Impact Of COVID-19 Pandemic on Management of Other Disease

Vaishnavi S. Patil*, Someshwar D. Mankar
Affiliation: Pravara Rural College of Pharmacy, Loni, Pravaranagar, Maharashtra,India.
Email: vaishnavipatil291@gmail.com

Abstract: The Coronavirus disease-2019(COVID-19) first discovered in late 1960's and now is cause of global pandemic. Virus belongs to Coronaviridae family which is allied with Severe Acute Respiratory Syndrome coronavirus2(SARS-CoV-2) or Middle East Respiratory Syndrome(MERS-CoV19). Virus is single stranded, positive sense RNA.SARS-CoV19 is a strain of corona virus which causes respiratory illness.The first case is identified in Wuhan city in China in December 2019 and now it has been spread globally. On March 2020, World Health Organization was declared COVID-19 as pandemic. Up to the March 27, 2020 there have been 595,800 confirmed cases of COVID-19. The virus is transmitted as same mechanisms of influenza virus, transmission from person to person through sneezing and coughing. coronavirus affects the respiratory tract and it may lead to difficulty in breathing and due to pre-existing medical conditions lead to lowering of immune system functions in older people. We highlight the disease can be fatal more severe in elderly persons with other chronic diseases like cardiovascular disease, diabetes and renal disease.

Keywords: coronavirus, pandemic, renal disease, cardiovascular disease, diabetes, SARS-CoV19, MERS CoV19.

Introduction:

Coronaviridae family virus has main four genera:alpha, beta, delta, and gamma. Mainly cause diseases in mammals, birds but few of them can transmit to humans. Those pass to humans are belong to alpha and beta genera. Beta Corona virus is highly pathogenic and is called as MERS-CoV-19. Corona virus infection may lead to diseases from common cold, fever headache to Severe Acute Respiratory Syndrome.[1] The virus transmitted through direct contact with infected people, coughing, sneezing and secretions of infected people. Covid19 disease is more vulnerable to elderly people with other chronic diseases.[2] Over 100 countries now reported confirm cases of COVID-19. Globally, 4,354,827 have been infected by Covid19 today. 80% of corona virus death rate is of over 60 age group. The symptoms of covid19 include dry cough, common cold, fever, fatigue, diarrhea, and headache. Some broad spectrum drugs are used to control the infection of COVID-19. Researchers found that about 33% of covid-19 patients lead to the renal dysfunction. 5-7% is related to Acute Renal Injury or Acute Kidney Injury (AKI). Children younger than 18 years of age had COVID-19 rate is only 1% of total no. of patients. COVID-19 patients with pre-existing cardiovascular diseases are in more frequency. In some patients myocardial injury with a high level of troponin found in serum. More of investigations focusing on patients with critical symptoms 44% had arrhythmia, 58% had hypertension. COVID19 virus infects the host cell through Angiotensin Converting Enzyme2 (ACE2) receptor which causes pneumonia. ACE2 receptors are important in cardiovascular and immune system. The present review is allocated to focus on cardiovascular disease, renal disease diabetes and COVID-19.

Reason for older People are more infected by COVID-19:

1) Decrease in immune function it is more difficult for older people to fight against infection.

2) Physiological changes due to aging.

3) Lung tissue becomes more elastic over age, which causes respiratory diseases like COVID-19.

but it is positive note, there is report of Europe, people with older age over 100 were infected by COVID-19 who were admitted in hospital have been completely recovered. But this is equally essential for those who have chronic conditions and immuno compromised.

The present review is allocated to focus on cardiovascular disease, renal disease diabetes and COVID-19.[3,4]

COVID-19 and Renal disease

Renal injury: Recent studies state that renal dysfunction to COVID-19 patients can lead to death in severe cases but exact mechanism is not defined. Initially it shows mild abnormalities, it is demonstrated that kidney cells are most target organ of covid-19 virus. It is possible that ACE2 receptors having susceptibility of SARS-CoV2 or MERS-CoV2.[5] Covid19 virus enters into the cells by using the ACE2 receptors and Transmembrane Serine Proteases (TMSPRSSs) which is act as co-receptors and performed important role in the cardiovascular system, renal systems and immune system. These receptors are generally found in the lungs, heart, kidney, intestineVirus affect to the ACE2 receptors, protein, protease ACE2 receptors. In other hand SARS-CoV-2

