



Literature Review



THE IMPACT OF HELMINTH DISEASE

Nurhadi Muslim¹, Hamzah Hasyim², Nurrobikha³, Nurhasanah⁴, Nining Indah Sari⁵, Ocik Lestari⁶, Nurmaya Sari⁷, Nurhaida Sigalingging⁸

^{1,2,3,4,5,6,7,8} Faculty of Public Health, Universitas Sriwijaya, Sumatera Selatan, Indonesia

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Hamzah Hasyim

E-mail: hamzah@fkm.unsri.ac.id

ABSTRAK

According to the World Health Organization (WHO), over 1.5 billion individuals, or roughly 24% of the global population, are infected with intestinal worms, which primarily affect school-aged children. India is home to a third of the world's 2.5 billion people without access to proper sanitation, as well as two-thirds of the 11 billion people who practice open defecation and a quarter of the 15 million people who die each year from diarrhoeal diseases. This work does a literature review to investigate the effects of helminthiasis. The articles obtained were extracted and conclusions were drawn from a literature study of intestinal worms using the PubMed database; the number of articles extracted became a conclusion of up to 30 articles, and the strategy for searching for articles in the database used the keywords "disease," "worms," and "worm disease." The impact of gastrointestinal helminth infections on the developing microbiota of juvenile hosts is poorly understood. Four different procedures were employed to determine worm infestation. Anthelmintic resistance (AR) in intestinal helminths of dogs and cats has only been observed on a few occasions, in contrast to parasites of livestock and horses. Soil-transmitted helminths afflict billions of people worldwide, primarily in low- and middle-income countries with inadequate sanitation and high levels of air and water pollution.

INTRODUCTION

Worm illness is a condition in which worms or parasites that dwell in the intestines infect the human body. This illness can strike both children and adults. The flatworm or roundworm that infects the person can be either. According to the World Health Organization (WHO), helminthiasis is an infection caused by one or more intestinal parasitic worms of the intestinal nematode class. Nematodes in the intestine. Helminthiasis is caused by worms belonging to the Soil Transmitted Helminths (STH) class, which require specific soil conditions to achieve the infective stage. STH nematode species that cause helminthiasis include roundworms (*Ascaris lumbricoides*), hookworms (*Ancylostoma duodenale* and *Necator americanus*), threadworms (*Strongyloides stercoralis*), and whipworms (*Trichuris trichiura*). Pinworms are another non-STH nematode that regularly infects (*Oxyuris vermicularis*).

Helminthiasis is caused by worms belonging to the Soil Transmitted Helminths (STH) class, which require specific soil conditions to reach the infective stage of development. STH nematode species responsible for helminthiasis include roundworms (*Ascaris lumbricoides*), hookworms (*Ancylostoma duodenale* and *Necator americanus*), threadworms (*Strongyloides stercoralis*), and whipworms (*Trichuris trichiura*). Pinworms are another non-STH nematode that infects people (*Oxyuris vermicularis*).

Although worms do not produce disease outbreaks that result in a large number of victims, they do have major health consequences by steadily lowering human health, causing lasting impairment, decreased levels of intelligence in children, and even death. Worms can be harmful to children's health because they impair protein, carbohydrate, and fat absorption in the body. Reduced macronutrient absorption leads to a decline in nutritional status, health, IQ, and, ultimately, productivity in children.

METHODS

The method employed is literature review, which is a summary of what is known and unknown about a topic from a collection of scientific studies, including the current gap in existing knowledge. The PubMed database (<https://pubmed.ncbi.nlm.nih.gov/>) is used to conduct article

searches for the literature review. Papers from the last ten years were used, with a total of 30 articles reviewed. Three keywords are used in PubMed's article search strategy: "helminth", "disease", and "helminth disease". The working procedure of this literature review can be seen in Figure 1 below:

