

CLINICAL MANIFESTATION OF COVID-19 IN GENERAL AGE GROUP: REVIEW ARTICLE

ABSTRACT:

BACKGROUND: COVID-19 is the disease caused by SARS-COV-2 or novel coronavirus. It is extremely contagious and has capability to produce severe clinical outcomes.

SUMMARY: Clinical manifestations of coronavirus disease 2019 or COVID-19 is different for different age groups. The general trend is that the chance of contraction and severe clinical outcome after infection increases with increase in age. The vulnerable section which is going through their immunosuppressive state must be cautious as they need to be protected more than any age group of the population.

CONCLUSION: More study needs to be done to find out the vulnerable groups and nuances attached between COVID-19 and clinical manifestation in them.

KEYWORDS: - Covid-19, Pandemic, Clinical Manifestation, Pathophysiology, Long Covid-19, Preventive Measures.

INTRODUCTION:

Coronavirus disease 2019 or COVID-19 which was first identified in Wuhan city of the Hubei province in China. It is caused by novel coronavirus or SARS-COV-2 which is the successor of the SARS-COV, a virus which caused the severe acute respiratory syndrome (SARS) in 2003.¹ The outbreak of COVID-19 has been proving an unprecedented event which has never happened before. Extremely virulent nature and capacity of producing lethal clinical outcomes makes it more fearful as compared to other disease outbreak. The menace was such that World Health Organization (WHO) was compelled to declare it as pandemic upgrading the status from public health emergency of international concern (PHEIC).² As of February 5, 2021, 104,947,762 infection cases has been registered all across the world and 2,286,170 case fatalities due to COVID-19 complications has been reported.³ The case fatality rate (CFR) has been hovering around two percent which is quite less as compared to SARS and MERS outbreaks but the R0 value which indicates the infection caused by one infected person is very high as compared to SARS and MERS which makes it difficult to control. United States of America, India, Brazil, Russian Federation, United Kingdom and France accounts for most number of case infections and case fatalities attached to COVID-19.⁴ The mutation of coronavirus strain in United Kingdom and Brazil is a serious cause of concern as the mutated virus is supposed to be seventy percent more virulent than the current strain. The novel coronavirus spreads very rapidly and takes control of the cell to spread more. Although the clinical manifestation of COVID-19 is different in various age groups. Although the vertical transmission is not yet established the

neonates are contracting the disease but no severe outcome largely been observed. Pediatric age and younger adults are believed to be the most resistant against the virus but they are not immune to the disease as several severe clinical outcomes has been reported from these age groups.⁵ On the other hand, the older aged population is very prone to both contracting the disease and developing the severe clinical outcomes in most of the cases. There are some long-term consequences are attached to the disease which makes it more dangerous. Therefore, it is necessity to follow the preventive measures for better results. In these articles are these aspects of COVID-19 has been discussed in depth.

PATHOPHYSIOLOGY AND MECHANISM OF NOVEL CORONAVIRUS

Coronavirus disease 2019 or COVID-19 is a viral infections and contagious disease caused by novel coronavirus or SARS-COV-2. Novel coronavirus is the successor in the coronavirus family of SARS-COV which caused the severe acute respiratory syndrome outbreak in 2003. The COVID-19 pandemic is the unprecedented event that has happened in almost past hundred years. The high virulent nature and capacity of producing extremely lethal clinical outcome makes it most deadly pandemic in the human history. More than one hundred million people has been infected by the COVID-19 and of which two million people lost their lives due to COVID-19 related complications. Human casualties at this level in a particular period was not registered in almost past century. Containment is the major problem as the virus has immensely fast pace of spreading through the human population. Population density has direct relation with the case load in a particular area. Higher the population density, higher is the case infection in that highly populated area.⁶

