

A Review of Pandemics from the Viewpoint of Bioterrorism

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ABSTRACT

COVID-19 pandemic encroached the earth in late December 2019. It was reported as a notifiable communicable disease of the fifth category by Taiwan CDC. The world has witnessed many episodes of bioterrorism attacks like anthrax used by Al-Queda in United States. The Wuhan institute of virology specialises in areas of various viruses. Local news reports suggest that the virus might have leaked out of the laboratory. According to Centre of Disease Control, "any agent-viral, bacterial, fungal, their toxins or others, the dissemination of which is intended to produce death and disease in humans, livestock or crops, to terrorize a population or manipulate government is called as a bioterrorising agent. It might be a modified version of normally occurring pathogens. The news of possibility of COVID-19 being a bioweapon flashed in media. Novel Corona virus has been kept in category 3 of bioterrorising agent by CDC. Every country is making maximum efforts in making the cure for Corona. According to latest list of World Health Organisation, at least 165 vaccines for Novel corona virus are being developed across the world. The invention is a tedious task in itself with numerous trials failing. The need for a feeling of safe environment is requisite. And the country officials would do anything to pacify population. Considering the fact that every country would want to get their hands on the vaccine as quickly as possible, one kind of vaccine will not fulfil the demand of globe. This article reflects on different bioterrorism weapons reported till date and view about COVID-19.

KEY WORDS: COVID-19, BIOTERRORISM, BIOWEAPON, MEDIA, SMALLPOX, ANTHRAX, DISTANCING, THREATS, IMPACT.

INTRODUCTION

In December 2019, the officials of China alerted world that cases of a new virus was unfurling in their population rapidly. In next few weeks it spread to other nations with the cases doubling within days. This was SARS related virus i.e. the Corona virus which causes COVID 19. It is said to have originated in an animal market. An Israel warfare analyst claimed that COVID originated in Wuhan in china's covert biological weapons programme (Prasad, R 2020). (Dr. Danny Shohan 2020) to Washington times "certain laboratories in institute have probably

been engaged in terms of research and development in Chinese biological weapons at least collaterally, yet not as a principal facility of Chinese BW alignment". The Wuhan institute of virology specialises in areas of various viruses. Local news reports suggest that the virus might have leaked out of the laboratory, Dr. Shohan Though said Wuhan institute of virology comes under Chinese academy of sciences, but certain laboratories among it have linkage PLA and BW related elements within Chinese defence establishment.

The truth is foggy at the moment but one thing is for sure: statistics around the world show it is lethal and spreads rapidly. A lot of theories have been highlighted and things are being questioned-was this negligence or a product of malicious mind? Was it a natural outcome of events or a certain organism introduced as a weapon of mass destruction? What was it intended for and how far can it be misemployed? Was it indeed misemployed? Is this a pavement for political dominance or is it someone's

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idea of genocide for greater good? These are few of the billion questions that remain unanswered to a single problem at large: the Corona virus.

Before we talk about problems faced, we start with how the virus spreads for a better understanding. This virus has a blanket around its genetic material and isn't even a living thing arguably. Like other viruses, it can only make more of itself if it multiplies inside a host. The Corona virus spreads primarily through aerosolized drops which are transmitted when a person coughs, sneezes or talks. These droplets can get deposited on surfaces like desks, utensils, door handles. Touching them and subsequently touching your own eyes, nose or mouth is how the organisms get entry to our body. The virus begins its expedition by hitching a ride as a stowaway deeper into the body into organs like intestines, spleen and lungs, where it can cause maximum destruction.

The inoculum is low and can cause a dramatic situation based on the status of comorbidity of the infected person. Like SARS virus, they infect epithelial lining of lungs causing respiratory tract infection, soreness of throat, cough, pneumonia, respiratory failure, septic shock, ultimately leading to death due to a hyper immune response. A patient with comorbidities even if gets cures of the virus, the continuous fight drains him of all the immunity providing neutrophils and helper T cells that even a slightest of infection can prove fatal. The ceaseless abuse to lung tissues leads to irreversible damage to alveoli causing them to develop scar tissue as they heal. This results in increased mortality.

