



A Review on Novel Corona Virus associated with Cardiac Obstacles

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ABSTRACT

The SARS COV-2 {severe acute respiratory syndrome corona virus} is the major cause for occurrence of covid -19. It begins in 8 December 2019 and more than two-hundred countries were affected. The first occurrence of disease was developed in china (wuhan) and rapidly rises within months of three. WHO (World health organization) announced covid -19 as a pandemic in the month of march 2020. There is rise in verification that subjects Who are affected with covid-19 infections may develop post covid obstacles such as cardiac obstacles, respiratory obstacles, cerebro- vascular obstacles, acute kidney failure and organ-failure etc. Subjects who are affected with covid-19 infections with cardiac obstacles have higher death rate. The severeness of disease corresponds with cardiac obstacles. SARS-CoV-2 mainly binds at the receptors present in the lungs and it also binds to the receptors in the heart. It is very essential to be aware of covid-19 & its cardiac obstacles. In this article we give an outline about covid-19 and its cardiac obstacles.

Keywords: Severe acute respiratory syndrome corona virus, Covid obstacles, Cardiac obstacles, Respiratory obstacles, Cerebro-vascular obstacles, Acute kidney failure and organ-failure.

1. Introduction:

The SARS COV-2 {severe acute respiratory syndrome corona virus} is the major cause for occurrence of covid -19^[1,2]. Although, SARS-CoV and MERS-CoV are the two forms of viruses. SARS-COV-2 which belongs to the :

Genus- Betacoronavirus

Family- *Coronaviridae*

Subfamily-*Coronavirinae*

It is an R.N.A (Ribonucleic acid) containing virus with an extent of 29.9 kb which is segment free, single positive stranded and enclosed in nucleus, which mostly influence on human-beings and animals^[3,4]. It begins in 8 December 2019 and more than two-hundred countries were affected^[5,6]. The first occurrence of disease was developed in china (wuhan) and rapidly rises within months of three^[7]. WHO (World health organization) announced covid -19 as a pandemic in the month of march 2020. ^[3,8]

There is rise in verification that subjects Who are affected with covid-19 infections may develop post covid obstacles such as cardiac obstacles, respiratory obstacles, cerebro- vascular obstacles, acute kidney failure and organ-failure etc^[9]. During covid-19 infection over expression of sympathetic nervous systems may persuade hyper coagulopathy levels & cytokine storm. These changes may persuade an un-repairable harm to the cardiac and respiratory system.^[5] the subjects who have cardiac diseases are more prone to get covid-19 infection and these SARS COV-2 virus may cause de novo cardiac obstacles.^[7,10]

The usual clinical features comprises pyrexia, muscle-pain and tickle in throat may develops^[6,11]. Subjects who are affected with covid-19 infections with cardiac obstacles have higher death rate. The severeness of disease corresponds with cardiac obstacles. It is very essential to be aware of covid-19 & its cardiac obstacles. In this article we give an outline about covid-19 and cardiac obstacles.^[4]

2. Epidemiology:

2.1 World Scenario:

The major cardiac obstacles occurs are deep vein thrombosis (DVT), arterial thrombosis, Myocardial infarction, arrhythmias and congestive heart failure. More than 20% of subjects induces DVT in emergency ward^[5,12]. The loss of life is more in DVT subjects. 60% of subjects are more prone to MI. In

United states 40% of subjects are prone to get MI. Acute coronary syndrome occurs in COVID-19 subjects is common in United states and Italy. 17% of subjects may notice cardiac arrhythmias in 140 SARS-CoV-2-positive subjects and it is the most common cardiac obstacles.

25% of subjects may notice congestive heart failure. these subjects are more prone to get DVT, loss of life and reduction of blood-pressure. In Spain 80 subjects had developed heart failure and seen to be as high as 47%.^[13,3]

2.2 China Scenario:

Through retrospective inspection we notice that more than 30% of subjects had dilated cardiomyopathy, acute coronary syndrome and hypertension. More than 25% of subjects may notice myocardial-infarction. Some case reports conclude that cardiac obstacles range from >6 to 15%. Hypertension ranges from 16-30%, Acute coronary syndrome ranges from 10% and diabetes mellitus ranges from >5% to <11%.^[14,15]

3 Pathophysiology:

The novel corona virus has different structural proteins and gene sequences. SARS-CoV-2 is homologous to SARS-CoV was first reported in the year 2003. It contains the four following proteins that are:

