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Review Article

Pandemocene: a review

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ABSTRACT

The history of humans has been divided into epochs, which are characterized by the prevalence of comparable conditions and are named based on their direct or indirect interactions with their environments. It is widely recognized that we are currently in the Anthropecene epoch. Infectious diseases have impacted humans in a different extent throughout its history. The numbers of viral infection pandemics in three quarter-century clusters (25 years each) formed from 1950 to the present day were compared by examining data figures from the literature. The source of the data is obtained entirely from the published articles relating the subject. The frequency of infectious disease pandemics has increased significantly in recent decades. Roughly speaking, there is an interaction between human population density, human activities and the impact of infection outbreaks. This increase in the frequency of pandemics may be associated with the increase in population density as well as the negative impact of humans on the environment. It may be appropriate to coin this most recent epoch as *Pandemocene*.

Keywords: Evolution, Epochs, Infectious diseases' pandemics, Pandemocene

INTRODUCTION

Throughout the history of mankind, the human beings have never been exempted from infectious diseases and have co-evolved with microbes, some of which are disease-causing.[1] The novel environmental conditions that human beings have faced or created them as a result of both environmental change over time and their invasions new environments, as well as eventually changing the environment in which they live, have had an effect on their health in both positive and negative ways.[2] In the first case, the climate of environment transformed from tropical to arid savannahs climate that have helped our ancestors to stand upright,[3,4] in the second, human conquest of the Earth began with the out of African diaspora[5], and in the third, "modern man" appeared along with sedentarization and urbanization.[6]

First, our hominid ancestor's transition from quadrupedalism to bipedalism is a long story that dates back to the *Miocene* and *Pliocene* epochs and is beyond the scope of this manuscript.[7] Second, migration has always been an essential of our history, and bipedal and long-legged man has always been eager to travel long distances; the wheels and boats he made with his hands freed by his bipedalism helped to extend the distances travelled, and new lands beyond mountains and seas, which were imagined but seemed impossible to reach, were discovered in this way by virtue of his developing intelligence. And, we called this epoch in which we settled down, the *Pleistocene*.[7] Third, the city refers, first of all, to the concentration of population and population concentration are formed of individuals who are not alike; environments where the diversity of human traits has never been greater, have been made possible by cities at the expense of creating an environment that a complete stranger to our

inner caveman.[8] We termed this most recent epoch as the *Holocene.*[7]

This entire process has been made possible through adaptations, compromises, and trade-offs.[9-11] Our species might have gone extinct if we hadn't done that. These novel environments, and the opportunities for protection, shelter, and nutrition they offer, have resulted in the acquisition of reproductive fitness for human beings on one hand, but on the other hand have resulted in the birth of maladaptations and mismatch diseases, which we call "civilization disorders" and they are beyond the scope of this article as another long story.[12] And, the short epoch, which began in the 1950's, was coined as *Anthropocene* to refer to, besides the civilization disorders, overuse of fossil fuels, intensive agriculture, excessive urbanisation, exponential population growth, uncontrolled nuclear explosions, plastic waste explosion, and incalculable space exploration efforts all of which refer to attempts at human ingenuity.[13]

On the other hand, all new environments in which human beings have settled and cultivated have also been home to other living beings, and symbiotic neighborhoods have been established in small and local biospheres throughout the evolution. Human beings have usually had good relationships with their neighbors, but this relationship has occasionally had negative consequences as well. In the first case, this relationship worked in our favor, such as the flora we carry in our skin and intestines, but in the second case, we faced some problems because we also harbor parasites in our skin, intestines, and the animal skin we put on our backs.[14] Some of these are regarded as heirlooms and are referred to as "old friends" in evolutionary terminology, having been passed down from hominid ancestors in Africa[15] or inherited from our primate cousins.[16] Novel commensals, so-called "touristic souvenirs", also diversified and adapted to make our airways and other system sick as our ancestors met new environments.[17] These infectious diseases did not threaten the entire group in clan of 150 people on average we lived in during the Stone Age, or they were limited to a single clan.[18] With the agricultural revolution, novel diseases began to have an impact on human communities as a result of population settlement and concentration, a decrease in food diversity, and animal domestication.[19]