The transmission rate is very high. The most important factor that works in the favor of dissemination is the long infective asymptomatic incubation period of 10- 15 days. A recent study by Indian council of medical education and research (ICMR) states that one corona virus positive patient if not put in isolation can infect more than 400 people in 30 days. WHO pronounced COVID-19 as a pandemic on March 11, 2020. In situation like this, it is highly possible that it gets too large. Amongst the tragedies and despair that we are facing, many theories have come to light. One of these is the association of usage of the word 'bioterrorism' with the virus (Das, S, and VK Kataria 2010). Bioterrorism: According to Centre of disease control, "any agent- viral, bacterial, fungal, their toxins or others, the dissemination of which is intended to produce death and disease in humans, livestock or crops, to terrorize a population or manipulate government is called as a bioterrorising agent. It might be a modified version of normally occurring pathogens. In fact according to World health organization (WHO), 71.8% biological pathogens are animal in origin and 60% human pathogenic (Jones, K. E., et al 2008).

In his book The Survival guide: What to do in a biological, chemical or nuclear emergency, Dr. Angelo Acquista says that the most practical course of action to manage a bioterrorist attack is early diagnosis and quarantine in the area of exposure is to be done effective immediately

(Acuista, Angelo.2003). The bioterrorising agents are divided into three categories according to the level of threat they possess- Category A, B and C; Category A containing organisms that can easily be dispersed in population; result in high death rates and jeopardizes public health; might cause terror in people; and require special action for health preparedness. Example: anthrax, botulinum, smallpox, H1N1 virus etc. Category B containing organisms that are moderately simple to be dispersed in population; result in moderate death rates; and requiring special action for health preparedness. Examples are: Brucellosis, Salmonella, vibrio cholera etc.

Category C containing organisms that emerging pathogens that could be developed for mass spread in the future because of accessibility; ease of production and transmission; and potential for high death rates and major health problems. Examples are: Hanta virus, Nipah virus, Corona virus. Bill Gates, the founder of Microsoft, in one of his speeches said that the threat of bioterrorist attacks have long been ignored and denied. The possibility has heightened over last few years. The organizational patterns are changing towards the use of deadlier, technologically more advanced weapons of mass disruption, in response to nuclear threat. The possibility of a bioterror attack roams at large. We need to prepare in advance, isolate all the stages: Perpetrator, motives, origins, relation to other attacks, why it started, what are the motives and finally: how will we end it (Ewen MacAskil 2017).

There are mainly three types of terrorizing agents: Biological, Chemical and Nuclear.

Biological agent versus chemical agent: Bioterrorism is more insidious as compared to chemical agents. Secondary and tertiary attacks are inevitable. Unlike chemical agents, biological agents are harder to detect and trace to origin. Are easier to disperse. Examples of chemical agents: mustard gas, sarin etc.

Biological agent versus nuclear agent: Nuclear agents like bombs and mines set off at ground level and represent a very limited public health threat due to limited area of contamination. They are easy to detect and nuclear reactors are relatively impregnable. Examples of nuclear agents are Uranium 235, plutonium 239 etc. A new possibility of "agro terror" has arisen due to limited food inspection procedures (Dallas, Cham E 2013 and Ganesan K, et al 2020).

The history is full of examples of bioterrorist attacks, most highlighted and well known being the postal anthrax after the attack of 9/11 in New York. Letters were mailed to news reporters and US senators containing 1 gram of Bacillus anthracis. With a total of 23 cases, 11 inhalational out of which 6 survived and 12 cutaneous- no casualties; all were traceable to be delivered by mail for 11 months, after which they stopped. Ciprofloxacin was administered prophylactically in the entire country.

Salmonella attack in 1984 in Oregon State, where the voting population were targeted by Rajneeshpuram management who put *S. enterica* in the salad of customers of more than five restaurants. Almost 800 people were hospitalized.

Late 1700s, the United States army distributed blankets infested with special fomites to Native Americans. The blankets had previously been used by soldiers recovering from small pox. The fomites thus carried the disease causing mass genocide. Smallpox has been mankind's greatest killer and conquering this deadly disease has been medicine's greatest victory. This milestone was achieved in 1977 in Africa by ring vaccination campaign. In total, there were 500 million cases of small pox with death toll of 100 million. After the eradication of the disease, all stocks of viruses in labs globally were to be eliminated by December 2002 but United States cancelled those plans after 9/11 anthrax posts and twin towers attack (Brown, Thomas. 2007).

