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Review Article

Control Measures Against Visceral Leishmaniasis in Brazil: Their Challenges

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Abstract

The visceral leishmaniasis (VL) has a wide geographic distribution, with 90% of its occurrence concentrated in six countries: Bangladesh, Brazil, Ethiopia, India, South Sudan and Sudan. Dogs are the main reservoir in the VL transmission, not only for their close relationship and/or coexistence with men, but also for their immunological inability in responding to the disease successfully. For this reason, if there is no prevention and multidisciplinary control among the three government spheres, health agents, environmentalists, researchers and mainly the community's awareness, we will not have an effective control against this infirmity. For this reason, through this review, we will show what are the principal measures proposed by the Surveillance Manual and Visceral Leishmaniasis Control, of the Ministry of Health in Brazil. According to the health policy in our country, the following are recommended for the visceral leishmaniasis control: the reduction of the phlebotominae population, dog euthanasia and health education activities. In view of all the ecologic and sociocultural problematic involved, the great challenge is to obtain a satisfactory outcome for the control of this disease with the support and involvement of the community, even before all the priorities which it encounters daily.

ABBREVIATIONS

VL: Visceral Leishmaniasis; CVL: Canine Visceral Leishmaniasis; DDT: Dichlorodiphenyltrichloroethane

INTRODUCTION

With a wide geographic distribution, visceral leishmaniasis (VL) affects mainly low income people, undernourished, with poor housing conditions and sanitation, without guidance in relation to education and health and with the immune system compromised. More than 98 countries are endemic to this disease, with roughly 300.000 new cases per year and 90% of the global occurrence concentrated in six countries: Bangladesh, Brazil, Ethiopia, India, South Sudan and Sudan [1,2].

The VL is caused by parasites of the *Leishmania* genus. These trypanosomatidare transmitted by the bite of the female insects of the *Psychodidae* family [3]. This disease presents high morbidity and mortality rate, having as main symptoms the intermittent fever and the enlargement of spleen and/or liver [4].

Particularly in Brazil, the VL is caused by the obligate intracellular protozoa *Leishmania (Leishmania) infantum* and mainly transmitted by the *Lutzomyia longipalpis* vector. This disease has zoonotic potential and has as its main reservoir in the urban area, the domestic dog, both in Brazil and other American countries [3].

Lutzomyiacruzi is another vector species framed in the transmission of this disease, considered neglected in our country [5]. In Brazil, reports on this phlebotomine have been described in Mato Grosso do Sul [6,7] and Mato Grosso [8,5] states.

The phlebotominae are known for their unique characteristics, such as their small size (2 to 3mm), body covered by numerous scales and bristles, with hairy aspect, straw-colored, raised wings when static and bouncy flying. Females are hematophagous, generally feed at dusk or at night [9] and show a radius of spreading in the urban area of up to 243m [10].

Therefore, it is important to point out that the expansion of this zoonosis in Brazil, where 20 states have registered autochthonous cases of the VL [11]. After the first urban epidemic in the city of Teresina, many outbreaks have been reported in urban or peripheric areas of the cities, like in São Luiz (Maranhão), Montes Claros (Minas Gerais), Belo Horizonte (Minas Gerais), Araçatuba

(São Paulo), Cuiabá (Mato Grosso), Campo Grande (Mato Grosso do Sul), Três Lagoas (Mato Grosso do Sul), Palmas (Tocantins) and Brasília, in the Federal District [12].

The dogs are epidemiologically relevant in the VL transmission not only for their close relationship or coexistence with men, but also for their immunological inability in responding to the disease successfully, as only 15% of the infected dogs heal spontaneously [13]. The disease in this animal species can be asymptomatic (80% of the cases in given areas) or show different clinic manifestations, such as localized dermatopathies, severe weight loss and even generalized lymphadenomegaly [14].

The canine visceral leishmaniasis (CVL) has its zoonotic character and a great importance in the public health, since the prevention of this infection is an obligation for both the dog's and the human's health [14].

For this reason, if there is not an implementation of preventive measures in a multidisciplinary control among the three government spheres, with the help of health agents, environmentalists, doctors, researchers and mainly an aware community, we will not have an effective control against this infirmity. For these reasons, through this review we will show what are the principal measures proposed by the Surveillance Manual and Visceral Leishmaniasis Control, of the Ministry of Health in Brazil.

DISCUSSION

The measures recommended by the Ministry of Health in Brazil are the control of the vector, of the canine reservoir, as well as activities in health education among the endemic areas to American Visceral Leishmaniasis.

Chemical control against the phlebotominae

The environmental management followed by the insecticide spraying is the main strategy in the control of vectors, being the first step in the collective protection and decrease in the visceral leishmaniasis transmission risk. Different classes of insecticides with residual action are commonly used, such as organochlorinated (DDT), organophosphates (malathion), carbamates [15] and synthetic pyrethroids (cypermethrin, deltamethrin, among others) [4].

