Epidemics and pandemics, a historical approach*

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Abstract

This is a historical approach to the most important epidemic and pandemic moments, a very relevant topic today given our current healthcare situation. The religious, political, economic and social influences which largely modified the development and final outcome of epidemics throughout human history are analyzed. This review of the history of epidemics and pandemics shows us that diseases like smallpox and measles were very important in ancient times, that the plague and typhus regained prevalence during the Middle Ages, and that influenza (in its various forms: Spanish flu, avian flu, and swine flu) and cholera positioned themselves as the main scourges of the twentieth century, all of them becoming major milestones in the history of medicine. This article shows the importance of microbiology, epidemiology and public health in understanding and having a proper approach to infections. Finally, the author offers a few concluding thoughts on the struggle between the imaginaries of science and belief. **(Acta Med Colomb 2021; 46. DOI: https://doi.org/10.36104/amc.2021.2247).**

Key words: *pandemic, epidemic, virus, bacteria, microbiology, epidemiology, belief, science, history.*

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Endemic, epidemic and pandemic

I would like to point out some definitions related to the topic before us; I am referring to the concepts of *endemic, epidemic and pandemic*. Endemic refers to infections of any type which appear in certain very well-defined geographic areas, and which are expected to appear intermittently in a clearly defined population. On the other hand, epidemic refers to the unusual increase in endemic infectious outbreaks, and also includes unexpected disease outbreaks which are not typical of the region. That is, if the infectious outbreaks increase in an exaggerated fashion and surpass the local setting, they are considered to be an epidemic. Finally, pandemic alludes to infections which appear in a certain place, disseminate rapidly and affect the whole world or all the continents. The fact is that these three terms are closely related, and basically what changes is the geographic scale and magnitude of the outbreak (1).

Having clarified these three concepts, I now want to tell you who the protagonists of this review are. The protagonists are the viruses and bacteria, which, throughout history, have caused the most serious epidemics and pandemics (2).

Viruses and bacteria throughout history

The interest in describing the infections which affect the different populations has existed since ancient times. The ones that have perhaps been described most fully and appropriately are smallpox (*Variola virus) and measles, as these diseases affected large populations in the Far East, Middle East and North Africa (3, 4)*.

In the Middle Ages, the importance of the viruses began to decrease, which is when bacteria began to appear, including *Yersinia pestis* (5), the genus *Rickettsia* and *Vibrio cholerae*. The first causes various types of plague, the second causes different classes of typhus, and the third is responsible for cholera (6).

In the Modern Age, towards the end of the 19th century and the beginning of the 20th century, we find another change in infectious behavior. Bacteria became less important, viruses reappeared, and endemic and epidemic peaks began to appear, with cases of influenza such as the Spanish flu, avian flu and swine flu during the 20th century (7-12).

Additionally, very clear descriptions of other diseases are found in different time periods. Leprosy, for example, ravaged Europe in the 11th and 14th century, but these were intermittent and very concentrated outbreaks, and they were never considered to be epidemic or endemic outbreaks. Cholera is another case (13) which, while being the cause of various epidemic outbreaks, accompanied mankind from 1817 to 1923, with very frequent interepidemic peaks in various parts of the world, possibly related to the voyages of the great European colonizing and conquest expeditions which were in vogue at that time throughout different parts of the world. Then, in the 20th century, in the 80s, we all experienced the advent of HIV AIDS. This disease, which

appeared in 1981, was only able to be clearly described in 1984 and, as some of us recall, 1997 was the year with the highest number of infections reported, with three million people infected and a large number of deaths. Appropriate diagnosis and treatment may not have allowed AIDS to become a great pandemic. You know now that it is a controlled infectious disease with a very high survival rate (14).

