

## Dissemination of information on visceral leishmaniasis from schoolchildren to their families: a sustainable model for controlling the disease

Informação sobre leishmaniose visceral por escolares aos seus familiares: uma abordagem sustentável para o controle da doença

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### Abstract

*A model for the dissemination of information on visceral leishmaniasis from schoolchildren to their families was evaluated in two schools in Caeté, Minas Gerais State, Brazil. Age ranged from 9 to 17 years in the two schools, one receiving the intervention (with 92 students) and the other serving as the control (96 students). All the students attended a class and received a pamphlet on visceral leishmaniasis. The intervention consisted of a homework assignment in which the student discussed the class content and pamphlet with a family member. Knowledge by family members (n = 100) on visceral leishmaniasis was evaluated with a pre and post-intervention questionnaire applied by a health agent, who also completed a form on hygiene around the household as observed during the home visit. A significant improvement was observed in knowledge and hygiene (e.g., sweeping of leaves, fruit, and branches from the yards) among the families that were exposed to the intervention (p < 0.05). The spread of information on visceral leishmaniasis by schoolchildren can contribute to measures for preventing the disease.*

*Visceral Leishmaniasis; Students; Information Dissemination*

### Introduction

Visceral leishmaniasis, which is fatal if untreated, has an incidence rate of 0.5 million cases worldwide, causing an estimated 59,000 deaths annually <sup>1</sup>.

In Brazil, the disease is urbanized and the control program is based on: free delivery of specific drug therapy; vector control, and serological testing and culling of seropositive domestic dogs (the main reservoir in urban areas) <sup>2</sup>.

The sustainability of these measures is difficult, and the last 22 years have witnessed a 21-fold increase in reported cases, from 160 in 1980 to nearly 3,500 in 2006 <sup>2</sup>. Another concern is the high visceral leishmaniasis case-fatality rate in Brazil, ranging from 3% in 1995 to 7% in 2007.

Due to the complexity of visceral leishmaniasis transmission, alternative strategies that contribute to the sustainability of control measures are necessary.

This study, based on a short-term intervention among schoolchildren, aimed to develop a model for providing and distributing information on visceral leishmaniasis within the family.

The potential and effectiveness of schoolchildren in spreading information on different diseases has been shown previously <sup>3,4,5,6</sup>.

Interventions involving schoolchildren, teachers, health professionals, and the community in an attempt to develop a sustainable strategy for visceral leishmaniasis prevention can be effective.

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## Material and methods

An intervention study was organized in two public schools with similar characteristics in curriculum, enrolment, and teachers' academic degrees. Both are attended by students from 5<sup>th</sup> to 8<sup>th</sup> grades and are located in districts with comparable socioeconomic conditions. The schools were randomly assigned to either the intervention (IS) or the control (CS). They were located 2.5km apart in order to avoid communication between students.

In each school, all students attended a standardized class on visceral leishmaniasis and received a copy of a pamphlet<sup>7</sup> on the disease. After the class, only the students in the intervention group received instructions on how to communicate information on the disease to their families. This sharing of visceral leishmaniasis information was organized as a homework assignment. The control students only received the class and the pamphlet, with no specific homework project.

### Study area and intervention

The study was conducted in Caeté, Greater Metropolitan Belo Horizonte, Minas Gerais State, Brazil, from 2005 to 2006. Caeté has a population of 39,039 (87.2% living in the urban area).

The intervention included the following items.

- **Training teachers and students**

All science teachers participated in a five-hour course on visceral leishmaniasis (15 days before the students' class), covering all aspects related to the disease that teachers were expected to address with their students. Teachers received a CD-ROM and a pamphlet on visceral leishmaniasis, plus specimens of the vector to show their students. The CD-ROM and pamphlet content included visceral leishmaniasis transmission, symptoms, and control measures.

All students from the 5<sup>th</sup> and 8<sup>th</sup> grades were invited to participate, 92 from the intervention school and 96 from the control. Eighty-eight (46.8%) were boys and 100 (53.2%) girls. Mean age was 10 years (range: 9-14) in the 5<sup>th</sup> grade and 14 years (range: 13-17) in the 8<sup>th</sup> grade.

In each school, all students attended a visceral leishmaniasis class given by the teacher, at the end of which they received a copy of the pamphlet. Classes averaged 30 students each.

