

ZOONOTIC PARASITE: UNDERSTANDING, IMPACTS AND STRATEGIES FOR CONTROL

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ABSTRACT

Zoonotic parasites pose a significant threat to global health. This article comprehensively explores the diverse landscape of zoonotic parasite, their biology, transmission dynamic, impacts on health and challenges associated with their control. This review article focusses on elucidating effective strategies for the prevention, management and control of zoonotic parasites to mitigate their impact on both human as well as animal health. Through an analysis of existing literature and case studies, this article aims to supply a holistic understanding of zoonotic parasites and purpose multifaceted approaches for their controls.

Introduction:

Zoonotic parasites, organism that can be transmitted from one organism to another organism such as between animals and humans encompass a broad spectrum of pathogens, including protozoa, helminths and arthropods [1]. Their ability to infect multiple hosts presents a unique challenge for disease control and prevention efforts, necessitating an interdisciplinary approach involving veterinary medicine, public health, social science, and environmental science [1].

Classification and epidemiology of zoonotic parasites

Toxicity and diversity of parasites: Zoonotic parasites encompass a diverse range of organisms including protozoa helminths (worms), and arthropods (such as ticks and fleas). Within these groups several genera and species are known to cause zoonotic infection for intense (1). **Protozoa** (such as *Giardia lamblia*, *Toxoplasma gondii*, and *Leishmania*) [3], **helminths** (such as *Ascaris lumbricoides*, *Taenia*, *Schistosoma*.) [3], **arthropods** (*Borrelia burgdorferi*, *Yersinia pestis*, *Plasmodium*) [11]. Global prevalence and distribution of key zoonotic parasites (: The prevalence and distribution of zoonotic parasites vary cross geographical regions due to environmental factors host availability and socioeconomic conditions. For instance, *Toxoplasma gondii* (worldwide with higher prevalence in regions where consumption of undercooked meat is contact with infected cats is more common). *Malaria* (prevalent in tropical and subtropical areas where anopheles mosquito thrives). *Leishmaniasis* (mostly in parts of Africa, Asia, and America, linked to poverty and substandard living conditions). *Schistosomiasis* (more common with area with poor sanitation and limited access to clean water).

Understanding zoonotic parasite biology

Life cycle and host specificity: Zoonotic parasites often have a complex life cycle involving multiple hosts. Understanding this cycle is important for controlling their spread. Some parasites are specific toward their host or vectors while they have a border range of hosts they can infect. Factor influencing parasite transmission dynamics: Several factors influence the transmission of zoonotic parasites. These can include environmental conditions (temperature, humidity), vector availability, host behavior and human activities. Emerging zoonotic parasite and their implications: Constant change in ecosystem climate and human to animal interactions contribute to the appears of new zoonotic parasite these emerging parasites pose challenges due to their potential to cause disease in previously unaffected population, highlighting the need for surveillance and rapid response measures[5].

Health impact and economic burden

Clinical manifestation in humans and animals: **Animals** (zoonotic parasite can cause a range of symptoms in animal including gastrointestinal issues, respiratory problems, skin problems and in severe cases organ damage or organ failure). **Human** (clinical manifestation vary widely based on type of parasite. Symptoms can include fever diarrhea, neurological signs, skin problems, anemia and in severe cases organ damage or death) [1]. Economic burden and productivity losses: **Health care cost** (treating zoonotic parasitic infection in curs' substantial health care expenses including diagnostic tests medications and hospitalization) [10]. **Productivity loss** (infected individuals especially those in agriculture and rural settings might experience reduced reproductivity due to illness impacting both the personal income and national economies). Public health implications and societal impact: **Public health impact** (zoonotic parasite pose significant public health challenges due to their ability to cause widespread infectious and potential outbreak)[1]. **Societal impact** (these parasites affect society by reducing workforce

efficiency, increasing health care demands and staining health care systems particularly in regions with limited resources) [8].

