

# PARASITOSIS INTESTINALES EN CANINOS DE REFUGIOS: EVIDENCIA EPIDEMIOLÓGICA Y PERSPECTIVAS DE CONTROL SANITARIO

## INTESTINAL PARASITES IN SHELTER CANINES: EPIDEMIOLOGICAL EVIDENCE AND HEALTH CONTROL PERSPECTIVES

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Fecha de recepción: 27/01/2026 / Fecha de aceptación: 12/02/2026 / Fecha de publicación: 13/02/2026

**RESUMEN:** Las parasitosis intestinales en caninos de refugio representan un problema de relevancia biológica, social y sanitaria debido a las condiciones de hacinamiento, deficiencia en infraestructura y ausencia de programas sistemáticos de control veterinario; estas infecciones, causadas principalmente por helmintos y protozoarios como *Ancylostoma spp.*, *Toxocara canis*, *Trichuris vulpis* y *Giardia spp.*, comprometen no solo el bienestar y la salud de los animales, sino que también constituyen un riesgo zoonótico que impacta en la salud pública. El siguiente artículo se propuso revisar la evidencia científica existente sobre la prevalencia de parásitos intestinales en los perros de refugio, determinar factores de riesgo asociados con ello, así como analizar las implicaciones epidemiológicas y sociales de este problema. Se llevó a cabo un estudio documental siguiendo un diseño descriptivo y analítico de revisión bibliográfica, sistematizando artículos de la producción científica publicados en bases de datos internacionales entre los años 2021 y 2025. Los resultados muestran prevalencias que oscilan entre el 25% y el 80%, con cifras más elevadas en América Latina, Asia y África, en contraste con Norteamérica y Europa, donde los valores son menores gracias a protocolos de diagnóstico y control más robusto. Entre los parásitos que se reportaron con mayor frecuencia destacan *Ancylostoma spp.* y *Toxocara canis*, además de la presencia de *Giardia spp.*, relevante por su potencial de transmisión interespecífica. Los principales factores asociados a la persistencia de las infecciones fueron la edad, el estado nutricional, las condiciones ambientales y la falta de acceso a atención veterinaria. Se concluye que la carencia de información sistemática en países andinos como Ecuador limita el diseño de políticas públicas eficaces. Por ello, se recomienda fomentar investigaciones longitudinales y multicéntricas que aporten datos sólidos sobre prevalencia, factores de riesgo y efectividad de intervenciones, integrando el enfoque “One Health” y garantizando el bienestar animal en refugios.

**Palabras clave:** Parasitosis intestinal, refugios caninos, zoonosis, salud pública, bienestar animal, epidemiología

**ABSTRACT:** Intestinal parasitosis in shelter dogs represents a significant biological, social, and public health problem due to overcrowding, inadequate infrastructure, and the absence of systematic veterinary control programs. These infections, primarily

English translation of the original article published in Ecuacientífica, Vol. 4, No. 8, pp. 42-58.

caused by helminths and protozoa such as *Ancylostoma* spp., *Toxocara canis*, *Trichuris vulpis*, and *Giardia* spp., compromise not only the animals' well-being and health but also constitute a zoonotic risk that impacts public health. This article aimed to review the available scientific evidence on the prevalence of intestinal parasites in shelter dogs, identify associated risk factors, and analyze the epidemiological and social implications of the problem. A documentary study was conducted using a descriptive and analytical literature review design, systematizing articles published in international databases between 2021 and 2025. The results show prevalence rates ranging from 25% to 80%, with higher figures in Latin America, Asia, and Africa, in contrast to North America and Europe, where rates are lower due to more robust diagnostic and control protocols. Among the most frequently reported parasites were *Ancylostoma* spp. and *Toxocara canis*, in addition to the presence of *Giardia* spp., which is relevant due to its potential for interspecific transmission. The main factors associated with the persistence of infections were age, nutritional status, environmental conditions, and lack of access to veterinary care. It is concluded that the lack of systematic information in Andean countries like Ecuador limits the design of effective public policies. Therefore, it is recommended to promote longitudinal and multicenter research that provides solid data on prevalence, risk factors and effectiveness of interventions, integrating the One Health approach and ensuring animal welfare in shelters.