The various forms of flu also appeared in the 20th century. I am referring specifically to influenza, H1N1 and SARS. Of these, it is very important to remind you of SARS, which had an influx in China, Mexico and Russia, along with avian flu and swine flu. The two viruses were reported in Mexico in 2009 and then MERS was reported in the Middle East in 2012 (10, 12). Finally, in 2014, in Sub-Saharan Africa, the terrible Ebola outbreak appeared, which was limited to certain countries on this continent and therefore was not considered to be an epidemic outbreak.

The history of epidemics and pandemics

Before beginning this journey throughout the history of epidemics and pandemics, I would like to make some comments on how certain situations related to civilization, beliefs, and humanity in general signaled important changes in the evolution of epidemics and pandemics. One of the most important factors is that in ancient times, the existence of microorganisms was completely unknown; thus, human beings had to find an intangible explanation for what was occurring, what was causing the disease. We are speaking of a mythical-religious context in which anything outside of the realm of rational explanation was foisted onto the deities. The problem lay in that these deities did not solve the enigma either, and much less did they supply the remedies for the diseases which became epidemics and pandemics (15). Followers of all the religions - including the priests themselves -, regardless of whether they believed in Eastern or Greek and Roman gods, viewed these infections, these sudden deaths, as divine punishment, and used them to intimidate the population. Christianity, for example, took advantage of the epidemics and pandemics to make people get closer to God and thus to the institution. The use of religious prayers within the Catholic church to ward off the disease had another, less noble, purpose: that of subjugating the population and at the same time, obtaining money for building their churches. But this behavior has not occurred only in the Catholic church; many other religions have operated in the same way throughout history (16, 18).

It is also important to point out that for much of ancient times, endemics, epidemics and pandemics were marked by a miasmatic paradigm (19). This concept stated that all epidemics, pandemics and infections were in the air. Thus the urgency to clean the air. Do not think that the habit of burning incense began to make closed spaces smell good; its purpose was to purify the air of evil spirits or bad humors. And the hypothesis of humors was so certain that at some points in history, the vapors from people of certain races (there was a belief - which still exists - that the races had characteristic odors) or social conditions (basically, poor people who smelled bad), were thought to cause infections and, thus, pandemics. This was the case, for example, of some Middle Eastern peoples, mainly Pakistanis and Afghans, who were condemned for their body odor (20).

Another case is that of Christians in the first and second centuries after Christ, who were blamed by the Greeks and Romans for causing diseases just because of their smell. One more case is that of the Jews, who were persecuted because, among other reasons, it was thought that their humors caused the epidemics. Some even came to believe that the cracks in the earth or volcanic eruptions were gases from Hell released by the devil and expelled by Satan to protest people's bad behavior. But these theories, which blamed the humors and miasmas and established connections between the disease and divine affairs, began to lose ground with the discovery of microorganisms (21, 22).

The 19th century marked a drastic change in the way of thinking about disease, as microorganisms appeared. This is when the miasmatic paradigm changed due to the emergence of microbiology, public health and epidemiology.

Quarantine has been a very important resource for decreasing the impact of pandemics and mortality. Although nobody has said that quarantines are useful for curing the diseases which result in epidemics, it is true that they regulate and modulate the aggressive or nonaggressive presentation of the disease. It is a control mechanism which remains in force today. Despite having so much technology now, so much science, quarantine, as you have noticed and as we have all experienced, is very important in controlling the type of infections that affect us at this time (5, 23). A

The influence of religion has been very significant in the development of epidemic episodes. The *Four Horsemen of the Apocalypse* painting (18), inspired by the first part of the sixth chapter of Revelation, tells of a punishment which would come due to man's bad behavior, a punishment which would be determined by these four horsemen, each riding on a different colored horse. The first, the white horseman, represents conquest (a current allegory for all civilizations because it represents the impulse of wanting to have power over others); the second, the red horseman, represents war, discord between nations; the third is the black horseman, which symbolizes food scarcity and famine; finally, the fourth is the yellow horseman, who symbolizes the plague or death, from which nobody escapes (18). The apologue I have just presented from Revelation shows us that the Catholic church, in order to manipulate the beliefs of their followers, would frighten them with the idea of the plague.

