VETERINARY TODAY

Popular Article
ISSN: 2583-8288

One Health – A Holistic approach towards Zoonotic Diseases

Manjusha K M[1], Anandhu S[2] and Chaithra S N[1]
[1]PhD scholar, Division of Surgery, [2]PhD scholar, Division of Parasitology,
ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Abstract

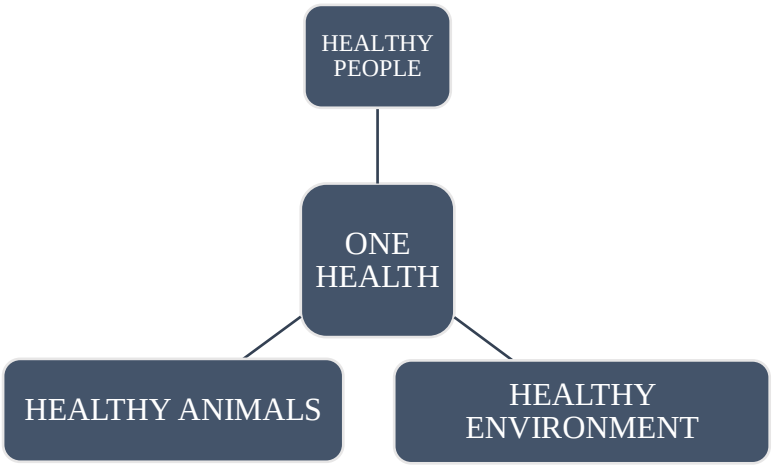
One Health has been attributed as a global strategy for disease control and prevention. One health emphasis on the fact that the heath of human beings is closely related to the health of animals and their shared environment. Recent pandemic outbreak has reminded us the connection between health and environment. One health is gaining momentum these days due to the drastic emergence of various zoonotic diseases throughout the globe. One health is a critical measure against prevention of zoonotic diseases and correspondingly it addresses other environmental issues like antimicrobial resistance and food safety.

Keywords: One health, zoonoses, human beings, animals and environment

Introduction

One health is a global collaboration between experts from various fields like health care, public health, veterinary, environmental, forestry and other related disciplines to ensure optimum health for humans, animals and environment. The interconnection between human being, animal and environment has given rise to the evolution of numerous zoonotic diseases. Common one health issues include zoonotic diseases, food safety and security, environmental contamination, vector borne diseases and other health threats shared between people, animals and environment (Aggarwal and Ramachandran, 2020). Zoonotic diseases are the diseases that are transmitted between humans and animals. About 60% of the infectious agents that affects humans are zoonotic in nature and 75% of the emerging infectious diseases are zoonotic (Dahal and Kahn, 2014). Every year, millions of human beings and animals around the globe are getting affected with zoonotic diseases. Examples of zoonotic diseases include rabies, west nile virus, Q-fever, salmonella infection, brucellosis, lyme disease, ebola, ringworm etc. With the increase in population, urbanization, industrialization and geopolitical problems, the biodiversity and ecosystems are getting deteriorated which is a major factor for occurrence of zoonotic diseases.

One health



According to WHO, One health is a multisectoral approach to achieve better public health outcomes. One health concept helps to understand the interaction between humans and animals and how these interactions pave way to the development of various diseases. It provides a common platform for the interaction between wildlife biologists, scientists, veterinarians, agriculturalists, epidemiologists, physicians and biomedical engineers to promote optimum health

for human beings, animals and environment. One health mobilizes people from multiple communities, sectors and disciplines from various sections of society to work together to tackle threats to health and ecosystems and to achieve a sustainable environment.