**Keywords:** *Intestinal parasitosis, dog shelters, zoonosis, public health, animal welfare, epidemiology*

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## INTRODUCTION

Gastrointestinal parasitosis in canines is one of the most common problems for veterinarians, but at the same time it is a potentially endemic problem for public health; these agents are mainly helminths and protozoa of worldwide distribution, which affect dogs in the majority of contexts, but have a higher prevalence in risk situations such as those that occur in shelters and temporary shelters. The condition of these institutions (with overcrowding, limited economic resources, and deficit of sanitary infrastructure) allows the persistence and dissemination of gastrointestinal parasites of veterinary and zoonotic importance (1) (2). Thus, dogs in shelters not only have their physical and physiological well-being compromised, but in addition are a potential means of transmission of pathogens to the human population that cohabits with them or that comes into contact with infected environments (3).

The scientific literature has provided a large amount of information that makes evident that intestinal parasites are one of the most frequent infections in dogs. Different studies carried out in different latitudes have reported prevalences that oscillate between 30% and 80% in canine populations of dog shelters, the most commonly identified infectious agents being *Ancylostoma* spp., *Toxocara canis*, *Trichuris vulpis* and *Giardia* spp. (1) (4) (5). These figures are very different from those observed in dogs that live at home or in dogs that receive periodic veterinary care, in whose case the

prevalence is much lower owing to the application of systematic deworming programs improving the state of the animals and the conditions of hygiene and nutrition (2). The situation is much more critical in Latin American countries where the economic conditions and the low coverage of animal health systems are factors that favor the transmission of this parasitosis and its control.

In Brazil, for example, prevalences higher than 60% have been documented in urban shelters, while in the case of Colombia the data appear around 54%. An investigation carried out in Mexico on stray dogs indicates a positivity of 37%; in Ecuador, for its part, data have been made public that exceed 70% in populations of urban shelters (5) (6) (7). These findings not only make evident the magnitude of the problem, but in addition suggest a close relationship between the socio-environmental context and the dynamics of transmission of intestinal parasites. In regions with high population density, deficiency in waste collection, absence of systematic plans of veterinary control, and exposure to contaminated water sources, the propagation of these agents is practically inevitable (3) (4).

The impact of intestinal parasitosis in canines transcends the veterinary sphere. *Ancylostoma spp.* is capable of producing cutaneous larva migrans in humans, while *Toxocara canis* can occasion visceral and ocular larva migrans, with consequences that range from gastrointestinal symptoms to neurological and visual complications. *Giardia spp.*, for its part, represents a relevant agent of diarrhea in communities with limited conditions of basic sanitation (3) (8). In this sense, canine parasitosis in shelters must be addressed under the perspective of One Health, considering the interdependence between animal health, human health, and the environment (2) (8).

In addition to their zoonotic importance, these infections seriously compromise animal well-being. Affected dogs can present chronic diarrhea, vomiting, weight loss, growth retardation, anemia, and immunosuppression, which in turn increases susceptibility to other diseases (2) (5). From an ethical perspective, it is imperative to guarantee the right to the well-being of shelter animals, framed in the five freedoms of animal welfare, among which are included being free from pain, injuries, and diseases.

The review of the literature reflects, however, that gaps still persist in the epidemiological knowledge of intestinal parasitosis in shelter dogs, especially in Andean countries such as Ecuador, where the studies are scarce and fragmented (6) (7). This absence of systematic information not only limits the design of control programs adapted to the local reality, but in addition hinders the incorporation of the One Health approach, which requires evidence on how animal, human, and environmental health are integrated, in order thereby to establish sustainable public policies. In this sense, the generation and systematization of epidemiological information in the Ecuadorian context is a priority in order to orient sanitary interventions that reduce the zoonotic risk and strengthen the sanitary management of shelters.