Infection stimulates cytokines and chemokines, it resulting in the death of patients.In-vitro studies demonstrate that by using Vero-E6 monkey kidney cell line SARS-CoV-2 replication is inhibited by soluble form of ACE2. Hence soluble ACE2 can block the growth of COVID-19 or SARS-CoV2 in ingress of infection.[6]The symptoms of renal injury in COVID-19 patients are involved in high protein in urine (proteinuria) and blood in urine (hematuria). A study shows that kidney function was weakened in 66% of patients who died from Covid-19 infection.Renal injury in COVID-19 patients may arise due to dehydration, hypoxemia, improper consumption of non-steroidal anti-inflammatory drugs, rhabdomyolysis. Recent studies emphasize that Acute Kidney Injury (AKI) or renal injury may be a severe complication in the COVID-19 patients.[7,8]

Kidney Transplant Recipients

COVID-19 infections lead to cause of mortality in kidney transplant recipients throughout the post-transplant process. Many factors like graft rejection, immune suppression, tissue injury. That endorses the viral infection after any organ transplant. In recent studies confirmed that SARS-CoV-2 infection has been found in kidney transplant patient in Spain and China. Due to the immunosuppressive therapy in kidney transplant patient causes COVID-19 infection. Kidney transplantation patient who may be at high risk due to immunosupression and residual chronic disease. SARS-CoV-19 infection has impact on kidney transplant recipient patient. It's challenging to manage immunosupression with COVID-19 infection in patient. In severe cases incubation and ventilation is required for these patients.

Patient at high risk of COVID-19 infections are as follows:

1) kidney transplant patient.

2) Older people aged over 65years.

3) Patient with Kidney disease caused by inflammation.

4) patient receiving rituximab, cyclophosphamide tablet.

5)Patient with nephrotic syndrome.

COVID-19 affects rejection treatment in kidney transplant patient.

Most common symptoms are:

1) Flu like symptom.

2) Fatigue.

3) Tenderness over transplantation.

4) Less urine.

If this symptoms occurs patient should immediately contact to specialist. Many patient on immunosupression have lowering in count of lymphotocyte known as lymphopenia. There is no more data accessible on COVID-19 and Kidney transplant recipients.[9]

Dialysis Patients:

COVID-19 is serious hazard for dialysis patients. Patient required dialysis in two case, Acute Kidney Injury(AKI) and Continues Renal Replacement Therapy (CRRT). Generally dialysis patients are more susceptible to COVID-19 infection than normal patients. Due to older age, weekly three times dialysis required for the patient consequently outside exposure for Hemodialysis (HD). Research study demonstrates that among 37 COVID-19 infected dialysis patients death occurs in 6 cases in Wuhan. In HD patients higher level of inflammatory cytokines found in compared to COVID19 infected patients. Furthermore dialysis patients with SARS-CoV-2 presented lower frequency of lymphocytes in the blood mononuclear cells.[10] Currently, patients with SARS-CoV-2 infection to kidney failure on maintenance dialysis are more triaged to hospitals. The reports suggest that SARS-CoV-2 affect the kidneys and in high degree of AcuteKidney Injury (AKI) found in over critical ill patients. COVID-19 also affects the staff, workers due to hospitalized patients and their families. In this pandemic of COVID-19 affect the many dialyze patients and present new crisis. Therefore, Taiwan society of nephrology and centers of disease control and prevention have published guidelines for hemodialysis (HD) centers for prevent the transmission of COVID-19 infection. Management of dialysis patient with SARS-CoV-2 infection must be shown in standards and protocols. Encouraging social distancing while work in HD centers can also help to decrease spread of COVID-19.[11]

Guidlines for for haemodialysis.

