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Health-disease Process of Acute Chagas Disease According to One Health Approach

Victor Viana da Graça [a*]
and Juarez Antônio Simões Quaresma [a]

[a] State University of Pará, Perebebuí Avenue, 2623, Marco, 66087-662 Belém, Pará, Brazil.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

One Health approach emerges as an innovative perspective to understand the health-disease process of acute Chagas disease (ACD). This study aimed to identify scientific evidence on the health-disease process of ACD through one health approach. This integrative literature review study had as guiding question: what is the current scientific evidence on the health-disease process of ACD according to One Health approach? A greater number of studies can be seen from 2021. The following categories were defined from the 13 studies found: One Health approach to Chagas disease; Spatial epidemiology of Chagas disease; Control and transmission factors of Chagas disease; Health indicators in Chagas disease; and Educational technology in Chagas disease. The results of this literature review, while showing greater proportions of studies involving ACD control and transmission, also demonstrate fields of study that are still little explored by national and international scientific literature, such as in the field of technologies for ACD, reflecting a large gap to be filled with future research on ACD. This study contributed to expanding the debate on the importance of an integrative approach in health research and encouraging the search for more comprehensive solutions for ACD.

**Corresponding author: Email: victorvianagraca@yahoo.com.br;*

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1. INTRODUCTION

Acute Chagas disease (ACD) is an infectious disease caused by the protozoan Trypanosoma cruzi, transmitted mainly by the insect vector Triatominae, also known as “kissing bug”. This endemic disease persists as one of the most neglected tropical diseases that affects 6 to 7 million people in the world, especially in the different regions of Latin America, representing a serious public health concern [1,2].

One Health approach, also called an integrative approach, emerges as an innovative perspective for understanding the health-disease process in this disease, promoting a broader and more holistic view of individuals and their relationship with the environment [3]. One Health, developed based on the understanding of the relationship between human diseases and animal diseases, leads to zoonosis prevention and control [4,5].

Therefore, understanding ACD’s health-disease process from this perspective can provide new perspectives for ACD diagnosis, treatment and prevention as well as management of its consequences [6].

This research’s relevance lies in the fact that, although ACD has been known for decades, its approach has been predominantly segmented into isolated studies of each health-disease process component. The One Health perspective opens new horizons for a more comprehensive understanding, allowing identifying gaps in current knowledge and formulating more effective proposals to combat this condition [7,8].

Through the integration of different disciplines and perspectives, the aim is to improve disease control strategies as well as contribute to affected populations’ well-being. Therefore, this study aims to identify scientific evidence on ACD’s health-disease process through a One Health approach, seeking to understand how biological, socioeconomic, cultural and environmental factors interact and influence the course of this disease.

2. METHODS

This is an integrative literature review (ILR) whose research method aims to investigate a certain subject already discussed in the literature following specific protocols, search strategies, thorough sample selection for analysis of results. It seeks to understand and analyze existing studies with the aim of correlating studies with each other, bringing new views and interpretations in order to contribute scientifically to the identification of gaps and flaws in studies as well as proposing and promoting discussions about the topic studied [9].

This review follows what was exposed by Sousa et al. [10], being organized into six distinct phases: research question definiton; data source and inclusion and exclusion criteria establishment; definition of the information to be extracted from selected studies (categorization of studies); assessment and critical analysis of findings, identifying differences and conflicts; interpretation of results; and synthesis of evidence found.

To conduct the research, a guiding question was developed based on the PICo strategy, an acronym for Population (P), Interest (I), Context (Co). For this study, P: health-disease process; I: ACD; Co: One Health. Therefore, the following guiding question was used: what is the current scientific evidence on ACD’s health-disease process according to One Health approach?

A search was carried out in the PubMed, SciELO, Scopus and Virtual Health Library (VHL) databases. The descriptors validated in DeCS/MeSH in Portuguese and English were “processo saúde-doença” or “Health-Disease Process”, “doença de Chagas” or “Chagas Disease”, and “São Paulo” or “One Health”, using the Boolean operators AND or OR.