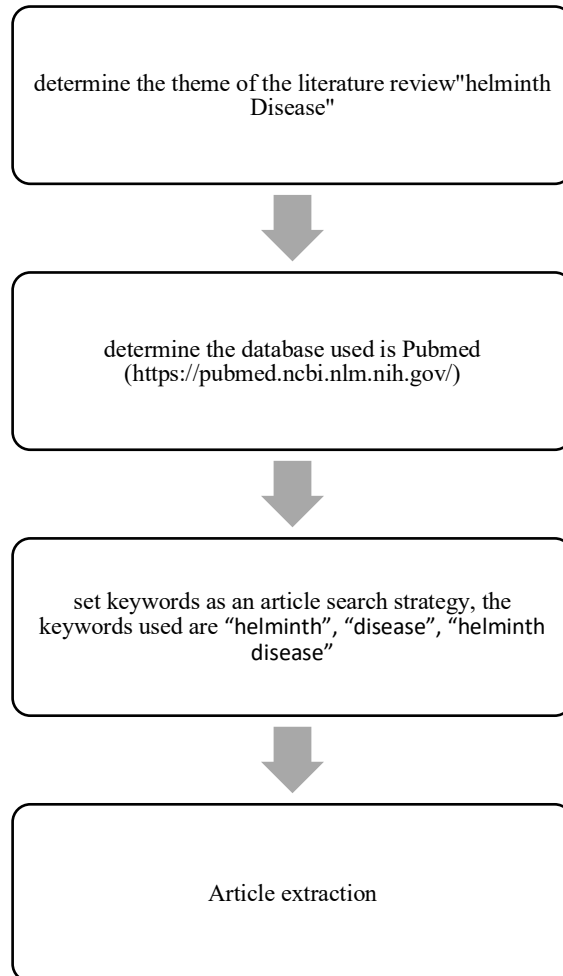


Figure 1: Literature Review Work Procedure

RESULT AND DISCUSSION

After obtaining 30 articles, then extraction of the articles was carried out, the results of the extraction from these articles were as follows:

No	Title/ Authors/ Years	Objective of Research	Type of Research	Method of Collecting Data	Population and sample	Result
1	Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection, and child malnutrition in Odisha, India: A cluster-randomised trial/ Clasen, Thomas Boisson, Sophie Routray, Parimita Torondel, Belen Bell, Melissa Cumming, Oliver	aimed to evaluate the efficacy of a rural sanitation intervention as part of the Indian government's Total Sanitation Campaign to prevent diarrhoea, soil-transmitted helminth infection, and	RCT's		100 rural village	We split the intervention group into 50 villages and the control group into 50 villages at random. In intervention villages, there were 4586 homes (24 969 people) and 4894 households (25 982 people) while in control villages, there were 4894 families (25 982 people). The intervention raised mean village-level toilet coverage from 9% to 63%, compared to 8% to 13% in control villages. Health surveillance data were collected from 1437 homes with children under the age of five in the intervention group (1919 children under the age of five) and 1465 households with children under the age of five in the control group (1916 children under the age of five). In children under the age of 5, the 7-day prevalence of reported diarrhoea was 88% in the intervention group and 91% in the control group (period prevalence ratio 0.97, 95 percent CI 0.83–1.12). In the intervention group, 162 people died (11 of these were