Yersinia pestis was weaponized in world war two. It causes plague. Anthrax was not used for the first time as a terrorizing agent in 9/11. A brilliant move by axis countries- sugar cubes were fed to horses which were shipped to allied forces during world war one by German soldiers. The sugar cube contained *B. anthracis*. After a while the allied countries' soil was found to have naturally occurring anthrax. It can be transmitted by cutaneous and inhalational routes. The clinical features of inhalational anthrax according to Centre of disease prevention and control (CDC) are: cough, fever, chest discomfort, chills, shortness of breath, nausea, vomiting, sweats, headache etc. The cutaneous have same feature in addition to a black centered painless ulcer. The patient finally succumbs to hemorrhage, septic shock and death. Anthrax. Can it be weaponized? Yes. It is thought that 17 countries are experimenting with it as a biological weapon. Many, including United States in 1950s and Iraq in 2002 in Gulf war have used it (Riedel S 2005).

Now the Novel Coronavirus, or COVID-19: It has been kept in category 3 of bioterrorising agent by CDC. As the definition says, it has a potential that it could be engineered for mass dissemination in the future. Not much is known about this virus. But if we look at the mode of spread, pathogenesis, symptoms and progression of disease of COVID-19 and anthrax, we find that both have droplet- inhalational route of spread, multiply inside living cells and cause death due to acute respiratory distress syndrome. The average incubation period of both of them is 15 days, but the recovery rate is higher in anthrax, making COVID 19 the deadlier disease amongst them.

If we compare Variola virus and Corona virus, we see that fatality rate is higher in Variola major: 30%, as compared to Corona virus, which on average is 3.4% as estimated by WHO till date. The infectivity rate of variola was 60% in an unvaccinated individual but even higher in COVID, evidence of which is the global imposition of lockdown since the outbreak of this disease. Without a

vaccine, the corona virus will surpass former due to its higher infectivity leading to greater fatality (Belongia EA, Naleway AL. 2003).

Drills have been done regularly by the United states to test preparation of top government officials in response to biological terrorist attacks, examples being: The Dark winter exercise: June 2001 by Andrews- simulated release of smallpox in three states; The Topoff exercise: three simulated attacks in three states- chemical, nuclear and biological (aerosolized *Y. pestis*). In both of the exercises, the conclusion was same: Leaders were unprepared, chain of commands were unclear, establishment of an outbreak was late, mass media spread fear and panic, ineffective triage, antibiotic supply and distribution was delayed, as did travel restrictions and the worst of all: hospitals exceeded capacities within 24hrs leading to greater avoidable fatalities (Leitenberg, Milton 2005).

What has world learnt? In the words of Frank Rühli, "We are in a constant arms race against pathogens". Looking at the patterns from past, it is inevitable that in future many viruses will overcome their potency to jump across species, say animal to human. With biological weapon information trending on every social platform and its availability at fingertips, the world has entered an era where it is not possible to live in denial over possibility of bio terrorist attack. A biological attack could threaten massive civilian casualties, violation of democratic processes (fundamental rights), civil disorder, loss of confidence in government. Current organizational structure is not suited for management of biological attacks.

How are things better now? The lines of authority have been drawn more clearly, surveillance is easier, trained first responders, better decontamination and quarantine facilities, sagacious use of mass media for information broadcast and better compliance by people. We are in a far superior stage of command of our life than we ever had been. Now is the time to gear up for the worst and be prepared for any anti-social event or elements.

Looking at the examples of several countries like Italy, USA, Brazil, India, Russia, South Africa and many others who have been worst affected by this invisible enemy, we are yet to see the full blown physical, mental, social and economic effects this will have in future to come. The virus's potential to mutate into a more lethal form is unknown although it has been known to do so in past, like a deletion in gene of 382 base pairs in gene ORF8, reported by Dr. Linfa Wang Et al in Duke NUS medical school in Singapore and once in 2003 during the severe acute respiratory syndrome- SARS outbreak. The mutation that led to Wuhan outbreak, at position 23,403 has accentuated interests as it made the surface proteins of virus more compatible with humans. Glycine replaced aspartic acid at position 614 of spike making G614 the new strain which grows 1.22 times faster than previous form. In a recent study done in by Dr. Andrew Rambaut, a molecular evolutionary biologist at the University of Edinburgh, states that "over the length of its 30,000 base

pair genome, SARS COV2 accumulates an average of one to two mutations per month.”

These mutations happen when not interfered with the organism at all. But what happens if this, or any other virus is mutated for personal or political gain? What if nations, in strive for power start another world war? With the staggering dip in economy, declining resources and halt in trade around the world, no country will recover from an impact this large if it was to be hit below the belt with something far disastrous than ‘nukes’- a humble invisible pathogen (Su YCF, et al 2020 and Kai Kupferschmidt 2020).