Throughout our history, outbreaks of diseases transmitted by direct contact, such as small pox, measles, and tuberculosis, as well as arbobacterioses such as plague, have been significant control factors of population growth, particularly in poor urban neighborhoods.[20] *Vibrio cholera*, which was able to travel from east to west on steamboats to western overpopulated cities with the industrial revolution, caused major massacres outside the Asian continent for the first time.[21] Epidemics, notable Plague and Cholera, eventually began to recede as a result of personal and collective hygiene measures such as the separation of clean water from wastewater and the construction of social housing as a necessary result of industrialization.[22] The influence of medical measures was manifested itself much later as a result of interventions that became systematic by the gradual acceptance of the ideas of scientists like Jenner and Pasteur.[23,24] Antibiotics have only been widely used for less than a century.[25]

The year 1950, which is deemed the start of the Anthropecene can be recognized as a watershed in the control of infectious diseases; sanitation and medical interventions along with the widespread commercial use of Dichlorodiphenyltrichloroethane (DDT) and penicillin since the 1950's, gave the wrong impression that we had arrived at the stage of controlling infectious diseases, but consequently, unintended human and animal health consequences have occurred, including environmental pollution, genetic disorders, penicillin resistance, and allergy.[26-31] A development we have observed in recent decades is further evidence of this fallacy: the frequency and prevalence of viral disease outbreaks have certainly increased sharply around the world, and this period deserves to be examined separately.[32] Adopting the theory of epidemiologic transition, the term "fifth stage of transition" was deemed appropriate for this period.[33]

In the present manuscript, the frequency of outbreaks of infectious diseases that show pandemic characteristics throughout human history will be examined, and the question of whether this frequency has increased in recent decades will be raised, and if it can give an impression that we are in a pandemic epoch, it will be proposed to coin this period appropriately.

METHODS

The source of the data is obtained entirely from the published articles relating the subject. The numbers of viral infection pandemics in three quarter-century clusters (25 years each) formed from 1950 to the present day were compared by examining data figures from the literature. The post-millennium 21 years period (2001-2021) was also considered as a cluster. Only the start dates of the pandemics were taken into account.

FINDINGS

The last plague pandemic began in 1885, and the last cholera pandemic began in 1961, the former is occurring in sporadic forms and small epidemics while the latter continues to exist in limited outbreaks.[34,35]

The influenza A pandemic of the early twentieth century occurred in 1889 (H3N8) and 1918. (H1N1). While no other influenza A pandemics were recorded in the two quarters of century between 1901 and 1950, but two influenzas A pandemics were recorded in the cluster between 1951 and 1975, including 1957 (H2N2) and 1968 (H3N2).[24] The influenza A pandemic was not recorded in the following cluster (1976-2000), but this period witnessed the birth of the HIV pandemic (1981).[32]

Although the last cluster (2001-2025) has not yet been completed, there have been 6 viral pandemics between 2001 and the present, this is a record in the history of mankind. During this period, there occurred one influenza A (H1N1) pandemic in 2009, and also five "novel" viral pandemics emerged at intervals of a few years. These pandemics are the 2002 SARS-CoV, the 2012 MERS-CoV, the 2013 EBOLA (first reported in 1976), the 2015 ZIKA (first isolated in 1947), and the 2019 SARS-CoV-2.[36] The emergence of the Omicron CoV variant in late 2021 can also be considered a separate pandemic, and a Monkey Pox pandemic is on the horizon; 2022 could be the year of a return to variolation.[37] Several variants of Bird Flu, such as H5N1 (since 1997), H7N9 (since 2013), H5N6 (since 2014), and H5N8 (since 2016 and 2021), have also been seen on more limited scales in different years.[38]

The 2015 Zika virus outbreak in South and Central America and the Caribbean was the fourth and last unexpectedly significant arboviroses recorded in the Western Hemisphere in the last 30 years, following Dengue in the 1990s, West Nile Virus infection beginning in 1999, and Chikungunya in 2013. Although these subsequent virus migrations seemingly unrelated, they may indicate shifting epidemic patterns.[39]