The usage of organ chlorides and other chemical groups (for example, organophosphates and carbamate) in the environment has raised a big concern from the environmental point of view and from the public health aspect.

The insecticide referred by the Visceral Leishmaniasis Monitoring and Control Programme (VLMCP) for areas with human and canine transmission points out the use of pyrethroid insecticides, which are sprayed throughout the household and peridomiciliar walls [16]. The VLMCP may find some challenges and its health agents have to be prepared for not being allowed by the house owners to spray the household or surroundings, as well as encountering locked houses and empty lots.

Thus, these active ingredients have been gradually replaced for synthetic pyrethroids (deltamethrin, cypermethrin, λ-cyhalothrin and α-cypermethrin), whose use is announced by the public health authorities in different countries [14].

The deltamethrin insecticide impregnated in bed nets at an endemic area showed to have a promising entomological effect in the reduction of the *Lu. Longipalpis* [17], confirming that the insecticide spraying program can be assessed as an alternative intervention or integrating for the control of the main leishmaniasis vectors.

Another alternative intervention to be considered is the association of the synthetic pheromone ((S)-9-methylgermacrene-B) of *Lu. Longipalpis* matching the insecticide (Lambda-cialotrina), at houses with chicken coops. These components together attract and kill phlebotominae of both sex, and thus avoiding females to look for other hosts and males to be able to constitute the range of aggregation at another site [18].

Another research enables the usage of the synthetic pheromone of *Lu. Longipalpis* to be used in the control of phlebotominae for a long period, and consequently in the prevention of the VL [19].

Euthanasia of seropositive dogs

For the control of the canine visceral leishmaniasis (CVL), the key recommendation is the euthanasia [20]. However, it does not have the full population's approval, due to the importance the animals have to their owners [21]. Also, part of the scientific community questions the real efficiency of this given measure [14,21].

The seropositive dog's euthanasia is ruling, which may be unfairly reflected, depending on how it is judged and experienced. The disease is what alters men in their normal life stage and in their tasks and, however, makes them suffer, as in the case of the distancing between man and dog. Public health should not exceed the ethical values, but look for wise and creative alternatives to control and/or eliminate the community harms [25].

Studies prove that culling dogs does not minimize the prevalence of the canine visceral leishmaniasis (CVL) in the area, for many factors, such as the constant introduction of animals among the population with little reproductive management [22]. This way, a great demand or need to replace this preventive measure for more suitable measures to generate canine control arises. As an example, the canine vaccines that are currently commercialized, even though they have not yet been adopted by the public health institutions as a way of controlling the CVL [23].

Another alternative for the CVL control would be the use of pyrethroid impregnated collars. However, there are some challenges, like the replacement of the collars each semester, the cost and high coverage of the cities [24,25], acceptance from the target population, side-effects and the replacement of the collars that have been lost or damaged in a short period of time [25].

Health education

The health education needs to be implemented in every public service that develops the visceral leishmaniasis control measures, promoting in that way an efficient engagement of multidisciplinary teams aiming only one goal in their community such as: the advertising to the population about the VL occurrence, team empowerment, adoption of proper preventive measures, integration of education activities in health issues and others [4].

The actions taken in health education have to show informational purposes, aiming to clarify the prevention and disease control measures, inducing the responsible pet ownership and environmental management measures, with information campaigns that highlight the disease and its risks. In order to reach community, health coordinators called for the distribution of instructing fliers, house-to-house talks and lectures directed to communities [16].

The per domiciliary portrayal of the assessed areas is important for the identification of the vector's life cycle's terrestrial phase, thus allowing that the proper environmental management measures be suitable for the decrease in transmission, preventive tool to guide the community through reduction in favorable environment for the vector's spreading, and consequently of the leishmaniasis human cases [22].

In Governador Valadares, Minas Gerais, Brazil, it has been investigated the degree of knowledge among the population in relation to VL. Through the results obtained, it has been noticed that the interviewed are not aware of the disease transmission mechanism such as the vector's specific habits, noticed lack of familiar hygiene and care regarding their animals, which represents risk to these people's health [26]. However, campaigns are not seen as well as systematic actions in health education and environment development by the public power to help as prevention and control tool.

In order to guarantee an efficient environmental control, it is essential that people have the knowledge needed and that they conduct appropriate practices that allow efficient changes to happen in their society [26]. Thus, we may have a proper control measure against the VL.

CONCLUSION

The implementation of a successful control program is a great challenge to the public organizations, researchers and mainly to the community that needs to be aware, take up responsibility for their acts and show a behavior change in relation to the habits acquired previously.

Bearing in mind all the ecological and sociocultural problematic involved, the big challenge is to obtain a satisfactory outcome for the control with support and community engagement, even before all the priorities to which it comes across on a daily basis.

After we cross this big preliminary stage, we will begin to have a favorable outcome in the control not only of this endemic, but of all the others in which we feel there is need to direct a critical and cautious eye oriented to the peripheral environment and public spaces, with community measures turned to its microenvironment and surroundings.

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