Full-text and free articles, which covered the objective and research questions, published between January 2013 and August 2023, in Portuguese, English and Spanish, were included. Articles that were repeated in the search, incomplete studies, other types of documents and studies that did not answer the research questions were excluded.

For textual analysis, the content analysis research technique proposed by Laurence Bardin [11] was used, which occurs through the process of categorizing scientific articles, classified and grouped by themes and elements that constitute each one.

The text organization and selection process was defined following the PRISMA Flow Diagram 2020. The content extracted from the texts was organized in a chart containing the most relevant

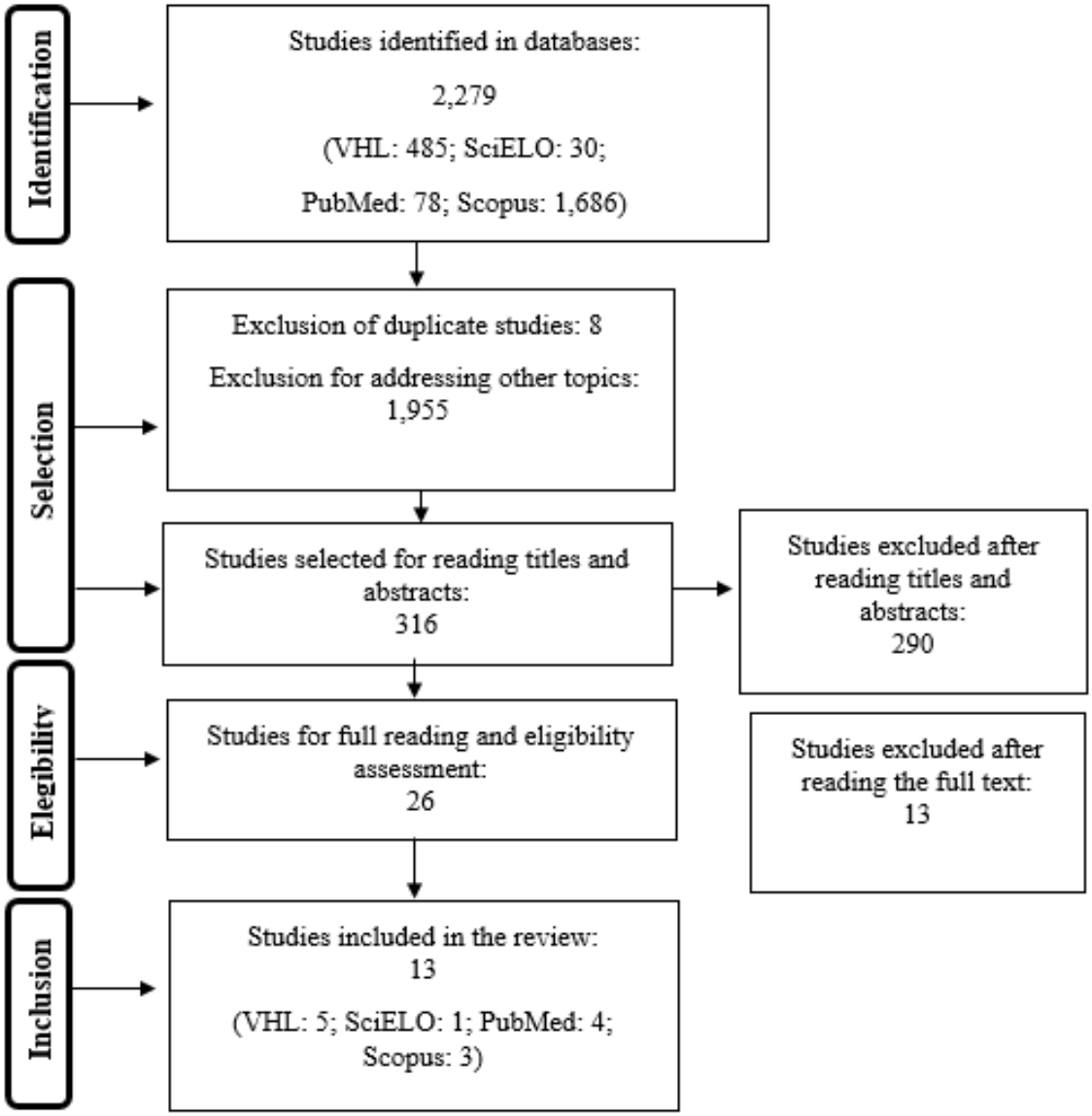

Fig. 1. Article selection flowchart
Source: the authors (2024)

