Original Article

Knowledge, attitudes, perceptions, and practices regarding cutaneous larva migrans in deprived communities in Manaus, Brazil

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Abstract

Introduction: Hookworm-related cutaneous larva migrans (HrCLM) is a neglected parasitic skin disease commonly found in resource-poor communities in tropical countries. It is acquired via skin contact with faeces of cats and dogs, and causes intense pruritus and significant morbidity.

Methodology: We investigated knowledge, attitudes and practices in caregivers of patients with HrCLM by performing focus group discussions (FGDs) with 20 mothers of children with HrCLM in two endemic urban communities in Manaus, Brazil. Additionally, socio-demographic data of 70 actively detected HrCLM patients in both areas were obtained by using questionnaires.

Results: We found that mainly children who lived in large households and habitually walked barefoot were affected. Family income was low, housing was poor, and food shortage common. In the FGDs, mothers described HrCLM as a severely distressing condition with considerable impact on individual and family life.

Conclusion: Inadequate treatment practices and the identification of poverty-related obstacles for practical prevention of HrCLM by the mothers of affected children indicate that both health education and improvement of living conditions are required jointly.

Key words: cutaneous larva migrans; focus group discussions; KAP study; neglected disease; poverty; Brazil

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Introduction

Hookworm-related cutaneous larva migrans (HrCLM) is a neglected poverty-associated ectoparasitic disease caused by the migration of larvae of animal hookworms, such as *Ancylostoma braziliense*, *Ancylostoma caninum*, or *Uncinaria stenocephala*, in human skin [1,2]. In South America, backyards, streets, public parks and playgrounds are frequently contaminated with faeces of cats and dogs containing hookworm eggs [3-5], especially in resource-poor communities [6,7]. Unfortunately, knowledge about the epidemiology of HrCLM in different countries is poor as most studies focus on manifestations in travellers rather than on the prevalence in endemic communities.

Studies from Brazil show that HrCLM is an important public health problem in resource-poor neighbourhoods, where prevalences of up to 4% in the general population and up to 15% in children were reported [8-10]. However, another study in an endemic area in Brazil showed that HrCLM is neglected by both the population and physicians [11].

Although by definition a self-limiting disease, HrCLM is an extremely irritating condition: the hookworm larvae migrate in the epidermis for up to several months and cause intense itching. The persistent itching leads to alterations of mood and to sleeplessness [1,10,12]. Additionally, HrCLM skin lesions are frequently superinfected as a result of excoriation due to repetitive scratching [10]. Similar to other parasitic skin diseases, HrCLM is difficult to hide and therefore potentially stigmatizing [13,14].

Studies about knowledge, attitudes and practices (KAP) regarding HrCLM in an endemic community have never been published, although this information is essential for planning public health interventions. Therefore, our study aims at investigating KAP regarding this ectoparasitosis in an endemic neighbourhood. Furthermore, owed to the association of parasitic skin diseases with poverty, it depicts the social context by providing socio-demographic data of

HrCLM patients from the same community. Thus we aspire to contribute to a further understanding of the health-related effects of poverty.

Methodology

Study design and study area

The study combines qualitative and quantitative methods. In a first step, we used a standardized questionnaire in Portuguese language to collect socio-demographic data and information on previous HrCLM episodes from HrCLM patients. In cases of minors, the questionnaire was answered by or with the help of a caretaker, usually the mother of the patient. In a second step, two focus group discussions (FGDs) were performed with mothers of patients identified by active case detection. The centre of attention lies in the qualitative FGDs, while the quantitative data serve as a supplement to describe the sociodemographic background of the patients and to provide some information about previous HrCLM infestations.

The investigation took place in Bairro da União (Area 1) and Nova Vitória (Area 2), two impoverished neighbourhoods in Manaus, a city of 1.7 million inhabitants. Both study areas were inhabited by approximately 1,000 persons. There was no public sewage system, garbage was dispersed on the footpaths and around the houses, and hygienic conditions were precarious. Innumerable dogs and cats strayed in both areas, that regularly became inundated with heavy rain. Area 1 was situated alongside an *igarapé* (small affluent of the Amazonas River) and the inhabitants had access to basic medical care in a small health station (*casinha de saúde*) nearby, whereas this was not the case for Area 2.