- **Spreading of visceral leishmaniasis information by the intervention students**

After the class, the intervention students received instructions on how to spread the information to their families. This sharing of visceral leishmaniasis information was organized as a homework assignment, in which the student had to: (a) discuss the pamphlet and class content with a family member; (b) record the responses in writing; and (c) help family members when they did not know the correct answers. All questions arising from this discussion were presented to the teachers. The students had 15 days to complete the assignment.

In contrast, control students only received the class and pamphlet on visceral leishmaniasis, with no homework assignment.

To be interviewed, the family member had to be responsible for the student's schooling and be at least 18 years old. While the required sample size for analysis was 60 families, we selected a random sample of 100 families (50 per school, 25 per grade).

Mean age of participating family members (40 years) did not differ between the schools (age ranged from 20 to 66). The majority were women (n = 63; 81.8%), and there were no differences between the two schools in parental schooling levels.

- **Pre and post-intervention assessments**

- a) **Students**

Knowledge of visceral leishmaniasis among students in both schools was evaluated before the specific class and 90 days afterwards, using an individual multiple-choice questionnaire with six questions<sup>7</sup>.

- b) **Families**

Family knowledge on visceral leishmaniasis was evaluated prior to the intervention and 30, 90, and 120 days afterwards by a trained health worker who administered the same questionnaire used for the students. After completing the questionnaire, the health worker gave the same pamphlet received by the students to the family member (this is a common procedure in prevention campaigns in Brazil). The health professional made no comments to the family member on the pamphlet's contents.

The family member participating in the post-test was the same person involved in the homework assignment.

During data collection visits, the health worker also completed a form assessing the hygiene

around the household (leaves, fruit, or branches on the ground, accumulated garbage, and animal droppings), i.e., the private outdoor area used by the family around the house.

Students, family members, and health workers were unaware of the intervention status, and did not know in advance when home visits were scheduled to take place.

The Bioethics Committee of the Federal University in Minas Gerais approved the study (file under protocol number 0354). The students and parent or person responsible for the student's schooling signed the consent inform.

### Data analysis

The study sample used a split-plot design. The four-time measure was defined as a plot, with the two factors, type of school (control or intervention school) and grade (5<sup>th</sup> and 8<sup>th</sup>). Peridomestic hygiene was analyzed using the qui-square test, with a 5% significance level.

### Results

The percentage of correct answers on the questionnaire by students before the class was similar and low in both schools (Table 1). Ninety days after the class, the average percentage of correct answers in the intervention group was 53.3%, as compared to 39.2% in the control group. A significant improvement of 20.1% in correct answers by students from the intervention group was observed, compared to 10.3% among control students ( $p < 0.05$ ). Performance according to grade was similar.

Seventy-seven families received all four visits by health agents. Thirty-one (40.3%) and 46

(59.7%) were responsible for intervention and control students, respectively.

Before the intervention, the proportion of correct answers by family members was 51.1% in the intervention group and 43.5% in the control group ( $p > 0.05$ ). At the final follow-up, the proportions were 71% and 52.2%, respectively ( $p < 0.05$ ).

Thirty days after the intervention, we observed a 16% increase in correct answers in the intervention families. The increase was significantly lower in control families (9%,  $p < 0.05$ ) (Table 2). At 90 and 120 days the differences were still statistically significant (intervention: 21%; controls: 12%,  $p < 0.05$ ).

There were no differences in peridomestic hygiene before the intervention. At 30 and 90 days, the intervention group showed significant improvements in sweeping of leaves, fruits, and branches ( $p < 0.05$ ) (Table 3). The results at 120 days were not included due to the small sample sizes.

### Discussion

The model adopted here is feasible and relatively simple. The approach was based on results from different authors that examined the potential of children as health agents. Once knowledge and health-related skills are acquired, students begin to lead healthier lives and contribute to improvements in their families' quality of life. The main concepts in this approach are action and participation, with students' direct involvement in the process<sup>5</sup>. This sharing of information on visceral leishmaniasis was also organized as a homework assignment, thus encouraging discussion between students and family, as well as between students and teachers<sup>3,5</sup>.

Table 1

Mean number of correct answers and improvement in a questionnaire on visceral leishmaniasis among 5<sup>th</sup> and 8<sup>th</sup> grade students from the intervention school (IS) and control school (CS) prior to and 90 days after a class on the disease. Caeté, Minas Gerais State, Brazil, 2006.