information extracted from studies according to authorship, year of publication, journal, methodological characteristics, objectives and main search results.

Finally, the identified evidence was gathered, organized and synthesized according to the categories defined in this study as well as researchers' conclusions and critical-reflective analysis based on research findings.

Fig. 1 presents an article organization and selection flowchart based on the PRISMA flow diagram 2020.

3. RESULTS AND DISCUSSION

After searching the scientific databases using search filters according to established inclusion and exclusion criteria and reading titles, abstracts and full texts, the final sample consisted of 13 articles. Such studies are arranged in the databases as follows: VHL: 5; SciELO: 1; PubMed: 4; Scopus: 3.

Chart 1 presents selected articles so that their characteristics and respective information for each publication, such as author, year, journal, methods, objectives and main results, can be observed.

Chart 1. Characteristics of selected studies

Author, year and journal	Methods	Objectives	Main results
Alejandra Lopez-García; Juan A. Gilabert, Trop Med Int Health, 2023	Systematic review of studies in which clinical cases of oral transmission were confirmed by parasitological and/or serological tests that included epidemiological investigation of sources of infection, vectors and reservoirs.	Analyze ACD outbreaks through a qualitative systematic review and discuss the determinants for their prevention and control.	Thirty-two outbreaks (1965–2022) were analyzed. The main foods involved in oral transmission outbreaks are homemade fruit juices. Different species of vectors have been identified. The reservoirs were mainly dogs, rodents and large American opossums (didelphids). Under the One Health approach, environmental changes are one of the factors responsible for increased oral CD transmission. Entomological surveillance of vectors and control of changes in wild and domestic reservoirs and reinforcement of hygiene measures around food in domestic and commercial settings are required.
Rachel E. Busselman and Sarah A. Hamer. Annual Review of Animal Biosciences, 2022 [23]	Ecological, quantitative study	Focus on triatomine distributions and animal infections in southern United States.	A quantitative synthesis of available US data from triatomine bloodmeal analysis studies shows that dogs, humans, and rodents are key triatomine feeding taxa. Imperfect and unvalidated diagnostic tools for wildlife complicate the study of animal T. cruzi infections, and integrated vector management approaches are needed to reduce transmission in the wild. The diversity of animal species involved in Chagas disease (CD) and ecology underscore the importance of a One Health approach to disease research and management.
Emma Taylor et al., International Health, 2022	The nine countries that make up the Amazon basin were considered (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela) in the formation of a new network.	Report the Amazonian Tropical Bites Research Initiative (ATBRI) project's work with the aim of creating transdisciplinary solutions to the problem of animal bites that lead to diseases in Amazonian communities.	ATBRI seeks to unify the currently disjointed approach to controlling neglected zoonoses across Latin America.
Javier Martín-	Literature review	Provide a	The study described