As part of a larger study on the epidemiology and control of HrCLM in Manaus, 70 patients were identified in the two localities (37 in Area 1, and 33 in Area 2) during a period of eight months (November 2008 to January 2009 in Area 1; February to May 2009 in Area 2). Active case detection in both neighbourhoods was performed with the help of local community leaders and paramedical health workers (*agentes comunitários de saúde*). Patients were examined at their homes in a room where privacy was guaranteed. Following the method of Heukelbach and Feldmeier [1], HrCLM was diagnosed when a characteristic elevated linear or serpiginous lesion was present. After diagnosis, patients were treated according to national guidelines with a single dose of oral ivermectin or, when under five years of age or pregnant, with topical thiabendazole.

The study was approved by the Ethics Committee of the Foundation of Tropical Medicine of Amazonas (FMTAM) in Manaus, Brazil. Before physical examination and collection of data, the study aims and methods were explained, and all study participants or, in cases of minors their legal caretakers, gave informed written consent. All were literate. It was made clear that they were free to refuse participation at any point of the study.

Focus group discussions

Based on the facts that in Brazil HrCLM predominantly affects children [9] and that in the study area usually the mothers were in charge of child care, we performed the FGDs with mothers of children with HrCLM. Inclusion criteria were residency in Area 1 or Area 2, and having at least one child diagnosed with HrCLM in the previous four months.

The mothers of all 70 patients included in the questionnaire survey were invited to participate in the FGDs. The invitation was made in written form by the physician who had diagnosed and treated the child. Health workers from the local health facility were not involved in the recruitment of FGD participants in order to prevent pressure on the mothers. The two FGDs were performed in public meeting rooms located within the boundaries of the community. At the beginning, the study aims and procedures were explained to the participants. The moderator (HL) had experience with FGDs in similar settings. The commonly used local name for HrCLM was "*mija-cão*", meaning "dog pee" or "devil pee".

During the sessions, the moderator posed simple, open-ended questions:

- *What are your experiences with "mija-cão"?*
- *What do you know about "mija-cão"?*
- *What do you do when your child has "mija-cão"?*

When the discussions became repetitive or less motivated, more precise questions were asked following a rough topic guide in the sense of "question flow from general to specific" [15]. During the FGDs, a second researcher (AS) noted observations of group dynamics. The discussions lasted 90 minutes (Area 1) and 65 minutes (Area 2). They were audiotaped and transcribed verbatim.

Data analysis

For data analysis of the FGDs, we used the method of qualitative content analysis as described by Mayring [16]. Repetitive statements and empty

phrases were excluded (reduction), diffuse, ambiguous or contradictory parts of the text were clarified (explication), and statements were organized in textual categories (structuring). The structuring was performed independently by two investigators (HL and AS) since this strengthens the validity [17], and the two categorization schemes were then united to a single system. Finally, the statements of each category were summarized, and example quotations were chosen and translated into English.

Statistical analysis of data from the questionnaire survey was performed by using SPSS for Windows, vs. 15.0 (IBM, SPSS, Chicago, USA). The SPSS database was checked twice for entry-related errors. To compare the characteristics of the two communities we used the Mann-Whitney U-Test for ordinal variables and Fisher's Test for categorical variables.

Results

Quantitative description

Socio-demographic data and information on the infectious status of the 70 HrCLM patients participating in the questionnaire survey are summarized in Table 1. The patients' average family income of 542 Brazilian Reais per month corresponded to 165 Euros (exchange rate from 31/12/2008) and was just above 480 Reais, the official minimum wage in Brazil for a full-time job at that time. This amount of money was used for an average household size of five. About one third of the respondents testified that they did not always have enough to eat.

Because Area 2 was an illegal settlement (*invasão*) where no health post (*casinha de saúde*) was implemented, 91% of the respondents in this community had never been visited by a health agent. Most interviewees had suffered from HrCLM before; among those over four years of age, previous episodes of the ectoparasitosis were reported in 38 out of 53 cases (71.7%). In 25% of the patients, treatment of the previous HrCLM manifestations had been recommended by health personnel or in a pharmacy, but none of the professional advisors had suggested an adequate anthelminthic drug.

In Area 2 the HrCLM patients were significantly younger ($p < 0.001$), the floor of the houses was more often made out of concrete or tiles ($p < 0.001$), the households had less contact with health agents ($p < 0.001$), and household income was marginally significantly lower ($p = 0.05$) than in Area 1 (see Table 1; p-values not shown). However, despite these differences most variables were similar in the patients from the two communities.

Focus group discussions

Twenty mothers participated in the FGDs: ten from Area 1 (labeled M 1-10) and ten from Area 2 (M 11-20). The participants' age and number of children were similar in both groups: median age = 29 years (interquartile range [IQR] = 28-31.5; range 25-39) and median number of children = 3 (IQR = 2-3; range 2-4) in Area 1 versus median age of 29.5 years (IQR = 20-37.5; range 19-51) and median number of children = 3 (IQR = 2-4; range 1-6) in Area 2.