The coronaviruses are not new to the world. Most of the times these viruses are present in the respiratory tract of human beings. The mega reservoir of the viruses is present in wild animals such as bats. Then an intermediate species such as wild hens and pangolins which are sometimes used in diet transmits the virus to humans. This transmission of the virus from wild animals to humans via intermediate species is known as spillover effect. From the discovery of the virus in the midst of 1960's, it was considered as a non-threatening virus which peacefully resides in the respiratory tract of human being. No major disease caused by coronavirus was reported for almost four decades since its discovery. But as the viruses are notorious for their mutation pattern and they undergo constant mutation throughout their life. One such mutation wreaked havoc in the year 2003 when the severe acute respiratory syndrome struck the world. The SARS was caused by coronavirus or SARS-COV which is the predecessor of novel coronavirus that is SARS-COV-2. This was the first time when coronaviruses were known to be lethal as considerable percentage of infected patients produced fatal clinical outcomes. Then the research on coronaviruses accelerated and various other aspects were discovered which later helped in drawing the mitigation strategy. Then several years later, in the year 2012 another mutated coronavirus caused outbreak of Middle Eastern respiratory syndrome (MERS). This also was successful in producing lethal outcomes as the respiratory system was under attack which one of the crucial systems of the human body. Although both of these outbreaks were limited to certain geographical area and were considerably less in infection numbers as compared to coronavirus

disease 2019. Novel coronavirus causes the coronavirus disease 2019 which recently crossed the mark of hundred million in infections all over the world. No other disease outbreak was so contagious and lethal as COVID-19 hence it is called as unprecedented situation. The once in a century pandemic has taken more than two million lives from all over the world.⁷

Mechanism of the virus somewhat resembles with the SARS-COV, its predecessor. The structure of the coronavirus is crown shaped. It harbors spike proteins which are the main tool for the virus to get in to a cell. Human body contains various angiotensin enzyme 2 (ACE 2) receptors at various organs of the body. ACE 2 receptor are mainly found on cardiovascular system that heart and respiratory system that is lungs. The ACE 2 receptors act as a gateway for the coronavirus and facilitates the entry of the coronavirus in to the cell. The spike proteins get attached to the ACE 2 receptors which then prohibits the receptors from attaching any other enzyme. The host cell is completely hijacked by the coronavirus and crucial functions of the cell like protein synthesis. Then the coronavirus starts to replicate itself and starts spreading to other parts of the body via various connective tissue like blood. The incubation period of the virus ranges from 2 days to 14 days. Generally the symptom starts to show up after 5 to 6 days and if medical intervention is not done then the person starts to show severe symptoms.⁸

CLINICAL MANIFESTATION OF COVID-19 IN DIFFERENT AGE GROUPS

Coronavirus disease 2019 or COVID-19 have wide range of clinical manifestations among the various sections of population. From neonates to the old aged groups, the COVID-19 showed various effects and there is stark difference in clinical outcomes produced by novel coronavirus in these age groups. Starting from neonates or infants which are classified under 0 to 1 age groups. These are the new born which are extremely vulnerable in catching the coronavirus disease. There are two theses proposing two ways the infants can catch the coronavirus disease 2019. A concept called vertical transmission in which the COVID-19 infected mother transmits the infection through placenta or any other form genetically to infants. No study or proof has been reported till date but it is not completely ruled out. Also some other proposed harms that can happen such pre term birth of the child, still birth, disorder at birth are being hypothesized on the data from previous similar outbreaks like severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS).⁹ But no concrete conclusions about these possible effects of COVID-19 on mothers have been reported. Another way by which the infants can catch the COVID-19 infection is through hospital or health care facility environment and medical negligence. As the COVID-19 is raging all across the world, containment of the same is the first priority. Major chunk of the resources is solely diverted for the mitigation measures which also included the hospital or health care infrastructures around the world. The non-COVID-19 ailments are sidelined and these includes pregnant women. Often same health care facility treating the COVID-19 patients have maternity wards and same personnel are working in shifts to cater the demand of both COVID-19 and non COVID-19 patients. Therefore, there is a high chance of medical negligence while handling the new born baby through which the baby can acquire the infection. Also, the infected mother can transmit the disease to her baby while breast feeding or handling the baby by various methods like sneezing without covering, talking