Besides religion, the wars also established different procedures for treating epidemics and pandemics. During ancient wars, the living conditions in the camps and battlefields were very bad. Success or failure in battle often depended more on health conditions in the trenches, polluted water or contaminated food than on military skill. In some wars

in the past, more soldiers died from the plague or infections than from an enemy's weapons (23, 24).

We find a couple of clear examples during the war for independence in our country. The patriot army was attacked by smallpox, a virus introduced to America by the Europeans, while the Europeans (mainly Spanish and Portuguese) had to endure the attack of yellow fever and amoebic dysentery. The immune systems of neither of the two peoples was prepared to face these infections, which killed natives and colonizers indiscriminately (6).

A similar, but more recent, case was the Thousand Day War, a civil conflict at the beginning of the 20th century in which liberal and conservative patriot factions confronted each other. Dysentery caused high mortality among the soldiers of the political factions that were fighting at that time.

Another aggravating factor in all these situations is migrations. The exodus of people from China towards Europe, for example, brought hunger and overcrowding to many regions of the Old World, to which the innumerable wars and colonizing expeditions must be added (25). These events became more notable during the 20th century in view of phenomena such as the Cold War, espionage or biological wars (which many people say have occurred); and, in the 21st century, with the advent of globalization, false science, social networks and fake news. While these latter events do not directly cause epidemics or pandemics, they do determine the population's response to these infections, as they can cause many people to die more easily or, on the contrary, lead people to better care for themselves.

Continuing with this journey throughout history, I return to the case of smallpox. Incomplete descriptions of the infection can be found dating back to 10,000-8,000 B.C. Based on studies of these records, historians conclude that it was a highly lethal disease in ancient times, as the mortality rate reached 70%. Likewise, statistical studies of outbreaks in the past arrive at a figure of 300 million deaths due to this cause. This dramatic figure can be compared with the mortality from the current COVID-19 infection or the mortality from Spanish fever (26).

Complete descriptions of the disease have been found dating back more than 3,000 years. A representative case is the mummified body of Pharaoh Ramses V (who reigned from 1147 to 1143 B.C.), which shows smallpox sequelae. The evidence allows us to conclude that this infection is possibly the cause of the greatest number of deaths throughout all human history (27).

Having examined the case of smallpox, the next protagonist is measles, a disease for which there are descriptions from approximately 3,000 years ago. Adding up the deaths caused by this disease, historians have arrived at a figure of 200 million. However, this information must be viewed warily since, in the past, it was uncertain if outbreaks were due to measles or smallpox (3, 13, 28).

Regardless of the civilization in which the disease appeared, people with measles were isolated and discriminated against. The Church, for example, displayed them as an example of abnormal people who had received a well-deserved divine punishment for behaving badly and disobeying the institution. Thus, the common people were forced to look at the sick people with the goal of having them behave well and obey God's will.

After these lethal viral infections, let us now remember the case of the Antonine Plague, of which there are descriptions in the book of Samuel, in the Bible, approximately in 100 A.D. It was called the Antonine Plague because it occurred during the Roman Empire, during the Antonine dynasty (21). It was Galene, approximately between 165 and 168 A.D. who documented the first descriptions of the plague. The disease, originating in Mesopotamia, reached the Roman Empire due to the fact that the region was an important area of conquest and colonization (29). However, since the origin of the disease was unknown, a local culprit was needed for the advent of this new scourge. Thus, the chosen culprits were the Christian people, for practicing an illegal and clandestine creed. This circumstance instigated the fury of the Greek and Roman gods, who unleashed the Antonine Plague on the kingdom. Not until much later was it determined that the plague originated in the region of Cathay (now part of China), a territory which apparently had commercial ties with the Romans.