In general, HrCLM was perceived as a debilitating condition, and not as a mere nuisance. The participants were eager to learn more about the disease and appropriate treatment. The mothers of both communities made very similar statements.

Causes

The infectious agent was described as "*um micróbio que anda na pele das crianças*" ("a microbe walking in the childrens' skin"). Several times the mothers referred to HrCLM as "*micose*", literally "mycosis", in the sense of "itchy skin disease".

Soil contaminated with cat or dog urine and faeces was seen as the main source of HrCLM, but rats and polluted water were also mentioned as causes. The participants in Area 1 expressed their disgust about the dirty, waste-carrying water from the *igarapé* that regularly flooded the community during the rainy season and dispersed sewage on the footpaths and near the houses.

> *[…] when you turn into our street, it seems like entering the sewers.*
> - (M 6, 29 years, four children)

In both communities, children were believed to become infested when walking barefoot in the muddy streets, playing football, and throwing sand at each other. Some mothers considered HrCLM to be transmitted by physical contact or shared clothes.

> *[…] When we scratch them, it stays underneath the fingernails, and then it will be passed to another body region, it is very dangerous.*
> - (M 1, 32 years, three children)

Table 1. Socio-demographic characteristics of 70 HrCLM-affected individuals and information about previous infestations

		Area 1	Area 2	Total
Number of patients		37	33	70
Sex	male	26 (70.3%)	20 (60.6%)	46 (65.7%)
	female	11 (29.7%)	13 (39.4%)	24 (34.3%)
Age (in years)	< 5	2 (5.4%)	12 (36.4%)	14 (20.0%)
	5-9	18 (48.6%)	14 (42.4%)	32 (45.7%)
	10-14	14 (37.8%)	4 (12.1%)	18 (25.7%)
	> 14	3 (8.1%)	3 (9.0%)	6 (8.6%)
	Median (Range)	9 (2-32)	5 (1-39)	8 (1-39)
Persons per household	less than 5	9 (24.3%)	11 (33.3%)	20 (28.6%)
	5-8	28 (75.7%)	19 (57.6%)	47 (67.1%)
	9 or more	0	3 (0.9%)	3 (4.3%)
	Median (Range)	6 (3-8)	5 (3-17)	5 (3-17)
Household income per month (R$)	< 480	10 (28.6%)	14 (46.7%)	24 (34.3%)
	480	10 (28.6%)	6 (20.0%)	16 (22.9%)
	> 480	15 (42.9%)	10 (33.3%)	25 (35.7%)
	Medium (Range)	630 (150-1200)	439 (0-960)	542 (0-1200)
	no information	2	3	5
House constructed of	Wood	26 (70.3%)	24 (72.7%)	50 (71.4%)
	Bricks	11 (29.7%)	8 (24.2%)	19 (27.1%)
	Recycled material	0	1 (3.0%)	1 (1.4%)
Floor made of	Concrete/Tiles	13 (35.1%)	26 (78.8%)	39 (55.7%)
	Wood	18 (48.6%)	2 (6.1%)	20 (28.6%)
	Sand/Earth	6 (16.2%)	5 (15.2%)	11 (15.7%)
Street	unpaved	32 (86.5%)	28 (84.4%)	60 (85.7%)
	paved	5 (13.5%)	5 (15.2%)	10 (14.3%)
Household is visited by health agent	Never	13 (35.1%)	30 (90.9%)	43 (61.4%)
	Rarely	19 (51.4%)	2 (6.1%)	21 (30%)
	Frequently	5 (13.5%)	1 (3.0%)	6 (8.6%)
Patient has always enough to eat	Yes	23 (67.6%)	20 (66.6%)	43 (67.2%)
	No	11 (32.4%)	10 (33.3%)	21 (32.8%)
	No information	3	3	6
Patient experienced HrCLM previously	Yes	22 (62.9%)	20 (60.6%)	42 (62.7%)
	No	13 (37.1%)	12 (37.5%)	25 (37.3%)
	No information	2	1	3
Previous treatment attempts using/ based on	None	14 (37.8%)	7 (22.6%)	21 (30.9%)
	Leftover drugs	13 (35.1%)	8 (25.8%)	21 (30.9%)
	Professional advice*	8 (21.6%)	9 (29.0%)	17 (25.0%)
	Homemade product	2 (5.4%)	7 (22.6%)	9 (13.2%)
	No information	0	2	2

*from health post or pharmacy

Symptoms

Severe itching was described as the main symptom of HrCLM, making the children suffer and their mothers feel helpless.