In a pandemic like this, it is a high possible scenario that the number of infected cases might get too large which the healthcare systems will not be able to handle. There would not be enough resources like medicines, staff or even medical equipment like ventilators left to help every patient. Especially in developing countries where there already is a scarcity of amenities and not to mention, capital. People will die without even getting treatment. As more healthcare staff get ill themselves, the capacity of an already fragile health care system disintegrates further. Terrible verdicts will have to be made over who lives and who doesn't. The confidence in system grows sparse meanwhile the number of deaths hike significantly in this case.

Every country is making maximum efforts in making the cure for Corona. According to latest list of World Health Organisation, at least 165 vaccines for Novel corona virus are being developed across the world. The invention is a tedious task in itself with numerous trials failing. The need for a feeling of safe environment is requisite. And the country officials would do anything to pacify population. Considering the fact that every country would want to get their hands on the vaccine as quickly as possible, one kind of vaccine will not fulfil the demand of globe. Also, some countries like the United States have indicated that they will monopolize the production of the new vaccines and thus the other countries will have to wait for a later date. Thus every country is taking a stand for itself and working hard in this mad race of who makes the best vaccine against Coronavirus first. The breakthrough in an effective vaccine is likely 14-18 months away. In the meantime, researchers are working towards to develop a preventative drug which lowers the infective rate.

Since we don't have an option of immunization for now, we have to socially engineer our behavior to act like a social vaccine. It all comes down to:

1. Not getting infected
2. Not infecting others.

It sounds trivial but the ultimate thing we could do now is to wash hands with soap. Every household has it, can afford it, has no stigma attached to it. A 20 second hand wash is the best weapon against the virus. Use of sanitizers when water is not available, use of protective

gloves, good quality masks are a necessity. Social distancing- no hugging or handshake. Many officials including prime ministers of several countries like Israel, United States, Dominican Republic, United Kingdom have urged public to greet by folding hands- Namaste- the Indian traditional way of showing respect. Avoiding to travel. Self-isolation after travelling for 14 days. Only going out to bring necessities. Stay at home to protect those who need to be out for society to function: doctors, police officers, grocers. This prevention of spread of disease and our health is in our hands. Literally and figuratively (Gao M, et al 2020).

(Somashkehahar et al 2020) reviewed the ASI's Consensus Guidelines to be followed in Covid 19. (Spoorly et al 2020) have reviewed about mental health problems faced by healthcare workers due to the Covid-19 pandemic. Risk factors of respiratory health issues in this region are evident from the previous studies (Taksande, et al 2016, Dhar, Raja et al 2019, Salampuria, et al 2019, Shah, P., and Naqvi W 2020, Gaidhane S, et al 2020, Jachak, S., P. al 2020). Cardiologist Dr. James Kneller from Washington in one of his social network channels said- it is reasonable to think that this began in an adventitious way from a laboratory that was supposedly studying the virus. We may never know the whole story. We may never know what went wrong. Regardless of how this began, it is important to realise that none of us ordinary citizens are at fault. We on the other hand are the unfortunate victims of this mess. Even if our government was responsible, we, as citizens, could not have stopped these actions even if we wanted. No citizens of any country are to be blamed. So let us not hold people around us liable. Frustration and fear levels are high. Lashing out at everyone and anyone is inappropriate and unfair.

The nations will have to join forces, act passionately and develop advanced action plans to impede the next intentional or fortuitous outbreak as the threat of bioterrorist attack looms around us, involves all countries working together in harmony. Making sure that adequate health care is being provided to those in need in the form of drugs, protective items like gloves and masks, beds, testing kits and safe transportation facilities is essential. Repeated execution of life sized, real life scenario drills and hands on experiences at all levels of healthcare workers will help a lot to reduce morbidity and mortality in the long run. We have learnt this the hard way that this is not just one nation's problem but our planet as whole. There are a number of studies reflecting on alarming aspects of COVID-1 (Joshi, K., N. Et al 2020, Khatib, M.N., et al 2020, Lakhkar, B.B., et al 2020). Studies by (Patel et. al. 2020, Phansopkar et.al 2020 and Prasad et.al. 2020) were reviewed.

CONCLUSION

The challenge is not only achieving global compliance but also to re-assess how they would manage the business of biotechnology so that it does not fall into the wrong hands. This would need re-evaluation on all foreign affair policies and relationships with trustworthy foundations

with allies, a sense of responsibility of a better future and above all: a better judgement of right and wrong for humanity.

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