Challenges and controlling zoonotic parasite

Diagnostic limitations and surveillance challenges: **Diagnostic challenges** (zoonotic parasites often presents challenges in diagnosis due to diverse symptoms and variation in infection stages and the need for specialized tests). **Surveillance difficulties** (surveillance of zoonotic parasite involves monitoring both the animal and human populations needing coordinated efforts among health sectors challenges include inadequate resources wearing reporting systems and under reporting of cases). Environmental and ecological factors influencing transmission: **Environmental conditions** (factors such as climate change, temperature, humidity, and ecological alteration affect the distribution and prevalence of zoonotic parasites and their vectors). **Vector habitats** (changes in land use or deforestation can alter the habitat for vectors like mosquitoes or ticks, influencing parasites transmission patterns). Socioeconomic determinants of zoonotic parasites transmission: **Poverty and living conditions** (socioeconomic factor, including poverty, inadequate sanitation, and limits access to clear water, significantly affect the prevalence and spread of zoonotic disease). **Human behavior and cultural practices** (human behavior cultural norms and practice related to food consumption, hygiene and animal handling can influence the risk of exposure to zoonotic parasite) [6].

Strategies of effective control

One health approach:

Integrating human and animal health (embracing the interconnectedness of human and animal health system from the corner stone of combating zoonotic parasite clericity efforts between veterinary and medical professionals' researchers and policy makers strengthening surveillance, early detection and coordinated responses, fostering a unified defense against these shared threats) [6].

Vaccination, treatment, and chemoprophylaxis (inoculation stand as a stalwart defense against certain zoonotic parasite, supplying immunity in both animal and humans. Equally crucial are effective treatments and chemoprophylaxis to mitigate infection and reduce transmission rate, underscoring the importance of access to quality health care) [2].

Vector control and environmental management (targeted interventions focusing on vector control strategies, such as insecticides use, and habitat management plays a pivotal role in curbing the spread of zoonotic parasite. Addressing environmental factors contributing to vector habitat helps disrupt the transmission cycle and reduce the risk of infection) [9]. **Public awareness and education initiative** (empowering communities through education initiatives and rising public awareness serve as linchpins in preventive efforts informative campaigns emphasizing hygiene practices, safe handling of animal and importance of regular checkup ease behavioral changes crucial in minimizing exposure to zoonotic parasite) [4].

Conclusion

The intricate web of zoonotic parasite necessitates a multifaceted approach in their understanding, control and prevention. Integrating one health perspective, collaborative strategies inter twining human and animal health system, alongside vaccination, treatment, vector control and community awareness initiative, from the bed rock of effective control program. lesson grant from previous studies and research advocate for interdisciplinary elaboration, adaptability and sustained Surveillance as pivotal element in mitigating these elusive threats. Looking ahead prioritizing research aligning policies and fostering global collaboration are the key stone guiding us toward

a future where the impact of parasite is mitigated, securing the healthier, interconnected world for all.

References

- [1] Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*. 2001 Jul 29;356(1411):983-9.
- [2] Hogerwerf L, Roof I, de Jong MJ, Dijkstra F, van der Hoek W. Animal sources for zoonotic transmission of psittacosis: a systematic review. *BMC infectious diseases*. 2020 Dec;20:1-4.
- [3] Rahman MT, Sobur MA, Islam MS, Levy S, Hossain MJ, El Zowalaty ME, Rahman AT, Ashour HM. Zoonotic diseases: etiology, impact, and control. *Microorganisms*. 2020 Sep 12;8(9):1405.
- [4] Justice MJ, Dhillon P. Using the mouse to model human disease: increasing validity and reproducibility. *Disease models & mechanisms*. 2016 Feb 1;9(2):101-3.
- [5] Nicoletti PL. Relationship between animal and human disease. In *Brucellosis 2020* Jul 24 (pp. 41-51). *crc Press*.
- [6] World Health Organization. The control of neglected zoonotic diseases: a route to poverty alleviation: report of a joint WHO. World Health Organization; 2006.
- [7] Adam RD. The *Giardia lamblia* genome. *International journal for parasitology*. 2000 Apr 1;30(4):475-84.
- [8] Robert T. Murrill K. &Mark S." Economic losses caused by food borne parasitic disease. *Parasitol Today*. 1994;10:419-23.
- [9] Bos R, Mills A. Financial and economic aspects of environmental management for vector control. *Parasitology Today*. 1987 Jan 1;3(5):160-3.
- [10] Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, Daszak P. Global trends in emerging infectious diseases. *Nature*. 2008 Feb;451(7181):990-3.
- [11] Sarvi S, Daryani A, Sharif M, Rahimi MT, Kohansal MH, Mirshafiee S, Siyatpanah A, Hosseini SA, Gholami S. Zoonotic intestinal parasites of carnivores: A systematic review in Iran. *Veterinary world*. 2018 Jan;11(1):58.