and so on. The baby is in extremely vulnerable state and needs utmost care as it is going through the immunosuppressive state. Maintaining the protocol for dealing such above-mentioned situations can ensure the reduction infections of the second type. In a study 1481 deliveries of babies were observed among which 116 mothers were containing the novel coronavirus infection. 120 neonates were born to the COVID-19 positive mothers. 79 of the followed-up infants were tested positive after 5 to 7 days after their birth and 79 infants were observed after 14 days of the birth. This study infer that the vertical transmission has a little chance to crop up and hospital or health care facility acquired infection is the reason behind the infection. Perinatal infection can be easily dealt with proper hygiene and handling of the infant. Also the babies were recovered successfully after treatment in most of the cases.¹⁰

In the higher age groups of adolescents and teenagers, these have high immune system and therefore one of the least affected individuals in the society according to age groups. Fewer number of people from this age group has been infected but their transmitting ability of the virus is at par with rest of the infected people. But a study found out that almost 4 out of 5 patients from this age group has been asymptomatic patient of COVID-19 that is it shows no symptom when contracted by COVID-19. There is also a categorization among this age group. Teenagers and adolescents having any kind of underlying illness or comorbidity can produce severe clinical outcomes, as comorbidity is the biggest decider whether the infected person shall develop severe clinical outcome or not.¹¹ Some cases need intensive care attention and might produce the fatal clinical outcomes but they are rare. The symptom can be varied from fever, cough and cold along with breathing difficulties and loss of taste and smell. Hypoxia is rarely reported among the age group of young ones. Widely seen factor which was responsible in infecting the young ones, which generally lives with their patents are their infected relatives which were in close contact with the young ones. Residing in a highly populated area is another cause of transmission. Almost all the studies done on pediatric age group infected by COVID-19 found that the age group showed milder to none symptoms post contraction of COVID-19. According to a study most common symptoms include fever which was found in 59.1 percent of cases examined, cough in 55.9 percent and myalgia in 18.7 percent. It rarely progressed to severe acute respiratory distress syndrome in pediatric age group and which is generally seen in older age groups. In some comorbid pediatric cases, the requirement of intensive care such as oxygen support system and mechanical ventilation was felt and applied. But this rare occurrences do not over shadow the largely milder to none symptoms cases among pediatric age groups.¹²

Clinical manifestation of COVID-19 in working class population, particularly younger adults and middle-aged persons is different from other groups. This was a proper notion that these groups' members do not contract the COVID-19 disease. It was a popular myth busted by various studies and numbers and statistics. In fact, large chunk of infected patients of COVID-19 is constituted by this group. Most the time the symptoms take time to show and are asymptomatic cases. Symptoms if showed includes fever, cough and cold. The ground glass opacity test does not direct towards proper conclusion as viral load I most of the cases is low. Another misconception attached to this group is that it cannot transmit the disease. The fact contrary to the notion and this contributes more than any other group when it comes on r_0 value or number of person infected by one person.¹³ the reason behind this rationale is that this group constitutes working

class people which often roam from one point to another for variety of reasons. Therefore, the transmissibility factor associated with this group is more as compared to other group of peoples which can be home confined for considerable number of days. The case fatalities in these groups are also unavoidable to be unnoticed. Comorbidity can play a key role in producing lethal clinical outcomes in this as well as every other group. Although the immunity factor is on this groups side as they are on the peak of their innate immune response function. Therefore, most of the cases are asymptomatic in nature among which many does not even know if they got infected by coronavirus disease 2019.

COVID-19 infection risk increases as one goes higher on the age ladder. Higher the age more is the chance of getting the novel coronavirus infection. Age group, particularly above 60 are most vulnerable as they are going through their immunosuppressive state. Their immune system is already weakened over the time. Also, several underlying chronic medical conditions are attached in most individuals also known as comorbidities which makes things even worse for these individuals. Comorbidity is the force multiplier of the deadly novel coronavirus and in almost all cases severe clinical outcomes have been reported. The case fatalities are almost constituted by this age group. The case fatality rate among this age group is more than 50 percent which is a serious cause of concern. Requirement of hospitalization and critical care are essentials in this scenario and constant monitoring of various parameters is a must to do while dealing with such cases at medical level. In United States of America 8 out of 10 deaths reported are from age group 65 years or above. The hospitalization chances as compared to comparison group that is age group of 18 to 29 years in 65 years and above increases from 5 times to almost 13 times higher. Deaths are 90 to 230 times higher as compared to comparison group. Many old ages people suffer from various ailments like diabetes mellitus, cardiovascular ailments, renal disease and so on which makes the treatment more difficult. Once the infection is contracted by the individuals ranging from 65 years and above then extreme medical attention is needed and therefore the best way to avoid such fateful scenario is following preventive measures.¹⁴

