing to do". Some adults (35%) and school children (40%) stated that it was shameful to have blood in urine. Forty six percent of the adult respondents (46%) and 26% of the school children were in favour of keeping away from people who have blood in urine. They explained that the disease was contagious.

Adult who reported not instructing their children to keep away from friends with hematuria explained that it was difficult to prevent children from playing with their peers. An adult informant in the Kaélé area narrated: *"It is hard to control young children. They will always get into contact with their sick friends to play with them (....) and get sick."* Most of the adult informants (97%) declared that they would be worried if a child were passing blood in urine. None of the adult respondents expressed happiness about the condition (**Table 2).** Respondents who were worried explained that having blood in urine was a sign of disease and an indication that something dangerous was going to happen to the child. Those who said

[1] Traditional healing involves diagnosing and treating diseases thought to be caused by witchcraft or the neglect of traditional obligations to ancestors. Traditional healers use potions, decoctions, herbs to cure illnesses.

[2] "Gris gis" are small tags which are put around the waist, neck, ankle or wrist, ... and which are considered to protect the carrier from evil spirits.

they would remain undisturbed justified that it is a condition, which heals by itself with age. Some children explained that they would not keep away from their friend with hematuria because of compassion, sympathy, or resignation. One respondent reported «*the illness is common and almost everybody has it*».

Interactions between perception and infection

There was a strong relationship between history of hematuria, self-reported hematuria and sex (Chi-square>65.80, p<0.001) The prevalence rate of oviuria did not differ significantly between sexes (OR=0.78, p=0.09), but boys were almost four times more likely to report blood in urine than girls (OR=3.62, p<0.001) **(Table 3)**. Moslems were less likely to report hematuria than respondents of other religious denominations. None of the other perception variables showed a significant correlation with infection **(Table 3)**.

Table 1 : Knowledge of the prevention of hematuria among school children and adults in the sudano-sahelian Cameroon (Mokolo, Maroua and Yagoua zones)

Variables	School children n (%)	Adults n (%)
Is Hematuria preventable?		
Yes	763 (79.2)	91 (63)
No	188 (19.5)	48 (33)
No response	13 (1.3)	4 (1)
Hematuria can be prevented by...		
Taking drugs	549 (35.2)	ND
Avoiding baths in water	360 (23.0)	ND
Avoiding contact with sick persons	210 (13.4)	ND
Avoiding sexual intercourse	154 (9.8)	ND
Being clean	218 (14.0)	ND
Others	30 (2.0)	ND
Don't know	32 (2.0)	ND
No response	8 (0.6)	ND
Do you look at your urine?		
Yes	834 (86.5)	82 (57)
No	121 (12.5)	65 (43)
No response	9 (1.0)	ND
Can a person with hematuria be treated?		
Yes	739 (87.0)	91 (63)
No	56 (5.8)	48 (33)
Don't know	47 (4.8)	ND
No response	22 (2.4)	4 (1)
Hematuria can be cured by...		
Taking traditional herbs	282 (16.4)	53 (37)
Putting on "gris gris"	121 (7.0)	ND
Going to the hospital	879 (51.1)	132 (92)
Going to the "marabout"	172 (10.0)	2 (1)
Reading the Koran/Bible	243 (14.1)	1 (1)
No response	22 (1.4)	ND

ND = Not Done

Because of multiple responses, some frequencies add up to more than 964

Table 2 : Stigma associated with hematuria among school children and adults in sudano-sahelian Cameroon (Mokolo, Maroua and Yagoua zones

Variables	School children n (%)	Adults n(%)
Is it shameful to have hematuria?		
Yes	381 (39.5)	50 (35)
No	505 (52.4)	92 (64)
No response	78 (8.1)	1 (1)
Should one keep away from a friend with hematuria?		
Yes	447 (46.5)	37 (26)
No	499 (51.7)	106 (74)
No response	18 (1.8)	--
Stigmatization of persons with hematuria		
Having attained sexual maturity	314 (30.2)	ND
Girls have their menses	356 (34.2)	ND
Others	48 (4.6)	ND
None	203 (19.5)	ND
No response	120 (11.5)	ND

- ND = Not Done

Table 3: Summary of logistic regression model parameter estimates by sex with infection as dependent variable (*)

	All	Male (%)	Female (%)	Chi-square (pvalue)	OR (CI)
History of hematuria	536 (56.3%)	263 (45.3%)	273 (73.5%)	73.29 (<0.001)	3.36 (2.5<OR<4.51)
Self-reported hematuria	363 (39.5%)	196 (80.3%)	47 (19.3%)	24.12 (<0.001)	3.62 (2.5<OR<50.2)
Microhematuria	547 (56.7%)	346 (63.3%)	201(36.7%)	2.47 (0.11)	0.81 (0.6<OR<1.0)
Oviuria	385 (40.0%)	267 (45.3%)	118 (31.4%)	2.73 (0.09)	0.78 (0.59<OR<1.03)

Discussion

Hematuria is widely known in the study area. Each ethnic group has a name for the condition,"chile iam" in Fufuldé [3], "hlaouwi zoumoura" in Massa, "touch tchi" in Toupouri, "houwaïkou gaïni feldi" in Mousgoum... all meaning "bloody urine" or "red urine". The knowledge that sun rays cause hematuria was widespread. This is depicted in its local names "Kourpass" for the Mafa, "tchile nange" for the Foulbé, all meaning "urine of the sun" [18].