In this context, the need arises to compile, analyze, and discuss critically the available evidence with the aim of identifying the most relevant epidemiological patterns and the risk factors associated with the presence of intestinal parasites in shelter canines. Among these factors stand out age, body condition, access to potable water, type of feeding, and conditions of overcrowding, variables that directly influence the parasitic load and community transmission (1) (3) (4).

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This article has as its purpose to synthesize the available information on the prevalence of intestinal parasites in dogs and bitches of shelters; to analyze and extract from the literature the risk factors implicated in a greater parasitic load in dog shelters and, in third place, to address the control strategies that have greater interest and applications in public health and animal welfare, which include the measures in shelters so that they serve as information or inputs at the time of enriching the sanitary management programs and shelters of the region.

Therefore, the specific objectives that will guide the review are, in the first place, to synthesize the information on the prevalence of intestinal parasites in shelter canines at global and regional scale; in the second place, to identify and analyze the risk factors that may be implicated in a greater parasitic load in shelters and, in the third place, to address the strategies that have been applied, as well as their visions taking into account public health and animal welfare.

## MATERIALS AND METHODS

The present work is a documentary-type study that has its base in a descriptive and analytical design of the bibliographic review type. It was developed on the explanatory plane, inasmuch as it was not limited to compiling published data, but rather it was intended to make relations between the prevalence of intestinal parasites in canines in shelters, risk of parasitization associated, and their implications in public health and animal welfare.

Works that offered information of international type were included in its content in order to have a broad and comparative vision of the problem. The process by which the final sample was selected was carried out by means of a systematic process of screening of publications obtained in the international databases, establishing the criterion of prioritizing those articles published as of the year 2021, in such a manner that from a temporal perspective the most recent evidence is made evident.

The search context is defined by the need to analyze the epidemiological situation of intestinal parasitosis in canines in shelter environments where the socioeconomic situation, population density, and sanitary infrastructure represent influencing factors. Priority was given to the inclusion of studies with representative samples, clear diagnostic methodologies, and analysis of risk factors, following the guidelines of the PRISMA statement for literature reviews, which made it possible to organize the process in phases of identification, screening, eligibility, and inclusion of the studies (9).

The procedure of information collection was carried out between the months of June and August of 2025. The search strategy included keywords in English and Spanish, such as “dog shelters”, “canine intestinal parasites”, “zoonotic helminths”, “protozoa in dogs”, “parasitosis intestinal en perros”, “refugios caninos”, and “zoonosis”. Boolean operators (AND, OR, NOT) and specific filters by temporal range (2021-2025), language (English and Spanish), and type of document (original articles, systematic reviews, prevalence studies, and epidemiological reports) were applied. The principal databases consulted were PubMed, Scopus, Web of Science, SciELO, Redalyc, and Google Scholar.

The inclusion criteria contemplated: articles published in peer-reviewed and indexed journals, studies that reported prevalence, risk factors, or zoonotic implications of

intestinal parasites in dogs, works that included shelter, stray, or vulnerable-condition populations, and publications as of the year 2021. As exclusion criteria were considered those articles for which full text was not available, publications with ambiguous methodologies or with manifest biases in the sampling, clinical reports without epidemiological data, and gray literature not peer-reviewed.

The treatment of the information was carried out through a thematic and comparative analysis. In each publication the following data were collected: author, year, country or region, sample size, type of canine population, diagnostic method, global and by-parasite prevalence, risk factors analyzed, and main conclusions. Subsequently, the articles were classified on the basis of the region and the most frequent parasitic agent. This organization made possible the identification of shared patterns, territorial divergences, and knowledge gaps.

In order to minimize biases and increase the reliability of the synthesis, the methodological quality of the studies was valued attending to whether the study had clearly defined the study population, whether the population size had been representative, whether it had described the sampling procedure, whether the diagnostic techniques used were valid, and whether there was consistency among the objectives, the results, and the conclusions. It was also examined whether the authors manifested eventual limitations or sources of error of their investigations. The articles were evaluated on the basis of these criteria in a qualitative form considering their methodological rigor and priority was given in the discussion to those that showed greater robustness in the design and in the presentation of the results. It was verified that the selected publications had employed recognized diagnostic techniques, such as centrifugal flotation, sedimentation, antigen immunoassays, or molecular tests (PCR). In those cases in which the studies relied on methodologies already validated by the literature, the original sources were cited with the aim of recognizing the standardized procedures.