School (number of students)	Mean test score (%)		Difference (post - pre)
	Class		
	Pre	90 days post	
IS (92)	33.2	53.3	20.1 *
CS (96)	28.9	39.2	10.3 *
Difference (IS - CS)	4.3	14.1 **	-

\* Significant difference after class on visceral leishmaniasis ( $p < 0.05$ );

\*\* Significant difference between IS and CS after class on visceral leishmaniasis ( $p < 0.05$ ).

Table 2

Percent improvement in answers to a visceral leishmaniasis questionnaire among family members of 5<sup>th</sup> and 8<sup>th</sup> grade students from intervention school (IS) and control school (CS) 30, 90, and 120 days after the students' intervention, in comparison with the pre-test. Caeté, Minas Gerais State, Brazil, 2006.

School (number of families)	Percent improvement in correct answers to questionnaire during follow-up		
	30 days	90 days	120 days
IS (31)	16	21	20
CS (46)	9	12	9
Difference (IS - CS)	7 *	9 *	11 *

\* The difference between intervention and control families was significant ( $p < 0.05$ ).

Table 3

Presence of environmental risk factors for visceral leishmaniasis in the peridomestic area prior to visceral leishmaniasis school intervention and 30 and 90 days post-intervention. Caeté, Minas Gerais State, Brazil, 2006.

Peridomestic hygiene	Number of households					
	0 *	IS (n = 31)		0	CS (n = 46)	
		30 days	90 days		30 days	90 days
Leaves, fruit, branches	15	9 **	7 **	25	28	27
Accumulated garbage	0	4	0	2	5	2
Animals droppings	5	9	8	5	6	8

IS: intervention school; CS: control school.

\* Pre-intervention;

\*\* Difference between pre- and post-intervention ( $p < 0.05$ ).

The spreading of information by students helped improve the level of knowledge on visceral leishmaniasis in the intervention families as compared to controls. It is important to recall that the intervention only occurred once. Additional interventions by students could further improve their families' knowledge<sup>3,5</sup>.

The health worker delivered the same pamphlet to all the families, and the control group showed a 10% improvement in correct answers to the questionnaire. Nevertheless, significant improvement in visceral leishmaniasis information levels and peridomestic hygiene was observed when the pamphlet was delivered in conjunction with the student's homework assignment, as shown in the intervention group. However, additional studies with larger samples are needed to further elucidate these issues.

Loss of participants in the sample was non-differential. The main reasons for refusal to participate were that interviewees did not want to answer the same questionnaire again, and that there had been no improvement in the peridomestic hygiene.

Our results point to the potential of a short-term intervention with schoolchildren to improve the provision of appropriate information on visceral leishmaniasis, contributing to preventive measures. Additionally, as highlighted by successful disease control programs, dissemination of health information should include more than simply distributing pamphlets to the population.

## Resumo

*Modelo de disseminação da informação sobre a leishmaniose visceral por escolares aos seus familiares foi avaliado em duas escolas no Município de Caeté, Minas Gerais, Brasil. Em ambas as escolas, intervenção (92 alunos) e controle (96 alunos), as idades dos alunos variaram de 9 a 17 anos. Todos assistiram a uma aula e receberam um panfleto sobre a doença. A intervenção consistiu de uma tarefa de casa, na qual o aluno discutia com o familiar o conteúdo da aula e do folheto. O conhecimento dos familiares (n = 100) sobre a leishmaniose visceral foi avaliado por meio de questionário antes e após a intervenção, aplicado por um agente de saúde, que também preenchia um formulário sobre as condições de limpeza no peridomicílio, no momento da visita. Observou-se melhora significativa do conhecimento sobre a enfermidade e da limpeza relacionada à retirada de folhas entre as famílias que receberam a intervenção (p < 0,05). A disseminação da informação sobre a leishmaniose visceral por escolares pode contribuir para as ações de prevenção da doença.*

*Leishmaniose Visceral; Estudantes; Disseminação de Informação*

## Contributors

Z. M. P. Luz and J. A. Silva contributed to the conceptualization and design of the study and the data analysis and interpretation, and critically revised the draft for intellectual content. D. F. Magalhães contributed to the study conceptualization and design and the data analysis and interpretation, and drafted the paper. J. P. A. Haddad and E. C. Moreira contributed to the data analysis and interpretation, drafting of the paper, and approval of the final version. M. I. M. Fonseca and M. L. L. Ornelas contributed to the study conceptualization, data collection, and approval of the final version. B. K. A. Borges contributed to data collection, revision of the manuscript, and approval of the final version.

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