An interesting point to discuss is that these great expeditions to China fostered the migration of the Tatars, a people considered to be barbaric who settled in Kaffa, a city north of the Black Sea which the Tatars wanted to conquer in order to install their operations center for accessing Europe. However, the invaders did not count on the fact that the city was very well walled, a circumstance which stopped their attack. This initial failure did not discourage them, and they then decided to set siege to the city. Under these circumstances, the Tatar generals had an idea as ingenious as it was macabre. Since the soldiers in their army were dying of the plague, they decided to dismember them and toss the body parts over the walls with catapults, unleashing the plague within the city. This was how the Tatars were able to invade Kaffa. It was one of the first examples of a biological war.

But shortly before these events occurred, a few Italians - mostly Venetians - realized what was happening and fled via the Dead Sea to Constantinople. The problem is that some of the escapees were already sick with the Antonine plague, and they infected the locals. In their passage through the Mediterranean they arrived in Sicily, from which the disease was disseminated throughout Europe (21).

A few centuries later, at the height of the Byzantine Empire (which practically owned all the North African, Asian Mediterranean and European Mediterranean territory), more precisely during Justinian's reign (540 A.D.), the plague appeared once again, leaving 30 to 50 million people dead, which is equivalent to a quarter of the European population of that time (22).

Cesaire, who was almost a doctor, wrote one of the first descriptions - very fitting, incidentally - of the buboes. He was also the one who determined that the plague had originated in China, and that the introduction of the disease to Europe was facilitated by merchants who travelled to the East to buy silk, gunpowder or spices from China. We are speaking of the famous Silk Road. Likewise, he was the one who described that the vectors of the disease were rat fleas which, like stowaways, accompanied the merchants on their return from their commercial expeditions. However, the common people, being very superstitious, did not understand that the rat fleas caused the disease, and preferred to believe that the culprits were the flies God had sent to punish his believers because they behaved badly, similar to what had occurred with the plagues of Egypt (19).

A few centuries later, between 1346 and 1356, the most famous plague appeared: the bubonic plague or Black Death (30). The disease was brought to Europe, once again, by the caravans of merchants who took advantage of Marco Polo´s trips to the East to strengthen their commercial ties. The balance: around 70 million people dead from the disease. If in our time this could mean a catastrophe, imagine the impact in the Middle Ages, when the European population was significantly smaller.

The Black Death was so named because of the necrotic and bluish areas which would appear on the limbs, or bubonic plague due to the buboes which would appear in the groin, axillae and other parts of the body. The first signs of the disease were swellings in the groin and axillae, also known as buboes, which sometimes reached the size of a common apple. Subsequently, black or red spots would appear on the arms and legs, which would then spread over the whole body (17).

The disease had such a profound effect on the lives of people in the Middle Ages that it even influenced the literature. Boccaccio, an important Italian writer, in his most representative book, *Decameron, made some very interesting descriptions of the plague. (What is more, I believe Boccaccio wrote Decameron* because of the plague.) The book recounts the vicissitudes of seven men and three women who isolated themselves in a villa close to Florence, Italy, to flee from the plague. In order to entertain themselves while they were shut in, they agreed that each one would prepare ten stories, preferably picaresque. Thus, *Decameron* consists of a total of 100 stories with a common erotic denominator. The plague epidemic in the 14th century was the most famous because of its tragic toll; however, successive, intermittent outbreaks continued to appear in other places, but with a lower intensity and mortality (5).

The preventive measures found in *Decameron are a model of the measures we take today. Proof of this is Reggio's edict, a very important decree, because it established isolation as a preventive measure in the city of Modena (Italy). Also, the edict includes one of the first notions of quarantine, which meant "cordoning off."* As we can see, the same measures continue to be taken today: isolation invites people to separate from each other, to keep their distance from others, and quarantine demands that people stay in their houses. And, with the same purpose of self-protection, physicians used black tunics as a means of chasing off the humors or whatever was causing the disease. But the most characteristic- and striking- part of the medical apparel in those times was the masks with bird beaks or dog muzzles, which are the precursors of our current face masks (5, 31).