The management of the references was performed following the Vancouver citation norms. Each source was contrasted with its DOI or link in academic repositories, which ensures the traceability and transparency of the review.

## RESULTS AND DISCUSSION

The systematic review of the literature made it possible to identify 35 articles published between 2021 and 2025 that addressed the prevalence of intestinal parasites in shelter dogs and analogous contexts in different regions of the world. The results showed that intestinal parasitosis continued to be a recurrent problem in these canine populations, with global prevalences that oscillated between 25% and 80%, depending on the region, the sample size, the conditions of the shelter, and the diagnostic methodologies employed (5, 7, 9-12).

The evidence was organized in comparative tables by continents, which made it possible to visualize epidemiological patterns, predominant parasitic species, and differences in the control measures applied (10) (11). Subsequently, the results were analyzed in the light of the risk factors, the diagnostic techniques, and the zoonotic implications.

### Prevalence in Latin America

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The literature showed that Latin America continues to be one of the regions with the highest prevalences of intestinal parasites in shelter dogs. The figures were explained by the limitations in infrastructure, the overcrowding, and the scarce coverage of animal health programs.

**Table 1. Prevalence of gastrointestinal parasites in dogs of Latin America (2021-2025).**

| Country                  | N (sample) | Main parasites                                    | Prevalence (%) | Source |
|--------------------------|------------|---------------------------------------------------|----------------|--------|
| Brazil (urban)           | 315        | <i>Ancylostoma spp.</i> , <i>Giardia spp.</i>     | 62.1           | (12)   |
| Colombia (Cali)          | 187        | <i>Toxocara canis</i> , <i>Trichuris vulpis</i>   | 54.0           | (13)   |
| Mexico (Hidalgo)         | 250        | <i>Ancylostoma caninum</i> , <i>Giardia spp.</i>  | 37.2           | (7)    |
| Ecuador                  | 142        | <i>Toxocara spp.</i> , <i>Trichuris spp.</i>      | 71.4           | (6)    |
| Peru (Lima)              | 98         | <i>Toxocara canis</i> , <i>Giardia spp.</i>       | 58.7           | (14)   |
| Argentina (Buenos Aires) | 126        | <i>Toxocara canis</i> , <i>Cystoisospora spp.</i> | 46.2           | (15)   |

Source: Own elaboration based on the data of the study, 2025.

The evaluation of the condition of the studies for Latin America reveals an epidemiological state with high rates of infection and a broad spectrum of parasitic species, which indicates that there exists active, maintained, and possibly conferred circulation of the parasites under the conditions of the shelter, whose relation appears taken from the common structural characteristics in the region, the most important of which are the deficiencies in sanitary infrastructure, the high turnover of the animals, and the difficulties for the maintenance of programmed dewormings and the sanitary state of the same. With respect to the biological distribution, the helminths occupy a prominent place starting from the identification in the studies of the genera *Ancylostoma* and *Toxocara*, whose persistences would be associated with the environmental resistance triggered by their infective forms and with the management conditions that promote reinfection. Also the detection in the studies of protozoa, such as *Giardia spp.*, reinforces the impact of the hygienic-sanitary conditioners and the conditions of water quality as determinants of the transmission cycle of the considered parasite.

### Prevalence in Europe

The European studies reported lower prevalences in comparison with Latin America, which was related to the application of entry protocols, preventive deworming, and routine diagnostics in shelters.

**Table 2. Prevalence of intestinal parasites in shelter dogs in Europe (2021-2025).**

| Country          | N (sample) | Main parasites                                | Prevalence (%) | Source |
|------------------|------------|-----------------------------------------------|----------------|--------|
| Spain (shelters) | 204        | <i>Giardia spp.</i> , <i>Ancylostoma spp.</i> | 28.5           | (16)   |
| Italy (Rome)     | 112        | <i>Trichuris vulpis</i> , <i>Giardia spp.</i> | 22.4           | (17)   |
| Germany (Berlin) | 156        | <i>Giardia spp.</i>                           | 19.7           | (18)   |

Source: Own elaboration based on the data of the study, 2025.