Author, year and journal	Methods	Objectives	Main results
Escolano, et al. ACS Infectious Diseases, 2022		comprehensive update on our understanding of the current life cycle, new morphological forms, and genetic diversity of T. cruzi as well as identify intervention points in life cycle where new drugs and treatments could achieve a parasite cure.	Trypanosoma cruzi's life cycle and the main challenges for developing effective treatments for CD. In recent years, technical advances in several areas, combined with changes in research practice and a more favorable financing scenario, have contributed to a better understanding of this parasite's biology and life cycle, which has made it possible to profile the ideal of both drugs and therapeutic options for CD treatment.
B. K. M. Case et al., a. PLoS Negl Trop Dis., 2022	Epidemiological study of spatial, quantitative analysis. The method fits Bayesian geostatistical models to make spatially informed predictions while gradually transitioning from prioritizing homes based on forecast uncertainty to targeting high-risk homes of infestation.	Describe spatial epidemiology and adaptive targeted sampling for managing the Triatoma dimidiata CD vector.	A key feature of the method is the use of a single exploration parameter (α) to control the transition rate between these two design targets. In a simulation study using empirical data from five villages in southeastern Guatemala, we tested our method using a range of values for α and found that it can consistently select fewer houses than random sampling while reducing the rate of village infestation below a certain threshold. We further found that, when additional socioeconomic information is available, much greater savings are possible, but achieving the infestation rate target is less consistent, especially among less exploratory strategies. Our results suggest new options for implementing long-term T. dimidiata control.
Melissa N. Garcia et al., PLoS Negl Trop Dis., 2016	Ecological, quantitative study	Assess One Health interactions of CD vectors, canine hosts, and human residents along the Texas-Mexico border.	To determine the prevalence of infection, we tested sera from coyotes, stray domestic dogs housed in public shelters, and residents participating in related research, finding 8%, 3.8%, and 0.36% positive for T. cruzi, respectively. Polymerase chain reaction was used to determine the prevalence of T. cruzi DNA in vectors collected from peridomestic sites in the region, with 56.5% testing positive for the parasite, further confirming the risk of transmission in the region.

Author, year and journal	Methods	Objectives	Main results
Tania C. Araujo-Jorge et al. Plos Neglected Tropical Diseases, 2021	Case study	Develop and test under field conditions an interdisciplinary itinerant education scenario called "Chagas Expresso XXI" (CE21) as innovative social technology.	CE21 was shown at local educational institutions (schools, universities) in four cities, involving 2,117 people who assessed the 41 activities carried out. Citizens and healthcare professionals enjoyed acquiring information related to blood, parasites, vectors, reservoirs, environmental changes and social determinants of CD. Moreover, local legacies of 600 participants are volunteers in health promotion groups and CD associations, local empowerment groups fighting for better health conditions and 05 mural paintings. We observed that 81% of participants ignored the possibility of treating CD, whereas 52% of participants requested a blood test for CD, showing seropositivity in 20% of them.
Adriana Gisela Martínez-Parra, Maria Yaneth Pinilla-Alfonso, César Ernesto Abadía-Barrero. Social Science & Medicine, 2018	Data for our ethnographic study was collected in 2013 and included participants in observation in two main endemic areas in Colombia. Furthermore, 81 people belonging to four groups (patients and families; healthcare professionals; researchers; and officials). They were recruited using the snowball sampling technique and participated in informal and semi-structured interviews. People from the first two groups also participated in social activities and	Identify and characterize the sociocultural dynamics that influence CD health care in Colombia.	Data analysis resulted in the identification of three main sociocultural dynamics, such as: local understandings: patients reported confusion surrounding disease transmission, treatment efficacy, and development of future complications; providers' knowledge and training: gaps in professionals' knowledge and training mainly affect the primary level of care in rural areas. Professionals undergo minimal training during medical school and do not have access to continuing education. In contrast, physicians working in tertiary university hospitals or the CD unit of the Colombian National Institute of Health (NIH) demonstrated great knowledge and competence; and health system barriers: Colombia's market-based health system reform has increased access barriers, which has had a major impact on CD care. We identified geographic and bureaucratic itineraries that depended on the type of insurance plan, insurance contracts with service-providing institutions and service levels.