	Ensink, Jeroen Freeman, Matthew Jenkins, Marion Odagiri, Mitsunori Ray, Subhajyoti Sinha, Antara Suar, Mrutyunjay Schmidt, Wolf Peter/2014	infant malnutrition.					children under the age of five), whereas 151 people died in the control group (13 children younger than 5 years) [1]
2	Regulation of immunity and allergy by helminth parasites/ Maizels, Rick M./2020	-	-	-	-		Cellular immunology of the response to helminth infection, in particular, has revealed critical new populations such as the type 2 innate lymphoid cell,159 and the intestinal epithelial tuft cell,160,161, while reinterpreting the functions of subsets such as M2 macrophages,162 mast cells, and basophils. 163,164 With a better knowledge of helminth parasite molecular mechanisms, we can now envision how they can inspire future therapeutics against inflammatory illnesses. Defined parasite products target specific pathways, receptors, and cell populations that must be managed in certain disease circumstances, such as an inhibitor of IL33, the alarmin that is intimately associated with asthma in humans. Furthermore, widely acting mediators like those that drive regulatory cell populations show potential for recalibrating the overactive immune system in allergic illness. [2]
3	Dysbiosis associated with acute helminth infections in herbivorous youngstock - observations and implications/ Peachey, Laura E. Castro, Cecilia Molena, Rebecca A. Jenkins, Timothy P. Griffin, Julian L. Cantacessi, Cinzia/2019	-	-	-	-		These findings confirm the concept that gastrointestinal helminth infections in young cattle are linked with considerable changes in the GI microbiota, which may have an influence on both metabolism and the development of acquired immunity. This knowledge will guide future research targeted at determining the long-term consequences of infection-induced changes in the GI microbiota in young animals.[3]
4	In addition to birds’ age and outdoor access, the detection method is of high importance to determine the prevalence of gastrointestinal helminths in laying hens kept in alternative husbandry systems/ Zloch, Angelika Kuchling, Sabrina Hess, Michael Hess, Claudia/2021	-	-	-	-		To determine worm infestation, four alternative approaches were used. Cestodes were primarily discovered during necropsies when the worm infestation was assessed. [4]
5	Spread of anthelmintic resistance in intestinal helminths of dogs and cats is currently less pronounced than in ruminants and horses – Yet it is of major concern/ von Samson- Himmelstjerna, Georg Thompson, RC Andrew Krücken, Jürgen Grant, Warwick Bowman, Dwight D. Schnyder, Manuela Deplazes, Peter/2021	-	-	-	-		In light of current information about the genetics, processes, and principles of AR development, we highlight issues that, in our opinion, lead to a decreased risk of AR development in intestinal helminths of dogs and cats. Finally, we describe research priorities and make recommendations on how to effectively record, avoid, or at least postpone the development of AR in dog and cat helminths based on what we know about AR in ruminant and equine helminths. [5]
6	Comparison of helminth fauna from three different habitats in the Andaman Sea coastal ecosystem, southern Thailand/ Pakdee, Wallop	study investigated helminths in commercially caught marine fish from three ecological areas of the coastal	-	-	-		The findings also demonstrated that helminth diversity and physicochemical parameters differed considerably between the study sites; hence, physicochemical factors may play an essential role as contributing factors that determine helminth diversity in the Andaman Sea coastal environment.[6]

	Yeemin, Thamasak Sa-ngunkiet, Surapol Chullasorn, Supawadee Sutthacheep, Makamas/2018	ecosystem near Tarutao Island				
7	SARS-CoV-2 and helminth co- infections, and environmental pollution exposure: An epidemiological and immunological perspective/ Naidoo, Pragalathan, et al/2021	-	-	-	-	Soil-transmitted helminths afflict billions of people worldwide, primarily in low- and middle-income countries with inadequate sanitation and high levels of air and water pollution. [7]
8	Extracellular vesicles: new targets for vaccines against helminth parasites/ Drurey, Claire Coakley, Gillian Maizels, Rick M./2020	-	-	-	-	This study examines the relationships observed so far between helminth extracellular vesicles and the immune system, as well as the benefits of targeting these lipid-bound packets with a vaccine. Furthermore, we discuss various antigens that may be the greatest targets for an anti-helminth vaccine. In the future, comprehensive understanding of the parasites' whole arsenal for manipulating their host may provide us with the optimal target for a totally successful vaccination. [8]
9	The ‘breakpoint’ of soil-transmitted helminths with infected human migration/ Hardwick, Robert J. Vegvari, Carolin Truscott, James E. Anderson, Roy M./2019	-	-	-	-	Extend our investigation by creating a basic stochastic model and analyzing the uncertainty it introduces into the dynamics. All analytical results are backed by numerical analysis when relevant. [9]
10	Tuft-Cell-Derived Leukotrienes Drive Rapid Anti-helminth Immunity in the Small Intestine but Are Dispensable for Anti-protist Immunity/ McGinty, John W. Ting, Hung An Billipp, Tyler E. Nadsjombati, Marija S. Khan, Danish M. Barrett, Nora A. Liang, Hong Erh Matsumoto, Ichiro von Moltke, Jakob/2020	-	-	-	-	Type 2 immune responses are elicited by helminths, allergens, and some protists, but the underlying mechanisms of immune activation remain unknown. Chemosensing by epithelial tuft cells in the small intestine activates group 2 innate lymphoid cells (ILC2s), which drives increased tuft cell frequency. This feedforward circuit is required for intestinal remodeling and heme removal. [10]
11	Taxonomic Distinctness and Richness of Helminth Parasite Assemblages of Freshwater Fishes in Mexican Hydrological Basins/ Quiroz-Martínez, Benjamín Salgado-Maldonado, Guillermo/2013	analyse the distributional patterns of adult helminth parasites of freshwater fishes with respect to the main hydrological basins of Mexico	-	-	-	The current research shows distance - decay as one of the main elements leading to the observed patterns of variety. The present study found no evidence for the concept that helminth diversity could be explained by the basin's ichthyological variety.[11]
12	Impact of helminth diagnostic test performance on estimation of risk factors and outcomes in HIV-positive adults/ Arndt, Michael B. John-Stewart, Grace Richardson, Barbra A. Singa, Benson Van Lieshout, Lisette Verweij, Jaco J.	compared these associations using microscopy and PCR	This cross- sectional study	microscopy and real-time multiplex PCR for the stool detection and quantification of Ascaris lumbricoides, Necator americanus, Ancylostoma duodenale, Strongyloides	153 HIV- positive adults surveyed	Of 153 HIV-positive adults surveyed, 55(36.0%) and 20(13.1%) were positive for one or more helminth species by PCR and microscopy, respectively (p<0.001). PCR-detected infections were associated with farming (Prevalence Ratio 1.57, 95% CI: 1.02, 2.40), communal water source (PR 3.80, 95% CI: 1.01, 14.27), and no primary education (PR 1.54, 95% CI: 1.14, 2.33), whereas microscopy-detected infections were not associated with any risk factors under investigation. Microscopy-detected infections were associated with significantly lower hematocrit and hemoglobin (means of -3.56% and -0.77 g/dl) and a 48% higher risk of anemia (PR 1.48, 95% CI: 1.17, 1.88) compared to uninfected. Such associations were absent for PCR-detected infections unless