Daniel Defoe, the famous author of *Robinson Crusoe*, is another writer who tells of the effects of the Black Death in England (33). In 1678, there is a very interesting description by Dr. Sobeit of the plague and its spread. In the account, Dr. Sobeit tells how his prince invited many European people to his birthday party. Sobeit told him, warned him not to invite them, given the large number of sick people in the country. But the king, ignoring Dr. Sobeit's recommendation, celebrated the royal party. The doctor's fears were not groundless, and the ambassadors and visitors carried the plague with them to their regions and countries of origin, unleashing a plague in 1678 which killed many people. Then, in 1700, Chalin de Vinary and Guy de Clauliac, two famous papal doctors, perhaps best described the progression of the plague and its clinical presentation.

Once into the 19th century, the wars once again became the protagonists. Among the most important wars of this period were the Napoleonic wars (1812-1860), a series of conflicts which involved almost all continental Europe. We refer to them because typhus played a decisive role in the defeat of the British at the hands of Napoleon Bonaparte. As is now known, typhus is transmitted by several species of bacteria from the genus *Rickettsia, which reside in fleas* (*Rickettsia typhi*) and lice (*Rickettsia prowazekii*). In short, Napoleon's best weapon was not in the hands of his army, but on the backs of the rats; a good part of the English army died in the trenches without knowing which enemy had attacked them. Clearly, for a long time, epidemics determined the success or failure of wars. Having arrived at this point in history, it should be noted that the bacteria which plagued humanity between the 10th and the 14th centuries ceased to be the protagonists, making way once again for the viruses.

At the dawn of the 20th century, the famous Spanish flu appeared. Also known as the Spanish fever, it was the most important pandemic the world had experienced up to that time. It has been called the Spanish flu because Spain was the country which introduced it to the rest of the world (8).

The disease is caused by the influenza virus, and its extremely high mortality, close to 20%, may be highlighted among its main characteristics. Between 50 and 100 million people died as a direct consequence of this disease, including 300,000 Spaniards. Unlike COVID-19, which mainly attacks people over the age of 60, the Spanish flu mostly attacked people between 20 and 40 years old, that is, people in their most productive stage of life (9).

The disease is believed to have arrived in Canada from Asia, and then crossed to its neighbor to the south. If this hypothesis is correct, the United States' participation in World War I was key in the virus crossing the Atlantic.

The disease, whose main peak was between 1918 and 1919, left close to 60 million dead, and between it and World War I (1914-1918), which left another approximately 40 million dead, we have a chilling sum of 100 million people who lost their lives. The balance of these two scourges was devastating for Europe, as they wiped out a third of the continent's population, and the worst of it is that this was the most productive part of society. The end of the war determined the spread of the epidemic throughout the world as the survivors carried the virus to their countries of origin. In fact, it is sad to think that many of the young people who survived the war returned to their countries to die of influenza (33). It could be argued that the Spanish flu was to the 20th century what COVID-19 is to the 21st.

But the Spanish flu was not the only protagonist, as at the end of the 19th and the dawn of the 20th century other forms of the flu appeared. We are referring to the swine flu, which caused one million deaths in Russia between the end of the 19th century and the beginning of the 20th century. (There is very little information about this due to the silence of the Soviet regime which arose during that time.) Another outbreak of the same flu appeared in Hong Kong in 1957, causing almost one million deaths. And much closer in time, in 2009, H1N1 appeared in Mexico. What is special about this last type of influenza is that it resulted from a mix of avian H1N1 and swine H1N1 (6).