Author, year and journal	Methods	Objectives	Main results
	cartography exercises.		
Velázquez-Ramírez DD, Pérez de Léon AA and Ochoa-Díaz-López H. Front. Public Health, 2022	Bibliographic study	Review of American trypanosomiasis in southern Mexico highlights as a surveillance and research opportunity to advance control through One Health approach.	Adapting One Health approach to American trypanosomiasis research is an opportunity to advance surveillance and control efforts for this neglected disease that disproportionately burdens rural and semi-rural populations in southern Mexico. This can be a challenge in the states of Chiapas and Oaxaca where it has been argued that the situation has reached a crisis point and where other vector-borne diseases affecting urban populations divert attention from American trypanosomiasis (71, 72). However, the official action plan to prevent and control American trypanosomiasis provides a path forward for transdisciplinary collaboration involving human and animal healthcare professionals (31), which may facilitate the implementation of One Health research to prevent American trypanosomiasis in rural and semi-rural areas.
JM Schurer et al., One Health, 2016	Systematic review of gray and peer-reviewed literature databases in English and Chinese	Identify zoonotic endoparasite research using a One Health approach in community settings.	Our review identified 32 articles where samples collected simultaneously from all three One Health domains (people, animals, and the environment) were assessed for endoparasite infection or exposure. Study sites spanned 23 countries, and research teams brought together an average of seven authors from two countries. Surveillance for bloodborne and gastrointestinal protozoa was reported most frequently (19 of 32; 59%), followed by trematodes, nematodes, and cestodes. Laboratory techniques varied greatly between studies, and only 16 identified parasites using polymerase chain reaction in all three One Health domains. Our review identified important gaps in parasitology research that operates under the One Health framework. We recommend that researchers working in the

Author, year and journal	Methods	Objectives	Main results
			zoonotic diseases domain strive to assess all three One Health domains, integrating modern molecular tools as well as techniques provided by economists and social scientists.
Little, S.E. Veterinary Parasitology, 2013	Literature review	Analyze key aspects of vector-borne disease maintenance cycles that present challenges to health in the Americas, including the emergence of vector-borne disease agents, the impact of habitat changes on vector-borne disease transmission, and the complexities faced in developing effective control programs.	New strategies will be needed to effectively combat these infections in the future if we are to succeed in promoting an environment that supports healthy animals and people.
Sheena Francis et al., One Health, 2021	Comprehensive literature review on reports regarding insect-borne neglected tropical diseases in the Caribbean and Latin America	Raise awareness of insect-borne neglected tropical diseases important to humans and assess the factors affecting this control in the English-speaking Caribbean.	Potential risk factors for arthropod-borne neglected tropical diseases in the English-speaking Caribbean are summarized. The mosquito appears to be the main insect vector of human importance in the region in question. Arthropod vectors of diseases of veterinary importance are also relevant because they affect farmers' livelihoods in economies heavily based on agriculture. Other neglected tropical diseases may also be in circulation, assessed by the presence of antibodies in Caribbean individuals. However, routine diagnostic tests for specific diseases are expensive and tests may not be performed when diseases are not prevalent in the population. It appears that only a few English-speaking Caribbean countries have examined secondary pathogen reservoirs or assessed the effectiveness of their insect control methods. As such, the disease risk assessment appears incomplete. While ongoing control is financially demanding, an integrated, multi-

Author, year and journal	Methods	Objectives	Main results
			sectoral approach can help divert costs. These interventions are now being promoted by health agencies in the region, and several countries are creating and exploring the use of new tools to be incorporated into their insect vector control programs.
Fernanda Cardoso Lanza et al. Journal of the Brazilian Society of Tropical Medicine, 2023	A mixed ecological and descriptive study carried out with secondary data. We analyzed data from 2008 to 2015: deaths from CD, self-reported cases of CD and blood donors not negative for T. cruzi infection.	Assess CD indicators (prevalence and mortality) in the Metropolitan Region of Salvador.	São Francisco do Conde was one of the municipalities with the highest mortality rates from CD. Seroprevalence rates varied by year and municipality. Those with the highest values were: 2008: Vera Cruz; 2009: Mata de São João; 2010: Dias D'Ávila; 2011 and 2015: São Francisco do Conde; 2012: São Sebastião do Passé; and 2013 and 2014: Pojuca. Spatial correlations between municipalities were not detected.

Source: the authors (2024).