	Sangaré, Laura R. Mbogo, Loice W. Naulikha, Jacqueline M. Walson, Judd L./2013			stercoralis, and Schistosoma species		infection intensity was considered, Infections diagnosed with either method were associated with increased risk of eosinophilia (PCR PR 2.42, 95% CI: 1.02, 5.76; microscopy PR 2.92, 95% CI: 1.29, 6.60).[12]
13	Infections by human gastrointestinal helminths are associated with changes in faecal microbiota diversity and composition/ Jenkins, Timothy P. Rathnayaka, Yasara Perera, Piyumali K. Peachey, Laura E. Nolan, Matthew J. Krause, Lutz Rajakaruna, Rupika S. Cantacessi, Cinzia/2017	to identify consistent relationships between parasites and commensal microbial species	explore the qualitative and quantitative differences between the microbial community profiles of cohorts of human volunteers from Sri Lanka with patent infection by one or more parasitic nematode species (H +), as well as that of uninfected subjects (H-) and of volunteers who had been subjected to regular prophylactic anthelmintic treatment (Ht	-	-	Bacteria from the Verrucomicrobiaceae and Enterobacteriaceae families exhibited a tendency toward higher H+ abundance, whereas bacteria from the Leuconostocaceae and Bacteroidaceae families showed a relative rise in H- and Htrespectively. Our findings contribute to the broad, yet understudied, study topic of parasite—microbiota interactions, and will serve as a foundation for elucidating the role such interactions play in the pathogenic and immune-modulatory features of parasitic nematodes in both human and animal hosts.[13]
14	Advancing the multidisciplinary of parasitology within the British Society for Parasitology: Studies of host-parasite evolution in an ever-changing world/ Stothard, J. R. Littlewood, D. T.J. Gasser, R. B. Webster, B. L./2018	-	-	-	-	The study of parasites generally crosses into other scientific areas and covers several scales, from molecular to populational, while encouraging a knowledge of parasites situated within evolutionary time. Because parasites may be found in many ecosystems, threatening human, animal, and plant health, the 2030 Sustainable Development Goals (SDGs) help shape much of present parasitological research.[14]
15	Epidemiology of canine gastrointestinal helminths in sub-Saharan Africa/ Chidumayo, Nozyechi Ngulube/2018	The aim of this study was to characterise canine helminthiasis in sub-Saharan Africa using a systematic approach	Meta analysis	Pubmed and Google Scholar were searched for relevant primary studies published from 2000	Forty-one eligible studies were	Trematodes were recorded seldom. Most pooled estimates have a significant level of heterogeneity (I2 80 percent). According to the findings of this study, canine helminthiasis is quite common in Sub-Saharan Africa, and there is a need for frequent deworming programs to enhance the health of the dogs and reduce the possible health risk to people. [15]
16	Composition and structure of the helminth community of rodents in matrix habitat areas of the Atlantic forest of southeastern Brazil/ Lucio, Camila dos Santos Gentile, Rosana Cardoso, Thiago dos Santos de Oliveira Santos, Fernando Teixeira, Bernardo Rodrigues Maldonado Júnior, Arnaldo D'Andrea, Paulo Sergio/2021	-	-	-	-	Despite this, the majority of the helminth species found in this species are also found in Atlantic forest rodents, with the exception of P. (Paucipectines) zygodontomys, which has only been reported in N. lasiurus up to now (Supplemental Material), though it was also found in the other two host species in the current study. While all of the helminth species in A. cursor had previously been described in other Atlantic Forest rodent species, five of the eight species were recorded in A. cursor for the first time, increasing its known helminth fauna. [16]
17	Helminth therapies: Translating the unknown unknowns to known knowns/ Khan, Adnan R. Fallon, Padraic G./2013	-	-	-	-	For some years, the helminth treatment juggernaut has been building steam. Even given the heterogeneity in efficacy shown from trial to research, it is possible that we have reached the 'chicken and the egg' scenario, in which therapeutic demand outstrips the rate of mechanistic knowledge.[17]

