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One health in veterinary parasitology: A mini review

Koppula Anusha

Abstract
One health concept is an integrated, collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and environment. It is particularly important to prevent, detect, and respond to global health threats such as COVID-19 pandemic. This one health concept is particularly relevant for food and water safety, nutrition, control of Zoonosis, drug resistance, environmental contamination, vector-borne diseases and other health threats shared by people, animals, and the environment. Parasitology is an example of the holistic approach of both medical and veterinary medicine. Parasitic zoonosis via contaminated food and water, Bite of vectors, faeco-oral route or oral Penetration, through skin and mucous membranes, Blood transfusion, any organ transplant and Autoinfection. The recent development of diagnostic innovations focusing on parasites of zoonotic importance will be introduced showcasing the present and future dimensions, opportunities, and applications.

Keywords: One health, parasitic zoonosis, diagnostic innovations

Introduction
The term "zoonosis" was first used in the 19th century by the German physician and statesman Rudolf Virchow, who is credited with being the "Father of Comparative Medicine, Veterinary Pathology, and Cellular Pathology" (Kahn *et al*. 2007) [2]. He also stated that "between Animal and Human Medicine there are no dividing lines nor should there be." However, there was a steadily growing divide between veterinary and human medicine in the 20th century. Through the work of the epidemiologist Calvin Schwabe (Schwabe, 1984) [7], who first established the notion of "One Medicine" - a general medicine for both humans and animals - the tight connection between animals, humans, and public health was once again recognized. The new name for this was "One health." It uses social, biological, medicinal, veterinary, and environmental science disciplines to advance certain fields.
According to Wood *et al*. (2012) [8], one health is mostly employed as a tool to highlight the introduction and re-emergence of "new" human diseases. The COVID-19 epidemic has educated scientists, job holders, legislators, and even laypeople over the past two years on the importance of integrative one medicine (also known as One Health), as well as raising their knowledge of the connections between veterinary sciences and human medicine. The holistic approach of both human and veterinary medicine is demonstrated by parasitology. High-profile zoonotic and medical parasitic infections like Plasmodium, veterinary parasitic infections of both wild and captive animals, and many of the agents that cause neglected tropical diseases, extending to parasites which infect plants and other parasites, are examples of parasites (Meekums *et al*. 2015; Sandlund *et al*. 2015) [4, 6]. We have a little knowledge of the parasitic infections and wildlife fauna, including those that can be transmitted to domestic animals and/or humans. According to MacPhee and Greenwood (2013) [3], there is a shocking dearth of information regarding pathogen diversity and susceptibility in primarily wildlife.

Parasitic Zoonosis
Many emerging zoonotic parasites are food borne in nature (WHO 2002) [9]. Undoubtedly, Parasitic zoonoses play a very important role in zoonotic transmission, that will be discussed with a focus on mainly, Meat borne diseases were Toxoplasmosis, Taeniasis, Trichinellosis, Sarcocystis, Pentostomiasis and Fish borne were capillariasis, Gnathostomiasis, Anisakiasis, Clonorchiasis, Opisthorchiasis, Paragonimiasis, Angiostrongyliasis, Heterophyiasis, Diphyllobothriosis.

Soil borne zoonosis were visceral larva migrans, cutaneous larva migrans, Tungiasis.
Plant borne zoonosis were Fasciolosis, Fasciolopsiasis
Faeco oral route Cryptosporidiosis, Giardiasis, Amoebiaisis, Dracunculosis, Schistosomiasis.
Vector borne were Trypanosomiasis, Leishmaniasis, Malaria, Babesiosis, Filariasis.
Occupational Parasitic zoonotic diseases were Hydatidosis, Toxoplasmosis, Neurocysticercosis, Cryptosporidiosis, Schistosomosis.

Diagnosis

1. Microscopic examination

Sedimentation	Heavy eggs, operculated eggs, larvae
Floatation	Nematode eggs, non-operculated eggs of trematodes (*S.mansoni*)
Stoll's technique	Eggs of hookworms, *S.mansoni*
Baermann's technique	Nematode larvae
Sputum examination	*P. westermani* – rusty brown colour
Urine examination	*S. haematobium* eggs
Blood examination	Trypanosomes, Microfilaria
Biopsy examination	Muscle biopsy - *T. spiralis*

2. Cultivation

Media- NNN, Balamuth's medium, Diamond's medium

3. Xeno diagnosis

The vector of a parasite is infected to make identification of the parasite easier after a period of multiplication. Ex - *T. cruzi*

4. Immunological diagnosis

Intradermal skin test - Casoni's test, Montenegro test,
Serological test – IHA, ELISA, IFAT etc

5. Molecular diagnosis – PCR, LAMP

Management and control measures

Regarding one health in control of parasitic zoonosis main role is for Environmental hygiene in control of transmissible factors such as mechanical vectors, for example, mosquitoes, house flies. Manage mental measures to be applied for environmental hygiene are source reduction, filling and drainage operations, water sanitary measures and proper disposal of refuse and other wastes. Simple fly traps were effective way of controlling house fly population. Systematic antemortem and postmortem examination of slaughter animals and proper disposal of offals has led to a substantial reduction in the risk of transmitting meat borne parasitic infections, Implementation of hygiene farm practices improves the sanitary environment health of animals. The practices include proper excreta treatment and disposal, availability of clean water, ventilation in poultry farms, pest control and general cleanliness.

Chemical measures

A wide range of insecticides belonging to organochlorine compounds, organophosphate, carbamates, pyrethroid groups are available for vector control. Improper usage of insecticides results in the development of insecticide resistance by transmissible vectors. Highly persistent compounds like DDT have now been replaced by readily biodegradable and less toxic compounds such as Methoxychlor, abate, and others fumigants such as Hydrogen cyanide, Methyl bromide, Sulphur dioxide. The pyrethroids are effective at low doses and cause low mammalian toxicity. In China bed nets impregnated by deltamethrin (15 mg/m2) have been used on mass scale. Bed netting serves as a baited trap for mosquitoes, who are attracted to the carbon dioxide and body odor that the people sleeping beneath the net emit. *Culex quinquefasciatus*, the filariasis vector has been controlled with the help of oil films on water in pit latrines and blocked drains. Floating layers Expanded Polystyrene beads will interrupt the respiratory patterns being used in water tanks is an enduring and efficient control technique (Curtis, 1994) [1] for mosquitoes eg: *Anopheles stephensi*.

Genetic manipulation of insect vectors

A controlled manipulation of an insect's genome by the direct insertion of DNA into the germ line is required due to the development of insecticide resistance by vector insects, the high cost of producing and registering new insecticidal compounds, and the challenging potential for gene exploitation provided by various cloning techniques.
Health education through mass media such as radio, television, newspapers, cinema, wall slogans, advertisements can be very effective. The services of various social and voluntary organizations can also be utilized for the purpose.

Conclusion

One Health concept through parasitology is particularly relevant on safety of food and the control of parasitic zoonotic diseases. One health initiative was formed by WHO to integrate work on animal, human and environment health. One health quadripartite WHO also working with FAO, UNEP and WOAH for giving recommendations for research on emerging diseases threats and development of long term global plan of action to evert various outbreaks of zoonotic diseases. Animals and humans are both infected by many of the same parasites since they share the same ecosystem. One sector's efforts alone won't be enough to stop or solve the issue. Multiple sectors collaborate and communicate through a single health approach to improve health outcomes. To better understand the one health idea, more research is needed on zoonoses and food safety.

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