Value of one health

The recurring outbreaks of zoonotic diseases like Avian influenza (H_5N_1), Severe Acute Respiratory Syndrome (SARS), Nipah and Ebola virus disease (EVD) revealed the interconnection between human beings, animals and the environment and it emphasized the requirement of a coordinated approach to tackle these zoonotic diseases. One health is novel in combining different sectors and discipline together to provide wider benefits (Kelly *et al*., 2020). The coordination among the cross sectors can improve science based decision making, reduce unwanted duplication among different sectors affecting the health and the outside factors influencing diseases (Machalaba *et al.*, 2018). One health expands the scope of comparative medicine for disease surveillance in animals and environment for early detection and diagnosis of the disease. For example, the death of apes due to Ebola virus can help in preventing the outbreak in human population by estimating the occurrence of predictions and taking preventive measures (Rouquet *et al.*, 2005). The outbreak of Rift valley fever can be predicted from weather changes and accordingly vaccination campaign and mosquito control measures (Anyamba and Chretien, 2009). Rabies control in domestic animals have been found to be effective through vaccination which have paved way for alternate strategy for rabies control in wild animals (Fitzpatrick *et al*., 2016).

Zoonoses and one health

Zoonoses leads to death of millions of individuals annually. The complex relationship between human beings, animals and the environment require multidisciplinary collaboration to tackle the threats caused by zoonoses. One health is a key aspect in addressing zoonotic diseases, public health threats and neglected tropical diseases (NTD).

One health issues

One health issues include zoonotic diseases, food safety and security, antibiotic resistance, vector borne diseases, environmental heath, chronic diseases, occupational health and mental health. The major drawbacks of implementing one health include lack of legal framework for implementation, poor coordination among public and private sector agencies, lack of adequate surveillance of animal diseases, constraints in data sharing and financial instabilities.

Need of the hour

Various factors like population explosion, climate change, global trade, biodiversity loss, erratic human lifestyle, international travel, along with mutations and variations in pathogens have contributed to the emergence and reemerging spread of newer infectious diseases like COVID-19, SARS and Middle East Respiratory Syndrome (MERS) (Jorwal *et al*., 2020). Implementing timely and systematic zoonotic surveillance, regulated antibiotic use among human beings and animals, establishment of zoonotic registry and constituting an expert network of stakeholders from academics, research, pharmaceuticals and other sectors is the need of the hour to tackle both emerging and reemerging zoonotic diseases under the umbrella of one health.

One health and Covid-19

The world has been witnessing major health crisis due to the novel corona virus SARS-CoV-2 since 2019. The virus first appeared in China in December 2019 and later spread over the globe drastically affecting more than 200 countries (Jorwal *et al*., 2020). The WHO declared COVID-19 as a pandemic and public emergency causing severe health issues on 11th March 2020. Globally, as of 6th September 2023, there are 770,437,327 confirmed cases of COVID-19 and 6,956,900 death cases as reported by WHO. The novel corona virus caused significant to severe respiratory infections in human beings and has led to misery all over the world. The novel corona virus has alarmed the health organizations across the world and has caused significant social and economic losses. Covid-19 has caused severe damage to world

company and jeopardized the human health. The members of corona viruses are prototype of one health viruses (Marty and Jones, 2020).

Saga towards one health

The operational mechanism of one health is variable across countries. The development of zoonotic disease units as coordination platforms should be enhanced. The UNO, World bank and USAID EPT program have compiled tools like resource mapping, capacity assessments and prioritization as strategies for one health system improvement (Baum *et al*., 2017; Machalaba *et al*., 2017; Schar *et al*., 2018; Schelling *et al*., 2007; Smith and young, 2018). These tools are effective in monitoring one health and result in a more holistic approach towards one health. The human-animal disease surveillance and prevention strategies like vaccination campaigns have been found to be effective actions in achieving one health (Schelling *et al*., 2007). Recently, the WHO has implemented One health target 2030 against neglected tropical diseases.

Conclusion

Currently, the whole world is fighting an unprecedented pandemic that caused severe loss to the economy and lives of people. The transition from the concept of 'health' to a wider concept of 'one health' has been critical in achieving one health. Even though one health concept has gained momentum over years, the implementation and execution across many parts of the globe is still challenging. Initially emphasis should be given for the development of national one health policies that is important for improving coordination and integration of activities across different sectors. Nation wise investment in human and animal health system should be promoted for strengthening the capacity for disease preparedness. The complex interaction between human beings, plants and animals is critical in adopting one health strategy.