18	A research agenda for helminth diseases of humans: Social ecology, environmental determinants, and health systems/ Gazzinelli, Andrea Correa-Oliveira, Rodrigo Yang, Guo Jing Boatin, Boakye A. Kloos, Helmut/2012			Using Stockols' social-ecological approach, we describe the role of various social (poverty, policy, stigma, culture, and migration) and environmental determinants (the home environment, water resources development, and climate change) in		We investigate these connections in terms of community engagement, intersectoral collaboration, gender, and the potential for scaling up helminth disease control and eradication programs in the context of integrated and multidisciplinary methods. The research agenda summarizes the significant gaps that must be filled. [18]
19	Control of helminth ruminant infections by 2030/ Vercruyse, Jozef Charlier, Johannes Van Dijk, Jan Morgan, Eric R. Geary, Tim Von Samson-Himmelstjerna, Georg Claerebout, Edwin/2018	present a vision of helminth control in farmed ruminants by 2030,	-	-	-	In order to successfully apply these worm control advances, infection patterns that are affected by changing climate and accompanying land use and farm husbandry changes must be successfully implemented. While scientific progress will produce numerous future solutions for helminth control, their integration and use must be prioritized in research programs if full advantages are to be achieved.[19]
20	High-dimensional analysis of intestinal immune cells during helminth infection/ Ferrer-Font, Laura Mehta, Palak Harmos, Phoebe Schmidt, Alfonso J. Chappell, Sally Price, Kylie M. Hermans, Ian F. Ronchese, Franca Le Gros, Graham Mayer, Johannes U./2020	-	-	-	-	Our cell isolation protocol and high- dimensional analysis allowed us to identify many known hallmarks of anti-parasite immune responses throughout the entire course of helminth infection and has the potential to accelerate single-cell discoveries of local helminth immune responses that have previously been unfeasible [20]
21	High helminthic co-infection in tuberculosis patients with undernutritional status in northeastern Ethiopia/ Gashaw, Fikru Bekele, Samuel Mekonnen, Yalemtehay Medhin, Girmay Ameni, Gobena Erko, Berhanu/2019	this study primarily focuses on determining the status of tuberculosis and parasitosis co-infections and associated factors	-	-	-	The rate of helminthic co-infection is predominantly high than that of intestinal protozoa. Single parasitic co-infection was more common than double or multiple co-infections. Both body mass index and mid- upper arm circumference anthropometric parameters revealed greater risk of undernutrition in tuberculosis patients.. [21]
22	Evaluating the performance of diagnostic methods for soil transmitted helminths in the Amhara National Regional State, Northwest Ethiopia/ Fenta, Abebe Hailu, Tadesse Alemu, Megbaru Nibret, Endalkachew Amor, Arancha Munshea, Abaineh/2020	this study aimed to compare and evaluate the performance of diagnostic methods for soil transmitted helminths.	A cross-sectional study	formol ether concentration, Kato-Katz, spontaneous tube sedimentation and agar plate culture techniques	520 school children was	Using a mix of approaches, the overall prevalence of soil transmitted helminths was 40.8 percent. Using formol ether concentration, Kato-Katz, and spontaneous tube sedimentation, the prevalence was 24.4 percent, 22.5 percent, and 32.4 percent, respectively. The agar plate culture revealed the greatest frequency of hookworm (29.2 percent). The sensitivity and negative predictive value of formol ether concentration were 57.9 percent and 78.4 percent, respectively, for Kato-Katz thick smear 55.2 percent and 76.4 percent, and 79.2 percent and 87.5 percent for spontaneous tube sedimentation to identify soil transmitted helminths. Agar plate culture has a sensitivity of 86.4 percent and a negative predictive value of 93.5 percent for hookworm identification, respectively. [22]
23	Helminth Infections Decrease Host	=	=	=	=	Helminthic infection is becoming increasingly rare in industrialized nations. Inflammatory illness is becoming more