I will take this opportunity to point out that up until the beginning of the 20th century, medical care was administered by the Church (this is why most hospitals are named after saints, and most nurses were nuns), and the State played a more or less secondary role. As a result, the financing of medicine was derived from public charity and only in some cases, especially during epidemics or pandemics, did the government provide extraordinary budget allocations to address the emergency; in other words, they were not in the government's budget. It was during these days that public health started to gain importance, and it began to be understood that medicine and public health had to be an important line item in state budgets.

In summary, to close this review of the history of epidemics and pandemics, I would like to emphasize that smallpox was very important in ancient times, that the plague became prevalent in the Middle Ages, and that in the 20th century, the Spanish flu was the main scourge. I believe these three scourges constitute important benchmarks in the history of medicine.

Epidemics and pandemics in Colombia

This section gathers some comments on the epidemics and pandemics in our country.

Colombia, due to its strategic geographic location, was a cornerstone for the colonizing campaigns in America -they did not arrive to conquer us or discover us because we were not covered-. And, among the many things these colonizers brought with them from their places of origin to our regions, were their diseases.

Typhus[1] was introduced to Peru and Colombia in 1546; measles in 1600; outbreaks of the plague were described in Bogotá in 1696; dysentery was reported in 1810 in Cali, and intermittent outbreaks of smallpox occurred in 1621, 1651, 1659, 1668, 1669, 1692 and 1693, with successive epidemics in the 18th century.

Now, we must make some clarifications regarding the particular case of smallpox. When Columbus arrived in America in 1492, he landed on an island which the Spaniards named La Española (what is today the Dominican Republic). The outcome of this first encounter with smallpox was eight million dead people, which is the equivalent of 90% of the native population. The virus also played a very important role during Hernán Cortés's colonization campaign, who arrived in Mexico in 1519. There, close to 20 million Aztecs, in other words, 90% of the population, died. Thus, it was very easy for Cortés to face and defeat the remaining 10% of the population. In 1531, Francisco Pizarro arrived in the Incan Empire; close to two million people died there, a large part of the population, as the Inca territory had a meager population. Finally, smallpox arrived in Colombia between 1778 and 1782, causing great mortality (there is no report of exactly how many people died in those days).

Smallpox arrived in Colombia in a very different way from that of other infections. Originating in Canada, the virus arrived by boat in Cartagena and Barranquilla from Mexico, and four months later appeared in Bogotá. Some Colombian historians have written very interesting descriptions of this case..

On the other hand, cholera arrived in Colombia in 1849 by a different pathway than that of smallpox. Coming from Panama, it entered the country through Cartagena, arrived in Honda via the Magdalena River a few months later, and in the mid-50s arrived in Bogotá. It should be noted that during the cholera epidemic of 1950, Bogotá physicians were already saying that communication should be suspended, as well as the arrival of boats and merchandise from Cartagena and Barranquilla, as these could transport cholera. However, the congress and government of Nueva Granada (let us remember that we were not called Colombia yet) ignored the physicians' recommendations and forbade quarantines. The reason for such a misguided decision must be sought in the economic pressures of the guilds, for whom commerce and the flow of merchandise could not be suspended at all. Following the profits logic of the merchant's guild, quarantine was a useless mechanism since those who had cholera would die anyway. Thus, clearly, the interests of economic groups ended up being more important than people's health.

Regarding the cholera epidemic which ravished the Colombian Caribbean, Joaquín Posada (34) points out:

> *Of those who were attacked, none saw the sun set. During that day's night, the mortality doubled, and grew progressively in the following ones. The cemetery´s large courtyard filled with cadavers, and long, deep holes had to be dug to bury the dead. Cannon shots were made believing that the detonations could purify the air.*

In this troubling passage, Posada Gutiérrez describes the impact of the disease and the rapidity with which the sick were dying.