> *My children can't bear the itching, it drives them crazy!*
> - (M 13, 51 years, six children)

> *I really don't know what to do any more.*
> - (M 14, 33 years, three children)

The participants noted that the itching caused sleep disturbances in their children.

> *Mine only scratches himself at night, during the day it's no problem, but at night the boy doesn't sleep and doesn't let me sleep either.*
> - (M 12, 25 years, four children)

Lesions were portrayed as little *caminhos* ("trails") that kept growing and were especially itchy in the head region of the track. Mothers underlined that scratching caused wounds, sometimes deep and bleeding. Some mothers reported the development of blisters. Secondary bacterial infections of the lesions, leading to pustules, purulent discharge, pain and fever, were also described. After healing, the women deplored post-inflammatory depigmentation as "white, ugly marks".

Hands, feet, legs, and back were named as the main topographic localizations of HrCLM, but buttocks, genitals, abdomen, and the head were also mentioned. Simultaneous infestations on multiple sites were common.

> *It was so ugly! On the legs, on the back and belly, on his buttocks, pure flesh from all this scratching, horrible!*
> - (M 2, 28 years, two children)

Frequency

Some mothers reported that their children repeatedly suffered from CLM.

> *My son has already lost count, he caught it so many times.*
> - (M 17, 50 years, 4 children)

> *[…] Mine hardly ever have none.*
> - (M 1, 32 years, 3 children)

It was claimed that after treatment and wound healing, some children became reinfested as soon as they went back to play outside.

> *He is fine now, but every two or three months it comes back again. When he has contact with sand, when he walks barefoot, it comes back.*
> - (M 13, 51 years, six children)

The occurrence of HrCLM was considered to be highest in the rainy season.

Treatment

A wide range of household remedies and drugs was brought up in the discussion about HrCLM treatment. Most participants had experimented with various creams and ointments. Topical antimycotics ("vaginal cream") were frequently applied on the lesions and natural remedies such as warm vinegar, warm or hot water/ salt water, slices of fried lemon, raw onion, or urine mixed with tobacco were mentioned.

> *I was taught to collect his pee and boil it with tobacco […], then to wash the wound well and rub it dry and then to put it on. He cried and cried, but it helped.*
> - (M 17, 50 years, four children)

In Area 1 the mothers discussed an ointment containing pork fat and sulphur, which was considered to be effective but unpleasantly smelling. Other options mentioned were acetone, talcum, bicarbonate, permanganate, perfume and common antiseptic substances like iodine, alcohol and antibacterial soap. Furthermore, insecticides, namely Lepecid® (Chlorpyrifos) and Baygon® (Propoxur), were sprayed on HrCLM lesions. These were regarded as being effective but unsafe for use in humans.

> *This spray that is used for cattle and pigs, Lepecid, my mother sprayed it on him.*
> - (M 2, 28 years, three children)

> *You used Lepecid? Look, that's dangerous.*
> - (M 1, 32 years, three children)

The application of hot candle wax or ice cubes was also considered as beneficial. Blisters were usually opened with needles or knives, although one mother argued that this may cause skin infections.

> *We do all these stupid things, with the intention of doing good. I opened all the blisters and didn't wash the wound as I should have done, and thus it turned into an infection.*
> - (M 1, 32 years, three children)

In the case of a severe bacterial superinfection, the child had been taken to the health station.

Expenses for medicine were considered an important financial burden for the household.

> *I had great difficulties to pay [the drugs], to bring him to the doctor, I spent a lot of money.*
> - (M 11, 20 years, two children)

Consequences

HrCLM infestation was stated to seriously disturb the children's everyday life. Itching was made responsible for restlessness and concentration problems at home and in school. Sleep disorders affected the whole family and led to conflicts and domestic violence.

> *For me it was difficult because at night he cried a lot, he didn't let me sleep. And for him to sleep I had to slap him a few times.*
> - (M 15, 27 years, two children)

To prevent re-infestation, many mothers prohibited their children to play football, to walk barefoot or even to leave the house at all.

> *My son always plays in the sand. It's a fight with him -- if I let him go outside, the next minute he already is there in that sand. Sometimes I tell him I will chain him up!*
> - (M 18, 29 years, three children)

> *The child's self-esteem goes down, because it feels rejected […]*
> - (M 17, 50 years, four children)

To hide their skin disease, affected children changed their clothing behaviour.