Concerning the language found in selected articles, around 100.00% of them (13) were published in English. As for the year of publication, of these 13 articles, a frequency of studies in different time periods was observed, with one (1) study in 2013, 2 (two) in 2016, one (1) study in 2018, two (2) in 2021, five (5) in 2022 and two (2) in 2023. Thus, a greater number of studies can be seen from 2021 onwards, with greater emphasis on 2022.

After reading and analyzing the sample content, the following categories were defined to facilitate the understanding of the subject and the synthesis of the evidence found: 1) One Health approach to Chagas disease; 2) Spatial epidemiology of Chagas disease; 3) Control and transmission factors of Chagas disease; 4) Health indicators in Chagas disease; and 5) Educational technology in Chagas disease. Such categories, as shown, were calculated from the 13 different studies found in this review and can be viewed below in alphabetical order.

3.1 Category 1 – One Health approach to Chagas disease

In this category, around five articles addressed One Health, each in a specific context. The term "One Health" refers to a concept that encapsulates and highlights the inherent interrelationship of the health of people, animals and the environment. Vector-borne infections are central links in this concept applied to health studies. One Health approach provides an integrated framework for observing and improving health issues associated with human, animal and environmental factors, and has been applied in particular to zoonotic disease problems [12,13].

As stated by Schurer et al. [14] and other collaborators, it is known that One Health serves to illustrate how zoonotic parasites' life cycles are complex and require the most diverse approaches and multifaceted strategies in studies and health measures, considering that parasites such as of CD presume interactions between people, animals and the environment, which amplifies the urgency of approaching CD through the One Health line.

For Velázquez-Ramírez et al. [15], One Health is an approach in which several sectors communicate and work together to achieve better public health outcomes, recognizing the complexity surrounding neglected tropical disease control and supporting the need for a shift away from disease-specific interventions with such feature. Therefore, it becomes increasingly important to use existing tools to combat CD in a harmonious and complementary

relationship with One Health structures so that the predominant transmission routes of trypanosomiasis pathogens can be identified and mitigated.

In a first analysis, as an initial example of the clear need for One Health in CD, we can comment on a study by Garcia et al. [16], whose research addresses the triad of person, animal and the environment in a very exemplary way.

It is known that CD is transmitted to mammals via vectorial, oral, congenital and/or transfusion/transplantation and that its triatomine vector, known as “kissing bug”, serves as the predominant mode of transmission, particularly in wild and/or domestic populations. Canines, in particular, are important components in peridomestic transmission, resulting in a bridge between wild and domestic transmission cycles. Thus, humans can become infected when vectors establish nests in or near homes, and vectors feed on both humans and domesticated animals [16].

In a study by Garcia et al. [16], the authors assess, in an unprecedented way, the overview and scenario of vector infection and the seroprevalence of CD among populations of mammals and humans, all of which live in the same geographic region, southern Texas, United States. Evidence from other recent studies confirms the establishment of vector transmission cycles, particularly in southern Texas, where there are aggravating factors that may contribute to this area being a high-risk region for transmission.

As results of the original study by Garcia et al. [16], seroprevalence was highest among the wild adult coyote reservoir (8%), moderate among peridomestic juvenile dogs in community shelters (3.8%), and lowest among local residents (0.36%). In addition to finding evidence of infection in canines and humans, the authors found a high and relevant percentage (56.5%) of vectors carrying the parasite, which solidified and further highlighted the risk of CD transmission in the region studied.

Another study, for instance, in a second analysis, is that of Velázquez-Ramírez et al. [15], in which One Health approach is used to investigate and understand the complexities of cases of American trypanosomiasis in Mexico, whose territory offers at least two thirds of ecological conditions that are conducive to triatomine vector transmission. It was evident in the study that the neglected disease disproportionately affects rural and semi-rural populations in southern Mexico.