The association of hematuria with the consumption of uncleaned fruits, poor hygiene by Mafa and Massa people confirms earlier studies in the Moudang and Toupouri communities [19]. A comprehensive study of major ethnic groups should be undertaken, so that the health education tool kit currently in use can be adapted to the region.

Reports that hematuria comes with puberty tallies with previous findings in Niger [20], Ghana [21] Kenya [22], Senegal [23] and Cameroon [24] where people related hematuria to exposure to sunlight and sexual intercourse. Such beliefs led to the dismissal of medical treatment in hospital [9]. In the Senegalese study, its early appearance was an envied sign of a long reproductive life.

Few authors have stressed the contribution of the study of local perceptions on schistosomiasis control interventions. Following the study of water-contact patterns, activities that required behavioural modification were identified and used as components of a schistosomiasis control intervention in Nigeria [25]. Knowledge, attitudes and practices studies in Kaélé division (Northern Cameroon) were used to design health education messages that were adapted to the "symptoms" and transmission" seasons [13]. The fact that some pupils related blood in urine to puberty and a sign of strength could have a cultural basis. In some festivities such as the "soro[4]", pleasure is taken to exhibit painlessness of bleeding in some ethnic groups. It is interpreted as bravery and resistance, which are status models [26]. The perceived sexual transmission of hematuria reported in the present study corroborates with earlier investigations in Nigeria where married women resorted to not consulting a physician for fear of being expelled by their husbands for unfaithfulness [9].

The belief that hematuria was due to drinking dirty water is consistent with studies in Zimbabwe [27], Cameroon [19,24], and Kenya [28]. The consumption of oily foods as a cause of hematuria reported by some of our respondents are in line with earlier studies in Kenya [28] and Ghana [21]. The occurrence of similar beliefs in a wide range of countries and regions denote a common basis of perceptions, and the amenability to some common basis to health education, despite inevitable ethnic and cultural differences. Few pupils (23%) recognized that hematuria could result from wading in surface water. There is a need to develop intervention messages that could emphasize that wading in the major means of exposure to urinary schistosomiasis.

The knowledge that hematuria is contagious was widespread (50% children respondents) and this justified why people believed that children should keep away from those with hematuria. Some of the respondents who would not isolate their friends explained that they would not do so because " (...) the *disease is too common (...)".* This attitude indicates that the proportion of stigmatized children could be greater. This may explain why some chlidren would not report hematuria. As this behaviour may have implications on the indirect diagnosis and treatment, it should be considered in schistosomiasis control interventions.

The stigmatization of the child with hematuria may add a social dysfunctional dimension to the biological disease, pain and

[3] Fufuldé is common language, spoken by most ethnic groups in northern Cameroon.

[4] Annual ceremony of adolescents during which male peers challenge each other and meet female sexual partners

suffering because of the ensueing ruined reputation [29] that is in keeping with his disvalued role of disease transmitter. These attributes affect social interactions with peers, school attendance [30], performance and educational achievement [31]. The burden of hematuria may be greater in urban areas where the prevalence of the disease is expected to be low. The few infected children would therefore be stigmatized. These issues should be investigated.

The fact that most adult informants but few school children reported hematuria as a sign of disease indicates the potential role of interpersonal communication in the study area. Such communication channels are known to be weak in communities of low socio economic status [20].

Few authors have used knowledge-based data to strengthen the health education components of schistosomiasis control programmes. Knowledge, attitudes, practices and beliefs (KAPB) data were used to foster the sustenance of control efforts after *S. mansoni* had replaced *S.* haematobium in an Egyptian transmission site [32]. An emphasis was put on the perception of risk to improve on the keeping of preventive guidelines in some endemic communities in Malawi [7]. Observational data were used to develop health education approaches targeting school children in Nigeria [12]. The sexual bias in favor of boys reporting hematuria more frequently than girls corroborate reports from Cameroon, Democratic Republic of Congo and Malawi. [33-34]. This may be related to the fact that girls kneel down to urinate while boys do not. This may be further strengthened by the fact that moslems were less likely to report blood in urine than christians.

We advocate a multi-disciplinary approach to the control of schistosomiasis using local perceptions to develop health education messages. Such an intervention can be sustained by introducing a health guide in the primary school curriculum, beside other community based measures. In such a venture, perceptions should be assessed in major ethnic groups.

Conclusion

Hematuria is a well-known sign in the study area. School children believed that hematuria was acquired by walking under the sun, drinking dirty water or on reaching puberty. Most study participant's thought that blood in urine was abnormal, and a sign of disease. The belief that hematuria was contagious was widespread. The stigmatization of the child with hematuria could reduce school attendance, performance, and reputation. There is a need to design and implement schistosomiasis control interventions that integrate local perceptions.

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