	Susceptibility to Immune-Mediated Diseases						frequent as helminthic infection declines. The elimination of helminths from our environment, as well as their major effects on host immunity, might have contributed to this increase. Several diverse helminth species can prevent sickness in mice models of inflammatory bowel disease, type 1 diabetes, multiple sclerosis, and other disorders. Helminths stimulate immune regulatory systems such as dendritic cells, Tregs, and macrophages, which contribute in disease management..[23]
24	Host Immunity and Inflammation to Pulmonary Helminth Infections/						The outcomes of activating pulmonary host immune responses vary, with certain helminthic infections causing severe pulmonary impairment and others offering immunological tolerance and protection against the development of pulmonary illnesses. Further elucidation of the convoluted interface between helminth infection and pulmonary host immune responses is crucial for the development of innovative treatments, which are critical for preventing the enormous worldwide morbidity caused by these parasites.[24]
25	Composition and structure of the helminth community of rodents in matrix habitat areas of the Atlantic forest of southeastern Brazil/ Lucio, Camila dos Santos Gentile, Rosana Cardoso, Thiago dos Santos de Oliveira Santos, Fernando Teixeira, Bernardo Rodrigues Maldonado Júnior, Arnaldo D'Andrea, Paulo Sergio/2021						The current study's findings supported the idea that <i>N. lasiurus</i> had a helminth fauna comparable to that previously seen in the Cerrado and Caatinga locations. Despite this, the majority of the helminth species found in this species are also found in Atlantic forest rodents, with the exception of <i>P. (Paucipectines) zygodontomis</i> , which has only been reported in <i>N. lasiurus</i> up to now (Supplemental Material), though it was also found in the other two host species in the current study. [16]
26	Helminth therapies: Translating the unknown unknowns to known knowns/ Khan, Adnan R. Fallon, Padraic G./2013	-	-	-	-		At the time of writing, at least 16 clinical trials employing helminth treatment were underway in a variety of illnesses ranging from IBD to MS to autism. For some years, the helminth treatment juggernaut has been building steam. Even given the heterogeneity in efficacy shown from trial to research, it is possible that we have reached the 'chicken and the egg' scenario, in which therapeutic demand outstrips the rate of mechanistic knowledge. However, there are precedents for this, since several medications in clinical use today, such as sulfasalazine, are effective therapy despite an inadequate understanding of their mechanisms of action. [25]
27	Soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm/ Bethony, Jeffrey Brooker, Simon Albonico, Marco Geiger, Stefan M. Loukas, Alex Diemert, David Hotez, Peter J./2006						As a consequence of statistics indicating gains in child health and education following deworming, as well as the illness load due to soil-transmitted helminths, the global population is becoming more aware of the significance of these diseases. Concerns regarding the long-term viability of benzimidazole anthelmintic deworming and the establishment of resistance have driven initiatives to develop and test other control techniques.[26]
28	Cross-disciplinary approaches for measuring parasitic helminth viability and phenotype/Peak, Emily Hoffmann, Karl F./2011	-	-	-	-		Further quantitative advances in this field are expected to emerge and have a favorable influence on fundamental helminth biology investigations. More significantly, the application of these high-throughput methods opens up a huge possibility for the quick identification of much required medication classes beneficial in the management of these lethal parasite illnesses. [27]
29	Helminth lifespan interacts with non-compliance in reducing the effectiveness of anthelmintic treatment/Farrell, Sam H.						Our findings show that reducing systematic noncompliance may be especially beneficial in mass medication administration programs treating longer-lived helminth parasites, and they underscore the need of enhanced data collecting in understanding the impact of compliance. [28]

