



Human Impact on Natural Zooprophylaxis or Disease Prevention by Nature

Rouhullah Dehghani ¹ and Behrooz Fathi ^{2,*}

¹Department of Environment Health, Social Determinants of Health (SDH) Research Center, Kashan University of Medical Sciences, Kashan, Iran

²Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

*Corresponding author: Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran. Email: b-fathi@um.ac.ir

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A large number of diseases are transmitted to humans by blood-sucking arthropods. Humans should try to find new and sustainable ways to maintain their health. One of the natural ways to control diseases is to preserve nature and prevent harmful changes to the animals that live in it, which can act as a biological defense shield to protect humans against numerous diseases, such as malaria and arboviruses. This is the main focus of zooprophylaxis (1).

Nature alone has various mechanisms that can be very effective in preventing diseases. Excessive human intervention in nature disturbs the ecological balance, intensifies the problems, and leads to an increasing prevalence of certain diseases. Therefore, it seems necessary to discuss the important role of nature and how it affects human health, ways of continuous human intervention in nature, possible methods to control such actions, and the duty of humans to preserve and prevent destruction in each region.

Zooprophylaxis is a technique in which parasite-carrying insects are diverted from humans to nonhost animals as an alternative source of blood meal in order to reduce disease transmission rates. These wild or domestic animals whose habitat is in the vicinity of humans play as natural protection (2). For example, using a zooprophylaxis technique called the “attract and kill” approach, the topical application of l-lactic acid (abate) mixed with an insecticide on the furs of a goat attracts the female malaria mosquito, *Anopheles gambiae*, and instead of feeding on the human diverts it to a goat. This contact and feeding of the mosquito from topical compounds lead to the inability to fly, fertility or reproduction, and even death. This process leads to a decrease in the chance of transmission of blood-borne parasites. Additionally, Europe, by changing agricultural techniques, has led to more effec-

tive zooprophylaxis and the disappearance of malaria. The USA, by treating cattle with permethrin, has successfully controlled the populations of *Anopheles quadrimaculatus* and *Psorophora columbiae*. Moreover, the Philippines has controlled malaria and filariasis using K-Othrine-treated buffalo-baited traps (2).

In the healthy and strong structure of natural or passive zooprophylaxis, humans are not involved, and animals naturally act as human protectors against numerous diseases. This phenomenon has proven its effectiveness for millions of years by providing a safer and healthier life for humans (3). However, an abundance of human interventions, such as occupying the natural habitat of animals, their forced migration, hunting or mass killing, and removing or changing their food source, has had a negative impact on this biological shield and altered natural zooprophylaxis (3).

In our surrounding environment, many kinds of plants and animals live. The big ones can be easily seen; nevertheless, the very small ones which play the most fundamental and constructive role in nature cannot be seen. Humans only identify, study, and deal with a small number of these organisms that cause problems in agriculture or pose serious risks to humans' health. It has been formed in the minds and imaginations of many of us that these creatures are harmful. This is not true, and it cannot be precisely proven that they are always harmful; therefore, it is necessary to be educated to know their natural role and treat them properly because nature has given each of them a role to function better and needs them to play their role. There is nothing superfluous in nature. Nature without arthropods, bacteria, fungi, and other microorganisms that convert organic matter to the required compounds, improve the quality of soil, and clean the environment

from organic waste cannot survive (4).

The actions and reactions that move the life cycle on the Earth are the same laws of nature preformulated and institutionalized within different beings and serve the planned goals of life. In the institution of every creature, there is a program with a history of millions of years that operates accurately until the time of death. That is, every living thing keeps pace with its life in nature and carries out a mission to survive in the biosphere (5).

All creatures around humans cooperate with microorganisms in cleaning the environment from animal and plant organic waste, feces, and carcasses; this cooperation and coordination are necessary. However, humans consume natural resources and generate waste (5, 6). Farmers, without proper thinking, contaminate their entire farms with chemical pesticides to destroy a particular pest while killing hundreds of other beneficial species that are hidden from view. For millions of years, nature has established a precise ecological balance with all living things except humans. Although man's survival and thriving depend on this balance, over the years, humans have destroyed it step by step leading to the destruction and extinction of many of these living creatures.

Humans, at the top of the food pyramid, are among the most useless consumers in nature and even harmful to the environment. The human population has increased significantly and undoubtedly caused a great deal of disturbance in the ecosystem, which eventually leads to its destruction with the same acceleration (7). If this destruction process continues with the same irrationality, life will be severely disrupted by the extinction of the Earth's living things (8). The man of the present age is trained, educated, and has access to tremendous knowledge, tools, machines, and computers. Therefore, it is wise to accept responsibility for guarding nature.

A human with an erect posture and a large brain is a unique kind of animal with distinctive features; however, contrary to selfish illusions, man is not the most valuable and superior being on the Earth. His existence depends on other organisms, including microorganisms, and without them, he will never survive. It is enough to look at the lives of two specific human parasites; firstly, *Ascaris lumbricoides* is an intestinal parasite that uses the human body as a living place for feeding, growing, mating, reproduction, and death. Secondly, *Pediculus humanus* uses the surface of the human body as a place for all biological activities. Man is entirely their property. From the point of view of these animals, they are the top creatures because they use the body of the smartest and strongest living organism on the Earth as a private place to live. They are human parasites, and they believe that man has no right to consider this place as his own (9).

Therefore, man should completely avoid wrong and hasty interventions and assigning tasks to other creatures. Man is the dominant species on the Earth which has occupied the millions of years old habitats of plants and animals everywhere. The consequences are awful and are the root of numerous problems, such as the prevalence of most new diseases, climate change, and pollution of the environment. Humans should understand the emergency condition of the biosphere and plan his activities in a way that life on the Earth does not face problems. This is fundamental to environmental health (10).

Vector production capacity is always present in any ecosystem, and a very large proportion of these vectors use blood animals as food sources. The elimination of these animals around our environment means the destruction of natural zooprophylaxis. It is clear that for the complete prevention of diseases, man needs to find other ways to prevent the entry of hematophagous vectors into residential areas or use natural repellents to prevent them from eating blood. Several studies indicated that with non-expert, unscientific, and clumsily interventions in nature and creating environmental changes, the prevalence of many such diseases increases.

In conclusion, biodiversity conservation is the most important and fundamental principle of natural or passive zooprophylaxis, which has a great impact on diseases transmitted by zoophilic vectors. Therefore, it is suggested to support the researchers, scientific centers, universities, and students who would like to work on this topic. This can help to scientifically control any intervention before being too late if it has not already been.

Footnotes

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