3.2 Category 2 – Spatial Epidemiology of Chagas Disease

In this second category, around two articles addressed CD based on an epidemiological analysis. Spatial epidemiology can work and develop better adaptive strategies regarding CD control. An example is geostatistics, a field that studies data spatial autocorrelation to make inferences and predictions. By making use of what One Health approach advocates, it can be used in the context of controlling the CD vector in infested homes and, consequently, with a high risk of infection in regions concentrated in dense forest. It is noteworthy that using such a statistical approach in this sampling of residences is efficiently validated, meeting targets for reducing transmission by the disease vector [13].

Epidemiology can still, as in a study by Busselman and Hamer (2022), highlight behavioral differences in CD in certain regions when compared. According to the authors mentioned at the beginning of the paragraph, CD has, in Latin America, species such as Triatoma infestans, which commonly colonize human homes and, therefore, have access to humans. This contrasts with the scenario seen in the United States, where triatomines are mainly wild and are associated with wildlife in natural habitats, with occasional dispersal into domestic environments and around homes.

3.3 Category 3 – Control and Transmission Factors of Chagas Disease

In this third category, around seven articles addressed control and transmission factors of CD. It is known that many infectious and emerging diseases arise from several factors, which are complex, and are also in constant evolution with the environment, depending on their respective condition. For instance, cases of deforestation precede climate change and so on to the point where the etiological agents of infectious diseases are more susceptible to using the human species as a host, a fact that is clearly observable in wildlife translocation (Schurer et al., 2021).

Furthermore, other factors, such as urbanization, food acquisition, living with animals in general, socioeconomic factors (poverty and global trade), are links that can influence the resurgence or emergence of diseases. It is important to mention that, even with the mass administration of medicines and parasite eradication campaigns, parasitic zoonoses continue to cause significant morbidity and mortality throughout the world and, therefore, still persist as serious public health concerns (Schurer et al., 2021).

It is concluded that control measures for diseases such as CD are affected in several countries and regions due to high cost associated with complex transmission factors. Therefore, an integrated and multisectoral approach to health may be one of the best solutions to offset the size of such costs of CD, which recent global public health data shows about 6 to 8 million people affected [17,18].

CD control and transmission factors are also attracted by the interrelationship of people's and animals' health. Investigations show that the sociocultural dynamics of certain communities affect the geographic dissemination of arthropod vectors due to the fact that, in these places, people have difficulties in understanding the specific etiological, clinical and therapeutic aspects of CD [12,19].

Unfortunately, even though CD is very difficult to eradicate, the disease still receives little attention from public and private bodies. There is therefore an urgent need to acquire regional information on neglected tropical diseases will not only promote progress in research but will also be imperative. This will direct health decision-making and policy development for countries and communities in all regions of the Amazon, focusing on prevention and control as well as coordinated collaborative and multidisciplinary strategies for a One Health approach to diseases such as CD [8,20].

3.4 Category 4 – Health Indicators in Chagas Disease

In this category, among the 13 studies selected, only one focused on addressing health indicators of CD.

Indicators such as seroprevalence and mortality rates are data that vary according to seasons and regions in Brazil and, given the importance of these and other metrics in public health, it is a fact that their analysis as well as constant surveillance allow for better controlling the parasite and its vector. That being said, it confirms the importance of strengthening surveillance programs at the municipal level, even in regions classified as low risk for T. cruzi vector transmission [21].

3.5 Category 5 – Educational Technology in Chagas Disease

In this last category, there was also only one article exploring the field of technologies associated with CD.
Technologies in tropical diseases are potentially useful, both for health and science education, and for an active search for asymptomatic chronic cases of CD. Furthermore, technologies for this purpose can be adapted so that we can understand and cooperate in various potentially epidemic situations, especially those related to tropical diseases considered neglected [22].

Therefore, regarding the appropriate discussions in this review, the studies found then vary and have different metrics depending on each specific topic, with studies on ACD control and transmission being more frequent. On the other hand, there is a low number of articles that specifically deal with the association of technologies or mapping with ACD and even more in-depth work in the field of One Health approach, reinforcing a perennial need for studies to cover other areas of CD.

