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Global Warming - Increased risk of Vector Borne Diseases

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ABSTRACT

The world's average temperature is ever rising, which poses significant threats to the survival of the eco-system. The earth's climate has changed before in history, but never this fast, never with this many negative consequences, and never before directly caused by people. Higher temperatures accelerate the maturation of disease-causing agents and the organisms that transmit them, especially mosquitoes and rodents. Higher temperatures can also lengthen the season during which mosquitoes are active. Clearly, global warming will cause changes in the epidemiology of infectious diseases. The ability of mankind to react or adapt is dependent upon the magnitude and speed of the change.

Key words: Global warming, Temperature, Mosquito.

Introduction

Global warming (climate change) has been caused by human beings through the high emission of so called greenhouse gases (mainly carbon dioxide Co2). Carbon dioxide is inevitably emitted when fossil fuels (coal, natural gas or oil) are burned. Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans." In February 2007, the United Nations released a scientific report that concludes that global warming is happening and will continue to happen for centuries. The report also stated with 90% certainty that the activity of humans has been the primary cause of increasing temperatures over the past few decades. As a result of indiscriminate use of natural resources and development of artificial substances like plastic, we have already filled the land and air with numerous pollutants. Fighting global warming requires a collective strength, which implies that the whole world should be mobilized to view it as a moral issue. The question whether to counter global warming or not needs to be addressed affirmatively because the basis of the matter is that it leads to the devastation of our planet.

Since greenhouse gas pollution stays in the atmosphere for decades or centuries, humanity may have no more than a decade left to begin stabilizing the climate to avert devastating and irreversible impacts. Of over 1,400 species analyzed, ranging from fish and mammals to grasses and trees, over 80% are migrating to higher latitudes or higher elevations and altering their annual routines in response to global warming. Over time, this could cause disruptive ecological and economic changes, such as the disappearance of entire fisheries. Amphibians have shown particular vulnerability. In mountains around the globe, many species, including the golden toad and most of the 70-oddspecies of harlequin frogs, have vanished or declined because of diseases spurred by climatic changes. Warmer temperatures also promote outbreaks of insects that feed on trees, killing many of the hosts and creating large amounts of dry fuel for forest fires. Insects are even spreading to areas that until recently were too cold for their survival (Ibid).

Outbreaks of vector-borne diseases

Many infectious diseases are spread by organisms such as mosquitoes and rodents, known as disease vectors, whose distributions and behavior are sensitive to temperature and moisture. Global warming can

increase the risk of vector- borne disease in a number of ways. The incubation period required for a mosquito to be able to transmit dengue fever virus after it has been infected falls from 12 days at 30°C to 7 days at 32–35°C; this translates into a potential threefold increase in the transmission rate of disease (Patz,J.A. et.al,1996). Ecologists have found that present-day mosquitoes wait nine days more than their ancestors did 30 years ago before they begin their winter dormancy, with warmer autumns being the most likely cause (Bradshaw et.al,2001). Malaria, the most prevalent vector borne disease, kills 1 to 2 million people annually. The disease is generally limited to areas with winter temperatures above 16°C, since the parasite is not able to grow below this temperature. Dengue viruses are generally limited to the tropics between the latitudes of 30° north and 20° south, since frosts or prolonged cold weather kill the vector, adult *Aedes aegypti* mosquitoes, as well as their overwintering eggs and larvae. The spread of the disease to higher altitudes has also been facilitated by heavy rainfall, which creates more pools of water in which mosquitoes can breed. Outbreaks of hanta virus, which is carried by wild rodents and can lead to severe and often fatal illness in humans. The effect of global warming depends on the complex interaction between the human host population and the causative infectious agent. Some vector populations may expand into new geographic areas, whereas others may disappear. Malaria, dengue, plague, and viruses causing encephalitic syndromes are among the many vector-borne diseases likely to be affected. The outcome will also depend on our ability to recognize epidemics early, to contain them effectively, to provide appropriate treatment, and to commit resources to prevention and research. Bird flu, cholera, Ebola, plague and tuberculosis are just a few of the diseases likely to spread and get worse as a result of climate change,according to a report released yesterday by the Wildlife Conservation Society (WCS). Most microbes and macroparasites have preferred temperatures and moisture levels for viability notes. "Climate change affects both hosts and vectors and thus disrupts the balance that developed over thousands of years." As temperatures rise, mosquitoes and ticks thrive. And so do the diseases they carry. Climate warming is allowing disease-causing bacteria, viruses and fungi to move into new areas where they may harm species as diverse as lions and snails, butterflies and humans, a study suggests. Pathogens that have been restricted by seasonal temperatures can invade new areas and find new victims as the climate warms and winters grow milder. Mosquito larvae are found in small pools of water. Factors affecting larval breeding include quantity of food, density of larvae and salinity of the surrounding medium (42). The eggs are laid singly on the water surface film and can survive winter weather resiliently. The progression of aquatic stages of development of the Anopheline vector is accelerated under conditions of increased temperature with optimal larval development at 28"C and optimal adult development between 28" and 32"C (Bayoh MN et.al. 2003). Malaria transmission cannot occur below16"C or above33"C as Sporogony cannot occur. The ideal conditions for transmission are high humidity and environmental temperatures between 20"and30"C. Rates of transmission also depend on the number of times the infected mosquito bites (el-Akad AS et.al. 1991). Many studies have suggested that climate change has various negative effects on human health including infectious diseases. However, it should be noted that the levels of the impacts of climate change on human health will differ among regions, depending on various factors, such as social infrastructures, and establishment of countermeasures.

Conclusion

The effect of global warming on infectious diseases is indirect. Global warming affects geographical distribution and activity of the vectors. Thus, the levels of the influence depend on the kind of vectors. Thus, the effect is assumed to be greater in developing countries

but less in developed countries.

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