It is timely to recall now that our country was not immune to the plague, and that between 1913 and 1925 the Atlantic coast (mainly the Antioquian and Coastal Urabá) had to face its scourge. In a shameful chapter of our country's history, we are told that people could not quarantine or protect themselves with isolation, as the banana companies demanded that their employees continue to work (the most representative case is that of the United Fruit Company, a North American company which became famous because of the Banana Company Massacre, an episode in which close to 1,800 workers died). And although the cholera epidemic was widely known throughout the country, there are no exact figures on the number of deaths as this information disappeared. It is clear, once more, that economic and political interests (especially those of the North American companies, which began to wreak havoc in our country at that time) were given precedence over the interests of the common people.

It is not superfluous to remind the audience that in the 19th century there were already recorded descriptions of confinement in the official government books. To illustrate the case, Laverde (35) notes:

> *The public offices, schools, university, bars, theaters and churches were empty; the urban services collapsed; the police, trolley and train and the postal service were paralyzed, because most of the police, operators, priests, students, teachers and employees got sick: all public shows were suspended and the streets of the city, especially at night, were almost deserted.*

This excerpt makes us reflect on what we are currently experiencing, as it is very similar.

Recapping, before the 20th century, a person who reached the age of 40 or 60 (that was the life expectancy at the time) could have experienced four to six epidemics. In turn, someone living during the 20th century would only have experienced one great pandemic: the Spanish flu. And today, exactly 100 years after the previous pandemic, we are going through the first great pandemic of the 21st century: the COVID-19 pandemic. But who was responsible for decreasing all these epidemics and pandemics? We owe this to the emergence of public health, microbiology and epidemiology.

The truth is that epidemics and pandemics have decimated humanity throughout history. However, we have learned to deal effectively with them. Even so, some people - I would venture to say in a foolhardy way - still assert that these are a result of the self-regulation of the species, and that they should exist to decrease the population. In the past, at the beginning of the 20th century, some came to assert that possibly in the future, that is in our days, people were going to live or travel in individual vehicles so as not to be infected by others, something which is not far from what we are experiencing.

Another matter is that despite the fact that the phenomena of epidemics and pandemics present a bleak picture, humanity has always found a way to overcome and even obtain some profit from them. Proof of this is that every time an economic or social depression follows an epidemic or pandemic, the economy and society resurge with more strength. For example, in the Middle Ages, when the plague appeared, Europe was submerged in religious darkness. There is a good reason the end of the plague coincided with the end of this period and the Renaissance followed, a period which led to a rebirth not only of the arts, but also of science and commerce. Something similar occurred at the beginning of the 20th century with the infections and the wars, as they determined the beginning of modernism. All this motivated the birth of fields like microbiology, epidemiology and public health, which are the three pillars supporting the fight against the COVID-19 epidemic in our times (36). Without them, controlling this outbreak would have been almost impossible.

The struggle of worldviews

To conclude, I would invite you to reflect for a moment on the disagreement between science and belief. While some people adhere to belief, we physicians are based on science. The first become desperate because they do not know to whom to attribute their fears, stimulating the emergence of false sciences.

Thus, all ages and civilizations have had charlatans who, taking advantage of people's ignorance and superstition, exploit their fear in order to sell inadequate medications and useless concoctions. This occurred in the past with smallpox, the plague and cholera, and occurs today with COVID-19.

It can thus be inferred that societal behaviors - including those of their institutions - change the way of facing epidemics and pandemics. First, religion, as is natural in any institution which embodies power, has taken advantage of these evils for its own benefit, in order to control its believers. Second, politics - we could give an entire talk on the influence of politics on epidemics and pandemics - is another institution which has taken advantage of these outbreaks to take measures which have little or no benefit for the population. This is the case of countries which have emitted erroneous and reckless policies which have not had a positive effect on the COVID-19 epidemic. Finally, the economy has a conflict between saving people's health or saving itself. I believe, however, that there should be a balance between the two.

In conclusion, I believe that mankind's struggle between science and belief has always existed and will always exist.

I invite you to, despite our differences, build this balance between the two, to be able to withstand all these problems, especially the one which claims all our attention at the moment: the COVID-19 pandemic.

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