References

Aggarwal, D. and Ramachandran, A., 2020. One health approach to address zoonotic diseases. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, *45*(Suppl 1), p.S6.

Anyamba, A., Chretien, J.P., Small, J., Tucker, C.J., Formenty, P.B., Richardson, J.H., Britch, S.C., Schnabel, D.C., Erickson, R.L. and Linthicum, K.J., 2009. Prediction of a Rift Valley fever outbreak. *Proceedings of the National Academy of Sciences*, *106*(3), pp.955-959.

Baum, S.E., Machalaba, C., Daszak, P., Salerno, R.H. and Karesh, W.B., 2017. Evaluating one health: Are we demonstrating effectiveness?. *One Health*, *3*, pp.5-10.

Dahal, R. and Kahn, L., 2014. Zoonotic diseases and one health approach. *Epidemiology*, *10*, pp.2161-1165.

Fitzpatrick, M.C., Shah, H.A., Pandey, A., Bilinski, A.M., Kakkar, M., Clark, A.D., Townsend, J.P., Abbas, S.S. and Galvani, A.P., 2016. One Health approach to cost-effective rabies control in India. *Proceedings of the National Academy of Sciences*, *113*(51), pp.14574-14581.

Jorwal, P., Bharadwaj, S. and Jorwal, P., 2020. One health approach and COVID-19: A perspective. *Journal of family medicine and primary care*, *9*(12), p.5888.

Kelly, T.R., Machalaba, C., Karesh, W.B., Crook, P.Z., Gilardi, K., Nziza, J., Uhart, M.M., Robles, E.A., Saylors, K., Joly, D.O. and Monagin, C., 2020. Implementing One Health approaches to confront emerging and re-emerging zoonotic disease threats: lessons from PREDICT. *One Health Outlook*, *2*, pp.1-7.

Machalaba, C., Smith, K.M., Awada, L., Berry, K., Berthe, F., Bouley, T.A., Bruce, M., Cortiñas Abrahantes, J., El Turabi, A., Feferholtz, Y. and Flynn, L., 2017. One Health Economics to confront disease threats. *Transactions of The Royal Society of Tropical Medicine and Hygiene*, *111*(6), pp.235-237.

Machalaba, C.C., Salerno, R.H., Barton Behravesh, C., Benigno, S., Berthe, F.C., Chungong, S., Duale, S., Echalar, R., Karesh, W.B., Ormel, H.J. and Pelican, K., 2018. Institutionalizing One Health: from assessment to action. *Health security*, *16*(S1), pp.S-37.

Marty, A.M. and Jones, M.K., 2020. The novel coronavirus (SARS-CoV-2) is a one health issue. *One Health*, *9*.

One Health Commission, Smith T, Young T. 2018. Advancing Emergency Preparedness Through One Health Act of 2018.;189(18):A.2615.

Rouquet, P., Froment, J.M., Bermejo, M., Kilbourn, A., Karesh, W., Reed, P., Kumulungui, B., Yaba, P., Délicat, A., Rollin, P.E. and Leroy, E.M., 2005. Wild animal mortality monitoring and human Ebola outbreaks, Gabon and Republic of Congo, 2001–2003. *Emerging infectious diseases*, *11*(2), p.283.

Schar, D.L., Yamey, G.M., Machalaba, C.C. and Karesh, W.B., 2018. A framework for stimulating economic investments to prevent emerging diseases. *Bulletin of the World Health Organization*, *96*(2), p.138.

Schelling, E., Bechir, M., Ahmed, M.A., Wyss, K., Randolph, T.F. and Zinsstag, J., 2007. Human and animal vaccination delivery to remote nomadic families, Chad. *Emerging infectious diseases*, *13*(3), p.373.

Weltbank, 2012. *People, pathogens and our planet: the economics of one health*. Washington.