	Anderson, Roy M./2018	As a result, 83% of the hosts were allocated to the right a priori categories. The disparity in parasite loads is most likely explained by the two hosts' varied eating patterns and habitat preferences. 29]
30	Helminth parasites of stellate sturgeon Acipenser stellatus Pallas, 1771 and Persian sturgeon Acipenser persicus Borodin, 1897 (Pisces: Acipenseridae) from the South-East Caspian Sea/Rajabpour, M. Malek, M. MacKenzie, K. Aghlmandi, F./2018	

The intervention villages had 4586 homes (24 969 people) whereas the control villages had 4894 houses (25 982 people). The intervention raised mean village-level toilet coverage from 9 percent to 63 percent, compared to 8 percent to 12 percent in control villages. Helminth parasites coevolved with human immune system and are now being exposed as troves of remarkable immunological weapons capable of manipulating every aspect of immunity.

The research of the immune response to helminths has revealed several points of overlap with allergies and other inflammatory conditions. A multitude of evidence suggests that the gastrointestinal (GI) microbiota of neonates and young vertebrates plays a role in the development and modulation of the host immune system. However, understanding of the influence of GI helminth infections on the growing microbiota of juvenile hosts is still limited. To determine worm infestation, four alternative approaches were used.

In contrast to parasites of livestock and horses, anthelmintic resistance (AR) in intestinal helminths of dogs and cats has been observed relatively infrequently. Soil-transmitted helminths afflict billions of people worldwide, primarily in low- and middle-income countries with inadequate sanitation and high levels of air and water pollution. This study examines the relationships observed so far between helminth extracellular vesicles and the immune system, as well as the benefits of targeting these lipid-bound packets with a vaccine.

In the future, comprehensive understanding of the parasites' whole arsenal for manipulating their host may provide us with the optimal target for a totally successful vaccination. We present an analytic framework for describing the dynamics of soil-transmitted helminth (STH) parasitic infections near the transmission breakpoint and equilibria of endemic infection and disease extinction, while allowing for

perturbations in the parasite's infectious reservoir within a defined location.

This perturbation simulates the effect of infected human migration across villages with varied levels of parasite control produced by mass medicine delivery (MDA). Chemosensing by epithelial tuft cells in the small intestine stimulates group 2 innate lymphoid cells (ILC2s), causing tuft cell frequency to rise. cysLTs, on the other hand, are not necessary for the tuft cell response generated by intestinal protists.

The current research shows distance - decay as one of the main elements leading to the observed patterns of variety. The present study found no evidence for the concept that helminth diversity could be explained by the basin's ichthyological variety. [11]. PCR-detected infections were associated with farming (Prevalence Ratio 1.57, 95 percent CI: 1.02, 2.40), communal water source (PR 3.80, 95 percent CI: 1.01, 14.27), and no primary education (PR 1.54, 95 percent CI: 1.14, 2.33), whereas microscopy-detected infections were not associated with any risk factors under investigation.

Newer diagnostic technologies, such as polymerase chain reaction (PCR), increase the diagnosis of helminth infections. This increased sensitivity may improve the detection of infection risk variables while decreasing the capacity to distinguish infections linked with poor clinical outcomes. Bacteria from the Verrucomicrobiaceae and Enterobacteriaceae families exhibited a tendency toward higher abundance in H⁺, whereas bacteria from the Leuconostocaceae and Bacteroidaceae families showed a relative rise in H⁻ and H, respectively.

The study of parasites generally crosses into other scientific areas and covers several scales, from molecular to populational, while encouraging a knowledge of parasites situated within evolutionary time. Because parasites may be found in many ecosystems, threatening human, animal, and

plant health, the 2030 Sustainable Development Goals (SDGs) help shape much of present parasitological research.

