

## Editorial

# Impact and Severity of COVID-19 Epidemic in Pakistan

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Editor

The impact of epidemic depends on three factors: the infectivity and virulence of the agent, the susceptibility of the host, and the environment favorability of the agent. That means simply, if the infectivity is high, it's going to attack more people, but if the virulence is high, it will kill more people without being able to be transmitted. If the host is not susceptible to infection then also epidemic will fade or may not produce increased case fatalities. And if the environment is not conducive to viral survival then also the epidemic will fade.

A latest Chinese study in Peking university on 103 patients, they identified two strains of COVID 19, the original S type and L type, which is a mutated type<sup>1</sup>; but their study found more of L type. It suggests that L type is more aggressive mutated form. We don't know which type is predominant in India? But overall the infectivity of COVID 19 is pretty high with a favorable mortality profile which is actually pro-epidemic. So the agent remains same as for the rest of the world, till now.

The host factor is very important in an epidemic. The infectivity and severity of the disease, as well the mortality are determined by immune response of the host. The COVID 19 causes more suffering in elderly and more mortality. Though the young patients are infected, they usually show mild or no symptoms. In 80% of cases symptoms are mild, 15% cases symptoms are moderate and 5% cases having severe symptoms like ARDS and overall mortality is around 2.5%. The most of the mortality is above 60 years of age with highest above 80 (14 % in Italy vs 10% in Wuhan). The mortality is almost insignificant among individuals less than 20 years of age (0.3%), and nil upto 9 years<sup>2</sup>. So age composition of a country will determine it's mortality. A country like Italy where 22% of population are elderly (more than 65 years) the mortality is very high<sup>3</sup>. Whereas in Indo Pak 6.4% are above 65, so naturally the mortality will be less here. Apart from this age composition another factor is important which is immunity of the host. We have two types of immunity. The first line is Innate immunity and 2nd line is Adaptive immunity. The innate immunity does not have a memory and it is mediated by NK cells, macrophages and neutrophils. The Adaptive immunity is mediated by T and B lymphocytes and it needs a memory of a previous encounter with the pathogen. But here our Innate immunity is important as the COVID 19 is a new virus.

A US team of researchers has found that Indo Pak, compared to other world populations carry more NK cells that can detect and terminate infections at early stage<sup>4</sup>. Indo Pak acquired the activating KIR (killer cell immunoglobulin receptor) genes as a result of natural selection to survive environmental challenges<sup>5</sup>. So there is some proof that we have a stronger first line defense, may be as we are exposed to more infective agents and that determine a specific microbiome inside our body. Apart from that, observation in the current epidemic is, mortality is less still in malaria endemic areas. We still don't know the causal relationship. But studies have shown Plasmodium Falciparum requires Zinc for parasitic growth<sup>6</sup>,

and zinc also inhibits the RNA dependent RNA polymerase of COVID 19 and Chloroquine is Zinc Inophore. So, there may be an interrelationship! But being a malaria endemic country we can breathe a sigh of relief!

There is another factor as well. A new study is recruiting health workers to evaluate effect of BCG vaccination in prevention or manifestation of COVID 19 infection<sup>6</sup>. BCG vaccine is given in children to modulate their immunity against tuberculosis. It actually enhances T cell mediated immunity which is a form of Adaptive immunity, but at the same time with the help of IL1 Beta it stimulates innate immunity, as well. BCG vaccination has been shown to reduce 30% of viral infections, with the help of this Innate immunity. So BCG, Tuberculosis and Innate immunity all seem to link together. We don't know till now whether we will have another advantage, in fight against this virus, of being a Tuberculosis endemic country.

It is hot topic now that whether the hot climate of our country will be able to kill the virus? We still don't know. But let's see the temperature and latitude of the affected countries! The 'Global Virus Network' has predicted that weather modeling can explain spread of COVID 19<sup>7</sup>. Their observation is that the spread of COVID 19 is along a narrow corridor of 30-50° N at consistently similar weather conditions of 5 to 11 degree Celsius and 47% to 79% humidity. They also suggested that a temperature rise of 12 degrees Celsius or higher, the viral transmission may be difficult. A study in China also found that the virus transmission is best at a temperature 8.72 degree Celsius and with every 1 degree rise in minimum temperature, the total number of cases go down<sup>8</sup>. So what will be the fate of the virus in boiling temperature of country is a valid speculation. We didn't have a single casualty in MERS epidemic in 2012, which was a deadly Coronavirus. We don't know whether it was due to a proper isolation or our climate ! So just hold tight till mid April, maintain a lock down properly, and leave the rest to scorching sun rays.

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