> *[My son] is ashamed; he only goes to school with long trousers, because the children are messing around with him.*
> - (M 4, 39 years, two children)

Some mothers felt stigmatized themselves since others might regard HrCLM as being a sign of maternal neglect. One mother who looked after children of another woman said:

> *[...] and when I went to the home of the [other] mother, she even criticized: you are very careless with the boy, all these wounds, man! I got so angry.*
> (M1, 32 years, 3 children)

Another one added:

> *I don´t listen to that talk. […] Many people criticize: 'What are you doing with your child? It´s all ugly, look at your child´s body!'."*
> - (M 8, 31 years, 3 children)

Discussion

The questionnaire data and the mothers' comments on frequent episodes of HrCLM in the past indicate that this parasitic skin disease is common in the study areas. The fact that patients were mainly children and the mothers' observation of higher prevalence during the rainy season are in accordance with other studies from Brazil [10,12]. Apart from being frequent, HrCLM was considered a severely distressing condition that affects individual and family life.

The symptoms of HrCLM described by the mothers of affected children precisely reflect the scientific description of the disease [10,12]. In addition, the emphasized nocturnal aggravation of pruritus is well-known [1]. Nocturnal itch leads to poor sleeping quality due to shortened deep non-REM phases [18].

Moreover, the strong social impact of HrCLM is displayed in the mothers' concern about stigmatization, school absenteeism, and family conflicts. Correspondingly, we showed in a related study that HrCLM significantly impairs life quality [19]. Stigmatization of patients with skin diseases is known from other ectoparasitoses [13,14,20] and represents a rarely appreciated source of mental harm and distress [21]. Social exclusion of patients might also result from the wrong concept of a person-to-person transmission of HrCLM.

The great variety of treatment practices discussed indicates that none of these was considered satisfactory. Non-specific and potentially hazardous treatment approaches are known from other poverty-related parasitic diseases associated with important morbidity [11,22,23]. The finding that HrCLM was usually treated without professional advice is in

accordance with our previous study in Fortaleza, Brazil, showing that patients with ectoparasitic diseases rarely seek medical assistance [11].

The application of toxic substances such as tobacco and insecticides is a matter of concern since this may result in intoxication [24,25]. Opening blisters and pustules with non-sterile instruments bears the risk of septicemia and tetanus.

In the FGDs, the mothers correctly identified soil contaminated with animal faeces as the source of infestation. They also showed good knowledge about environmental factors such as humid soil, animal excrements, and garbage scattered on the ground. However, rats and animal urine were falsely considered to be responsible for HrCLM. This is not surprising, as animal urine is deposited at the same places as faeces, and rats are an indicator for ample presence of organic waste [26]. In fact, organic garbage attracts dogs and cats and was shown to be a risk factor for geohelminth infections [27]. Interestingly, in our previous KAP study on tungiasis (jigger flea disease), a zoonosis with an animal reservoir similar to that of HrCLM in Brazil, the same environmental factors, namely presence of cat and dog faeces, soil littered with garbage, and rats were described as causes of disease [23]. For both parasitic diseases the local population correctly identified characteristics of poverty as important determinants [28,29]. The observation that HrCLM rarely occurs in more affluent districts of Manaus (S. Talhari, unpublished observation) and the very low income of the households of our patients (average monthly household income in the study participants population = 542 Rs; average in Amazonas State 1914 Rs) corroborate the assumption that HrCLM is a poverty-related disease in urban Brazil. In addition, poverty is reflected by the fact that about one third of the patients had experienced food shortage.

In a setting of deprivation, risk factors of HrCLM such as walking barefoot, dirty streets and helminth-infested stray cats and dogs are difficult to combat as they are symptoms of poverty themselves. Therefore, it is not surprising that the interviewed mothers could not translate their knowledge of the main causes and risk factors of HrCLM into effective prevention.

While health education about HrCLM seems suitable to reduce stigmatization and to promote adequate treatment, prevention measures such as providing shoes for all family members, regular deworming of cats and dogs [30], and keeping streets and public spaces clean will hardly be achievable without improvement of social circumstances and adequate sanitary services.

In conclusion, our study suggests that health education of communities at risk needs to be combined with the improvement of living conditions to allow disease control. The results of our focus group discussions provide a vivid picture of how an affected community perceives and copes with HrCLM and thereby point out the relation of disease and poverty. As a qualitative study such as the present one may not provide representative data, our findings should encourage further quantitative studies on this subject.

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