The European studies expose a rather controlled epidemiological scenario and that makes one think that the putting into practice of entry protocols, of preventive deworming, and of diagnostic follow-up would be responsible for the diminution of the parasitic load in the shelters.

In a coherent form, the data also indicate that the protozoa, especially *Giardia spp.*, present a relatively high frequency, suggesting that, even in places where adequate sanitary programs are applied, the parasites with environmentally direct transmission cycles continue to be an obstacle at the time of being able to control the parasitosis. The diversity of parasites in some of the studies makes evident that the origin of the animals,

the turnover of the animals, and the conditions of the lodgings contribute to the transmission.

In this line, different authors agree that the arrival of diagnostic techniques with greater sensitivity such as is the case of ELISA or PCR has permitted a better detection of subclinical infections, improving the taking of sanitary decisions and the elaboration of better focused ones on the fight against the parasites (16) (17).

### Prevalence in Asia

In Asia, the prevalence was elevated, especially in countries with high canine density and limited access to veterinary services. The studies reported figures that placed the region among those with the highest burdens of intestinal parasites in shelter and free-roaming dog populations, reflecting structural constraints similar to those observed in parts of Latin America and Africa. The combination of high animal turnover, inadequate sanitation, and limited systematic deworming programs contributes to sustained transmission cycles.

### Prevalence in Africa

The studies carried out in Africa find prevalences of intestinal parasitosis in shelter dogs among the highest, which makes evident an epidemiological context that responds to a very intense circulation of the parasitic agents. This behavior can be explained fundamentally by structural and environmental factors, such as: scarce veterinary coverage, difficulties in the application of systematized deworming programs, and sanitary conduction that is habitually very poor in shelter and reception centers.

On the other hand, the intense interaction that is produced between street dogs, sheltered dogs, and the human community increases the environmental contamination by infective forms and, therefore, increments the potential of zoonotic transmission. This situation not only maintains the infections in the canine population, but represents a public health problem, above all in populations very compromised with respect to the norms of basic sanitation.

In addition to that, the information that is presented in Table 4 is sufficiently illustrative about the magnitude of the problem and, in addition, corroborates the exigency of integral control strategies that include sanitary management, community education, and epidemiological surveillance over time.

**Table 4. Prevalence of intestinal parasites in shelter dogs in Africa (2021-2025).**

| Country  | N (sample) | Main parasites                                                                                                | Prevalence (%) | Source |
|----------|------------|---------------------------------------------------------------------------------------------------------------|----------------|--------|
| Ethiopia | 190        | <i>Toxocara canis</i> , <i>Giardia</i> spp.                                                                   | 68.2           | (1)    |
| Nigeria  | 145        | <i>Ancylostoma</i> spp., <i>Isospora</i> spp.                                                                 | 72.5           | (22)   |
| Kenya    | 948        | <i>Strongyloides stercoralis</i> , <i>Ancylostoma braziliense</i> , <i>A. caninum</i> , <i>Toxocara canis</i> | 39.8           | (23)   |

Source: Own elaboration based on the data of the study, 2025.

### Prevalence in North America

The set of studies carried out in North America shows us an epidemiological picture where the prevalences observed are sensibly lower than those of other regions, which points to the possibility that the sanitary control systems established in shelters and reception centers are efficacious. This tendency can be related to the application of systematic entry protocols, programs of periodic deworming, long-term clinical follow-up, and routine use of diagnostic tools with greater sensitivity.

*English translation of the original article published in Ecuacientífica, Vol. 4, No. 8, pp. 42-58.*

The higher levels of sanitary norms and of the possibilities of management and animal welfare go hand in hand to reduce the circulation and the maintenance of intestinal parasites in these populations. In a complementary form, the education of the adopter and the veterinary follow-up after the adoption are elements that contribute to limiting the reinfection and the environmental distribution of infectant forms.