Despite their great relevance, contemporaneity and impact factor on Brazilian public health, unconventional ways of approaching CD are still incipient and, furthermore, little explored by researchers, which is proven by the aforementioned scarcity of scientific work in the country about this zoonosis, even with the important descriptors used in this review.

From the visualization and variations of the studies, it is also clear that urgent dedication is also needed by public health bodies, since ACD's reality is still alarming, as it is endemic in all Latin American countries, mainly in locations where socioeconomic factors are decisive.

As stated by Araújo-Jorge et al. [22] in their study, the fact is that it is urgently necessary to take effective measures to control CD in more socioeconomically fragile and neglected locations, where there is an affected population, through articulation and integration of CD prevention factors, vector surveillance and

community education, with health promotion strategies through a dialogic organization in Primary Health Care units. Factually, actions like this depend directly on political decisions and social pressure to confront and reprimand such negligence in relation to CD [22].

Still according to Araújo-Jorge et al. [22], in endemic areas, especially important for CD, relevant data suggest that, in association with poor regions, information about CD is very precarious. Therefore, there needs to be more activities aimed at reducing this misinformation about a disease of such public importance.

In less developed regions, populations generally fall short of basic information about a given disease, and with CD being no different, in the most diverse regions where the disease is present. The population does not know, for instance, that there are treatments available nor is it aware of the ways the disease is transmitted and infected. Therefore, even though the field of microbiology has already made rapid advances in recent decades, it can be concluded that, often, primary and basic health attitudes are still dispersed in communities, especially those with a lower level of education, given that this is a strong determinant of vulnerability, which creates a huge need for new policies aimed at everyone's information [22].

In addition to a public eager for information of this magnitude, it is also visible that healthcare professionals, specifically community and endemic health workers, need access to training courses to reduce lack of knowledge about biological and epidemiological concepts related to CD focusing on One Health, as this aspect is best suited for providing types of multifaceted parasite control strategies [22]. That said, and according to the aforementioned paragraphs, despite One Health already receiving a certain frequency of discussion in the literature relating to zoonoses, the present work demonstrates that, in general, parasites such as CD are not explored in a scope that addresses the three domains present in the One Health triad simultaneously; and this can be explained, in part, by the logistical challenges adjacent to the interdisciplinary collaboration of this concept, especially at the level required for One Health research [22,13].

Potential issues with this include communication barriers across languages and disciplines, synchronizing research priorities, budget allocations, and ensuring that staff members remain engaged throughout the study period. Furthermore, methods are needed that require collaboration and coordination, not only at an intersection between health sectors, but also between organizations at regional, national and international levels, given that this is a principle in One Health definitions [13,15].

4. CONCLUSION

It is concluded that this literature review, while highlighting greater proportions of studies involving CD control and transmission, also demonstrates fields of study that are still little explored by national and international scientific literature, reflecting a large gap to be filled with future research on this neglected tropical disease, which is highly relevant in the field of tropical diseases, even more so because it is considered neglected.

Still in this context, a greater frequency of studies exploring other areas would, consequently, means more control strategies, interruption of cycles and health education for CD. The results of studies of such size could be translated into government policies or programs focused on crucial points regarding the elimination of the vector, seeking and acquiring the involvement of health actors, especially the figure of the public public health manager in tropical regions, which would shape and improve the scenario of vector surveillance, community education with health promotion strategies.

It is also demonstrated that many research works focus on municipal and regional realities in certain locations in some states of the federation, with an insufficient and unequal number of works per region when looking at study production at a national level.

That being said, it was intended, through this literature review and epidemiological and social data analysis, to draw a complete overview of ACD, considering the complex interactions between the various factors involved.

Thus, this study contributed to expanding the debate on the importance of an integrative approach in health research on this disease, which is the most serious parasitic disease in the Latin American region, with an estimated disease burden around five to 10 times greater than than malaria.

Furthermore, such an expansion of the debate can and should encourage the search for more comprehensive, accurate and humanized solutions in tackling endemic and globally relevant diseases such as ACD so that this threat so present to people on the poverty line can be eliminated once and for all.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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