There were 26 general of intestinal helminths recorded, and the pooled estimate of canine helminthiasis was 71% (95 percent CI: 63–79%). The most commonly reported helminths were *Ancylostoma* and *Toxocara* species, which are the causal agents of larva migrans in humans, with pooled estimated prevalences of 41 percent (95 percent CI: 32–50 percent) and 22 percent (95 percent CI: 16–29 percent), respectively. Nonetheless, with the exception of *P.*, the bulk of the helminth species discovered in this species are also present in Atlantic forest rodents. In the instance of *A.* Helminths may not be appropriate for all patients, but the capacity to 'genotype' a cohort for therapeutic compatibility would undoubtedly boost efficacy rates considerably.

Dissecting and pinpointing significant alterations in the immunological genome will take time, and once this knowledge is obtained, a more refined, elegant use of helminths in the clinic may be explored. We investigate these connections in terms of community engagement, intersectoral collaboration, gender, and the potential for scaling up helminth disease control and eradication programs in the context of integrated and multidisciplinary methods. The research agenda summarizes the significant gaps that must be filled.

Furthermore, the causes of system change are expected to differ greatly throughout the globe (Thornton, 2010), influencing the demand for and adoption of new technologies. Due to the powerful anti-parasite type 2 immune responses that drive mucus generation, tissue remodeling, and immune cell infiltration, single cell isolation from helminth-infected mouse intestines has proven notoriously difficult. We were able to efficiently separate millions of immune cells from the severely contaminated duodenum by meticulous improvement of a typical intestinal digesting routine. Co-infection with both diseases was not linked with gender or age ($P > 0.05$).

The prevalence of undernutrition was 58.6 percent based on BMI and 73.0 percent based on mid-upper arm circumference, with no significant correlation with gender. The prevalence of helminthic co-infection is higher than that of intestinal protozoa. Using a mix of approaches, the overall prevalence of soil transmitted helminths was 40.8 percent. Agar plate culture (APC) approach performed better for hookworm identification than other methods.

As a result, using spontaneous tube sedimentation for ordinary laboratory reasons and agar plate culture for

research purposes will significantly help in the correct detection of parasite diseases [22]. Soil-transmitted helminths afflict billions of people worldwide, primarily in low- and middle-income countries with inadequate sanitation and high levels of air and water pollution.

SARS is an abbreviation for Severe Acute Respiratory Syndrome. The virus that causes Coronavirus disease 2019 (COVID-19), Coronavirus 2 (SARS-CoV-2), can amplify Th1/Th17 pro-inflammatory cytokine production in humans, resulting in a cytokine storm. This effect on the lungs happens either directly as a result of larval migration and host immunological activation, or indirectly as a result of a systemic inflammatory immune response. Helminths influence the pulmonary immune response by complex orchestration and activation of the host's innate and adaptive immune cells. Nonetheless, with the exception of *P.*, the bulk of the helminth species discovered in this species are also present in Atlantic forest rodents. In the instance of *A.*

Gaining a better knowledge of the 'immunome' is the key to unlocking the promise of helminth treatment. Helminths may not be appropriate for all patients, but the capacity to 'genotype' a cohort for therapeutic compatibility would undoubtedly boost efficacy rates considerably. At the time of writing, at least 16 clinical trials employing helminth treatment were underway in a variety of illnesses ranging from IBD to MS to autism. For some years, the helminth treatment juggernaut has been building steam.

The prevalence of undernutrition was 58.6 percent based on BMI and 73.0 percent based on mid-upper arm circumference, with no significant correlation with gender. The prevalence of helminthic co-infection is higher than that of intestinal protozoa. The intervention villages had 4586 homes (24 969 people) whereas the control villages had 4894 houses (25 982 people). The intervention raised mean village-level toilet coverage from 9 percent to 63 percent, compared to 8 percent to 12 percent in control villages.

CONCLUSION

There is little known regarding the impact of gastrointestinal helminth infections on the developing microbiota of juvenile hosts. Four different procedures were employed to determine worm infestation. In contrast to parasites of livestock and horses, anthelmintic resistance (AR) in canine and feline intestinal helminths has only been observed on a few instances. Billions of people worldwide are infected by soil-transmitted helminths, primarily in low-

and middle-income countries with inadequate sanitation and high levels of air and water pollution.

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