1. S-protein (spike protein)
2. N-protein (nucleocapsid protein)
3. M-protein (membrane protein)
4. E-protein (envelope protein) and also it contains sixteen amorphous proteins. The spike protein is very important for entry into the swarm cells.^[4]

S-protein contains 2 sub-divisions, mainly the S1 and S2 sub-divisions, binds in a non-covalent manner^[5,16]. S1 sub-division includes (RBD) receptor-binding domain which face to face interconnect with the (ACE2) angiotensin-converting enzyme 2 convey on swarm cells, which makes smooth entry of virus^[8]. These enzymes mainly present in nasal membrane and some organs like liver, heart and the brain. Present review says that smooth entry of virus into swarm cells occurs when it holds to receptor-binding domain (RBD) holds to sialylation N-Glycans exist in mammalian cells.

Whenever, severe acute respiratory syndrome-corona virus-2 fuses with protease serine 2 causes structural alternation of S2 sub-division of spike protein, which allows binding of virus to the swarm cells.

After doorway of virus, the polyproteins pyrophosphatase (inorganic)-1a (Ppa1a) and pyrophosphatase (inorganic)-1b (Ppa1b) are generated through translating of open reading frame 1a (ORF1a) and 1b (ORF1b). which results in 16 amorphous proteins are produced through protein breakdown of Ppa1a and Ppa1b, which is necessary for attacking, the swarm cell generation of proteins and allowing replica of virus.

Alike, supplemental ribonucleic acid viruses, WHO divided viruses classes as variants of interest (VOI) and variants of concern (VOC) which depend on based on qualities like as transmission or severity. Presently, variants of concern are of 5 types i.e. alpha (B.1.1.7), beta (B.1.351), gamma (P.1), delta (B.1.617.2), and omicron (BA.1, BA.1.1, BA.2 & BA.3).^[3,4,15]

SARS-CoV-2 mainly binds at the receptors present in the lungs and it also binds to the receptors in the heart. these are the physiologies discussed about cardiac obstacles they are:

3.1 Damage to the myocardial cells:-

Whenever, viral entry occurs into the cells it holds with ACE2, mainly located in lungs and heart, which outcomes in changes of ACE2 signal route, which causes myocardial and pleural cells damages.

3.2 Systemic inflammation:

In covid-19 subjects inflammatory mediators and cytokine storm, levels are increased results in damage to the many organs.

3.3 Varied myocardial need:

O₂ demand increase but O₂ supply decreases during infection which leads to MI.

3.4 Breakdown of thrombus:

During infections flow of blood in the blood-vessels are raised due to pressure, which results in thrombus breakdown leads to MI.

3.5 Side-effects developed during covid-19 treatment:

During covid-19 infection many drugs like anti-virals and steroids had been used which severely causes cardiac obstacles.

3.6 variance of electrolytes:

variance of electrolyte may causes hypokalemia in covid-19 infection and may give rise to cardiac-arrhythmias.^[2,7]

4. Cardiac Obstacles:

4.1 Myocardial Infarction:

It is ordinary cardiac obstacles. In this condition raise in cardiac-markers i.e more commonly troponin-1. The most common physiology for the occurrence of disease is damage to the myocardial cells and systemic inflammation.^[7]

4.2 Cardiac Arrhythmias:

As per the case-reports in china concluded that tachy-arrhythmias and brady-arrhythmias may happen.^[7]

4.3 Myocarditis:

It mainly occurs in viral contamination i.e. in SARS-COV and MERS-COV. In this condition raise in cardiac-markers i.e. more commonly creatinine kinase myoglobin and troponin. death of muscle cells and intrusion of multifocal cells may develops COVID-19 related myocarditis.

4.4 Congestive Heart Failure:

Heart failure subjects who are affected with covid-19 may notice elevated serum troponin ranges.

4.5 Acute Coronary Syndrome:

Physiologies included in this are systemic inflammation and breakdown of thrombus may occur. By these physiologies we conclude that covid-19 subjects may develop acute coronary syndrome.^[4]

5. Conclusion

SARS-CoV-2 is the major cause for covid-19 and was first detected in December 2019. This virus is responsible for production of severe cardiac obstacles those are MI, myocarditis, Acute coronary syndrome, congestive heart failure, cardiac arrhythmias and deep vein thrombosis. Hence we concluded that how cardiac obstacles occurs in covid-19 subjects. The perfect process for occurrence of cardiac obstacles are not known. So that, further research should be necessary to understand the process of cardiac obstacles and their covid-19 relationship.^[3,4,17]

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