PREVENTIVE MEASURES OF COVID-19

Different age groups have different clinical manifestations of the COVID-19. Especially in older ages and people with comorbidities, the course of COVID-19 infection can take fatal turn in most of the instances. Also, there are various long-term consequences which can haunt the survived patients of COVID-19 for considerable amount of time post illness. Persistence of these symptoms may arise the need of post COVID-19 care and rehabilitation. Therefore, it is important to secure oneself from the lethal infection by following basic preventive measures which can act as protective shield against COVID-19 infection. World Health Organization (WHO) and several premier health care agencies after due diligence, came up with certain guidelines that can be followed by the people in order to ward of the viral infection. This include wearing masks, maintaining safe and minimum physical distance when in crowd, sanitizing hands on regular basis, going out only when the reason is unavoidable, wearing personal and protective equipment's (PPE) kits and so on.¹⁵ Most of these measures have been tried and tested during previous outbreaks of severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS) along with Ebola outbreaks. In such times of desperation where

there is an urgent need to control the menace of the coronavirus disease 2019; we have to rely on these measures. For examples, wearing masks made enabled the health care workers to trace the Ebola patients which was running wild and treat them eventually gaining the contrail on the disease spread through masks.¹⁶ Washing and cleaning the hands are the prime factor in saving oneself from the infection as the hands can harbor many viruses and the virus can enter through mouth and nose. Therefore, it is important to clean the hands before performing and activities. During SARS outbreaks of 2003, various authorities advised people to wash their hands before any activity. Especially medical professionals who are the front-line fighters against COVID-19 must wear the PPE kits while on duty. These measures together are called as social vaccine which must be taken till full roll out of medical vaccine.¹⁷ Studies on impact of COVID on different contexts were reported. Adhit et. al. reported on clinical features, effects on gastrointestinal system and possibility of faecal transmission.¹⁸ Agrawal et. al. reported its financial effects on the dental fraternity and health-care workers.¹⁹ Anjankar et. al. reported on positive aspects of COVID-19 and also impact on Medical Education System.^{20,21} Bakshi et. al. assessed the awareness and psychosocial effects of covid-19 pandemic on health care professionals and medical students across the state of Maharashtra.²² Balsara et. al. reported on detection, response, preparedness and readiness measures for covid-19 pandemic.²³ Similar studies were also reported by Bawari et. al.²⁴ and Bawiskar et. al.²⁵ and Gaidhane et. al.²⁶. Khan et. al. also reported about the demographical and epidemiological profile of coronavirus disease.²⁷⁻³²

CONCLUSION:

The COVID-19 is a medical emergency that struck the whole world and human civilization in a once in a century way. Therefore, dealing with it becomes a humongous task especially when the disease is extremely contagious. Targeted approach works the best and proves efficient. As the clinical manifestations are different for different people. Therefore, most vulnerable people can be given priority in treatment. Also, vulnerable group can be made to follow the preventive measure so that case fatalities can be lowered. Wearing masks and maintaining social distancing has been proven to be effective already and now it can be followed in the COVID-19 pandemic in order to lower the daily new infections. The flattening of the curve can be achieved by various other preventive measures which are way cheaper than curative measures undertaken after infection. Vaccine roll has been started in major countries and priority sector wise distribution will ensure the maximum efficacy of the vaccine. Finally, more study can be done on vulnerable population group so that more curated strategy can be planned in order to achieve maximum efficiency in mitigation measures.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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