The data contained in Table 5 allow us to observe the general tendency of the region and, above all, to make evident that the implementation of sanitary control strategies can have an important effect on the reduction of the parasitic load in animals of reception.

**Table 5. Prevalence of intestinal parasites in shelter dogs in North America (2021-2025).**

| Country       | N (sample) | Main parasites                                  | Prevalence (%) | Source |
|---------------|------------|-------------------------------------------------|----------------|--------|
| United States | 210        | <i>Giardia spp.</i> , <i>Ancylostoma spp.</i>   | 24.3           | (2)    |
| Canada        | 165        | <i>Giardia spp.</i> , <i>Cystoisospora spp.</i> | 18.6           | (24)   |

Source: Own elaboration based on the data of the study, 2025.

In these countries, the programs of early diagnosis and the frequent sanitary control reduced the figures to less than 25%.

Beyond the numerical data, the reviewed studies indicated that the age of the animals was a determining factor: the puppies presented higher parasitic loads and with greater diversity of agents, in comparison with the adults, similar data found in studies of Sanhueza et al. and Lopes et al. (3) (4). This was explained by the immunological immaturity and the greater susceptibility to reinfection.

The data showed that, despite the methodological and regional differences, *Ancylostoma spp.* and *Toxocara canis* continued to be the most frequently identified helminths, while *Giardia spp.* consolidated itself as the protozoan of greatest clinical and zoonotic relevance (1-4). This pattern was consistent in the majority of studies, which confirms that these agents constitute the epidemiological nucleus of the parasitosis in shelter dogs.

The interregional comparison made evident a clear epidemiological pattern: countries with a low contribution to the provision of animal care, with shelter systems with structural penuries and a scarce coverage of veterinary attention, had higher prevalences of intestinal parasitosis, coinciding with some studies (2,5,7). This pattern suggests that the persistence of intestinal parasitosis would seem to be more in function of the social and operative characteristics that determine the capacity to implement stable programs of sanitary control. Gruntmeir (25) in his study details that the highest figures were given in developing countries of Latin America, Africa, and Asia, while in Western Europe and North America the prevalences were smaller, which can be explained as a consequence of the systematic application of entry protocols, joint diagnostics, and standardized antiparasitic treatments.

The individual factors of the different animals also intervened, in addition to the geographic differences, in the dynamics of the infection, given that the fact that the malnourished dogs presented a greater risk of parasitosis gives importance to the existing association between the nutritional states and the immune response before the parasitic invasions, similar data found in the studies of Amala (26) and Murnik (27). The degree of age was fully determining, since the puppies showed parasitic loads and diversity of the agents greater than that of the aged animals, similar data found by some

authors (21) (28) (29). This fact corresponds to the immaturity of the immune system in the earliest stages of life and to the greater predisposition of the animals in the same to processes of reinfection.

The environmental factors also determined the persistence of the infections. According to what was reported by Salnt et al. (30) and Papini et al. (31), the shelters that utilized water from untreated sources or from water stored in an inadequate form showed higher associations of enteric protozoa such as *Giardia spp.* and *Cystoisospora spp.* On the other hand, Vafae et al. (19) indicate that the warm and humid climatic conditions favored, on the other hand, the survival and maturation of the infectant forms of ancylostomids and trichurids in the medium, and thus help to maintain transmission cycles in places with those conditions.

From the optic of public health, the reviewed data corroborate that the shelter dogs infested by intestinal parasitosis possess a potential risk for the human communities. The presence of *Toxocara spp.* on tourist beaches where dogs attend in Ecuador reported by Calvopina et al. (6), permits corroborating the environmental contamination with infective forms in recreation spaces, in addition to incrementing the probability of human exposure. A parallel case is that described by Pal et al. (32) on the identification of coinfections of zoonotic helminths in community dogs in India that suggest that the dog populations could act as active reservoirs capable of maintaining the transmission in the environment.