DISCUSSION

When the years are grouped backwards into 25-year clusters, one can say that the frequency of viral droplet infection pandemics increased in the last cluster (2001-) marking the millennium's beginning. 1 and 2 viral pandemics occurred in the previous two clusters (1951-1975 and 1976-2000, respectively) as opposed to 6 definitive and 2 suspected major viral infection pandemics seen since the turn of the millennium, and the frequency of viral pandemics has increased obviously in the last cluster.[32,36]

Morbidity and mortality indicators for these diseases are not taken into account here because we do not know the actual seroprevalence and causes of death. If reliable indicators can be obtained, more sensitive comparisons can be made.[40] The durations of outbreaks, particularly their start and end dates and some of which are still ongoing, are also not taken into account here because it may be based on measurements with low validity in many countries. The benefit of comparing infection incidences with the population numbers they affect is also debatable; the human population is growing at a rate of 1.1% per year (83 million per year).[41] and artificially stabilizing the population dynamics may pose a challenge to statistical methodology. Another growing issue that is beyond the scope of this paper is the antibiotic resistance epidemic.[42] The threats of "near-miss" pandemics are also excluded from the scope of this manuscript; and it can only be said that they have the potential to turn into pandemics. By extension, we can draw a conclusion that if health authorities had taken appropriate and effective measures, we would not have witnessed the actual pandemics.

Developments associated with the phenomenon known as globalization may be as important as the denominator (vulnerable population) characteristics such as population growth and population movements in explaining the increased frequency of viral pandemics. Factors such as increased intercontinental travels, the propensity of people to move away from poor countries where they were born, the growing popularity of eccentric tourism, the rise of metropole-states, and the explosion of telecommunications have all contributed to the most intense, complex, and dramatic interpersonal and human-environment relations ever recorded in history of humans.

Man-made disruptions of ecological balance may eventually lead to the unexpected reawakening of a large number of dormant infectious agents. Significant statistical interactions between the increase in the frequency of pandemics and man-made phenomena such as the increase in the number of trees cut down in rainforests and polar bear mortality, as well as the expansion of livestock farming particularly in developed world can be demonstrated. However, these observations like the regression between the number of sunglasses sold and the frequency of drowning in the sea cannot be used to infer a valid cause-and-effect relationship because they are based solely on crude observations.[43] On the other hand, the incidences of suicides, homicides, nosocomial infections and cancers also increase beside the frequency of viral pandemics.[44-47] The statistical interactions of each of these with the factors mentioned at the beginning of this paragraph can be easily demonstrated in a logical and consistent manner. We must admit that our hand in this regard is not yet strong enough.

To be sure, political influence of multinational corporations must be monitored, mining industry pressure on the natural environment must be limited, gorillas must be left alone in their forests; highways-railways-marine-air transportation routes must be made safe for organisms living on their itineraries, nuclear warheads must be eliminated, and fossil fuel use must be reduced. However, we must accept in advance that there is no "flagrante delicto" evidence that these factors are primarily responsible for viral infection pandemics, rising average annual temperatures, and an increase in the frequency of super storms.[48-50]

CONCLUSION

Nonetheless, the view that viral infection pandemics are both increasing in frequency and in the populations it affects, does not appear to be unfounded, and it would not be wrong to add infection pandemics to the list of disasters were deemed to be caused by human acts such as glacier melting, warming oceans, rising sea levels, and increased severity and frequency of hurricanes. If this is accepted, the name *Pandemocene* can be proposed for the current epoch (2001).

This period is also defined as the fifth stage of the epidemiologic transition. But there is no consensus on this point yet. As an extension of the preceding paragraph, the *Pandemocene* can be viewed as a direct consequence of the Anthropocene. When this distinction is made, it is clear that infection pandemics should be included in the list of expected man-made disasters, such as ocean acidification and species extinctions, and that appropriate preparedness measures should be implemented.

Thus, governments can be persuaded to include pandemic preparedness plans apart from any climate change-related activity plans, if any, on their agendas. We need to broaden our research area to understand the evolution of the role that getting more complicated ecosystems will play in future pandemics. Monitoring the enabling conditions for pandemics and eliminating the enabling factors is more important than attempting to control pandemics once they have begun. The results of our massive ecological destruction in all spheres, bio-atmo-litho-hydro, tell us that we cannot cope with pandemics solely by targeting microbes.

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