With respect to the control strategies, the literature concurs (33) (34) that the isolated interventions, such as the sole deworming at entry, are insufficient to detain sustainedly the infection cycles.

Campanale et al. (12) corroborated that, although the initial deworming diminishes in the short term the prevalence, a considerable percentage of said animals maintains infections at egress, which also permits demonstrating the necessity of therapeutic schemes repeated over time and continuous monitoring. In the same line, various studies in Latin America have proposed protocols adjusted to contexts of limited resources, combining the use of broad-spectrum antiparasitics with the progressive improvement of the state of health and infrastructure of the shelters (16).

In environments in which there exists limited access to formal veterinary services, the practice of ethnoveterinary medicine has been utilized throughout history as an empirical strategy of sanitary management. The traditional utilization of medicinal plants and local knowledge, especially in rural and peri-urban populations in Latin America, Africa, and Asia, shows that accessible alternatives have been necessary for the management of the distinct ailments that affect the domestic animals (32) (35). However, from a scientific perspective these practices must be valued as a complementary strategy and not as a substitutive practice of evidence-based veterinary medicine.

Some studies have given account of the practices of use of plant extracts that could possess possible antiparasitic, anthelmintic, or antiprotozoal effects and that could contribute to the reduction of the parasitic load always that they form part of practices of sanitary management, hygiene, and community education (36) (37). However, the evidence that sustains these practices continues being scarce and heterogeneous, above

all with respect to the standardization of the plant species, to dosage and the routes of administration, as well as the evaluation of the adverse effects for their formal incorporation within standardized practices of sanitary management (35) (38).

In this context, ethnoveterinary medicine represents an emerging line of applied research that could contribute low-cost and culturally acceptable alternatives for the control of intestinal parasitosis in canine shelters, always that its practices are subjected to processes of rigorous scientific validation. The integration of this traditional knowledge with modern veterinary epidemiology would permit developing more contextualized sanitary strategies, aligned with the One Health approach, and oriented to improve in a sustainable manner the animal welfare and the protection of public health in environments with limited resources (32).

## CONCLUSIONS

The present study of epidemiological review on opportunistic zoonoses leads us to conclude, in the first place, that the intestinal parasitosis in shelter dogs constitute a biological and social problem of great impact, owing to the conditions in which these animals are sheltered. The compiled data demonstrate a marked preponderance of helminths and protozoa in contexts of overcrowding, deficient sanitary infrastructure, and scarce programs of veterinary control. This situation not only affects the animal welfare, its growth and nutrition, but also compromises in a significant manner the public health.

Despite the fact that the phenomenon under study is of a biological nature, the comparative analysis among countries demonstrates that the differences are related directly to the approach of the clinical epidemiology adopted. In regions such as North America and Europe, the prevalences tend to be low owing to the implementation of control strategies, while in Latin America, Asia, and Africa they surpass 60%, evidencing the lack of veterinary attention in shelters.

These results reinforce the necessity of addressing in an integral manner the problem, considering both the prevention and the control of the intestinal parasitosis in shelter dogs. Finally, it is concluded that the vacuum of systematic information, especially in Andean countries such as Ecuador, constitutes a limitation for the design of effective public policies. For that reason, it is recommended to foster longitudinal and multicentric investigations that permit generating robust data on prevalence, risk factors, and effectiveness of the interventions, adapted to contexts of low resources.

These new lines of investigation must be oriented not only to the epidemiological ambit, but also to the evaluation of the social and ethical impact of guaranteeing the welfare of the animals in situation of shelter.

## ACKNOWLEDGMENTS

We thank the Instituto Superior Tecnológico San Gabriel for the institutional, academic, and methodological support that made possible the development and the culmination of this investigation.

## DECLARATION OF INTEREST

*English translation of the original article published in Ecuacientífica, Vol. 4, No. 8, pp. 42-58.*

The authors declare that there exists no economic, personal, or academic conflict of interest that may have influenced in an inappropriate manner the elaboration of the present manuscript.

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*English translation of the original article published in Ecuacientífica, Vol. 4, No. 8, pp. 42-58.*

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