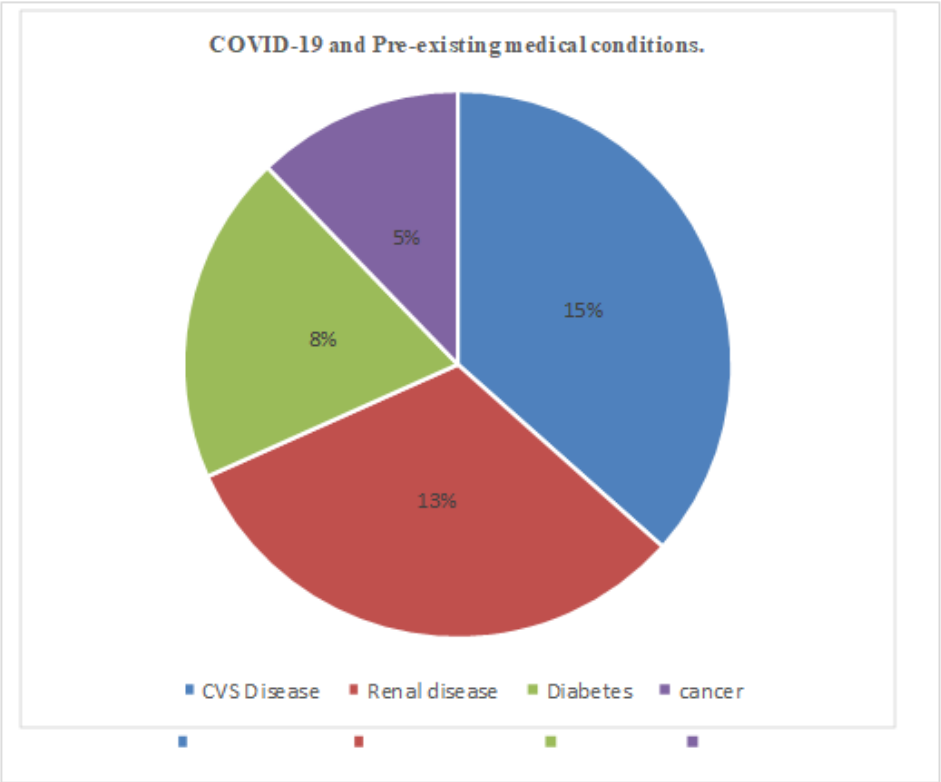
1. COVID-19 spread by droplets by coughing sneezing, direct contact patient should be wear face mask and cover nose and mouth.

2. CDC advised that Dialysis patient with COVID-19 should not be treated in infection isolation room.

3. In organization unit patient should be screen for COVID-19 infection before dialysis.

4. Dialysis staff should be ensure that, patient and staff. Does not become source of Covid-19 infection.

5. Hospital staff should use Personal Protective Equipment(PPE) inside dialysis unit. [12,13]



CDC report from US

People over 65 years

Cases	Adults (65-80)	Adult (+81)
Hospitalizations	31-60%	31-70%
Intensive care unit admission	10-45%	6-30%
Deaths	24%	27%

COVID-19 and Cardiovascular Diseases

In this two decades epidemics of SARS-Cov-2 infection shows serious hazard to global health. COVID-19 infection is not just pneumological but also seen in other diseases. This infection can directly affect the cardiovascular disease (CVD). Pre-existing CVD may influence to SARS-CoV-2 infection. Additionally COVID-19 infection may have several effects on cardiovascular health. Objective of the review is to describe impact of cardiovascular health on COVID-19 infection.[14] Study state that among 99 COVID-19 patients in Wuhan 13% patients presented a high level of lactate dehydrogenase and 7.2% patients found as elevated hypertensive troponin level although 16% had arrhythmia. Myocardial dysfunction may be indirect due to reduced oxygen supply, lung failure after COVID-19 infection.[15] Johns Hopkins University made data the infection of COVID-19 is more than influenza virus. Chinese center for disease control establish that clinical severity has been reported as mild 81%, severe 13% and critical 4.8%. The mild COVID19 infection includes signs fever, fatigue, diarrhea, cough and severe cases symptoms are pneumonia, acute respiratory syndrome. In elder people with or without cardiac shock. Children appear to be less liable to disease due to stronger innate immunity. To the date, approved vaccines or therapeutics are not available for COVID-19. The mechanism that leads to cardiovascular disease (CVD) increasingly edge with pathway of immune system. While age is strongest risk factor for COVID-19 infection and CVD that directly affect immune functions. Old people over 65 years having CVD, diabetes, renal dysfunction and hyperlipidemia that reduce the immune functions. Although there are no specific therapies for COVID-19, it is essential to consider potential of cardiovascular side effects and interaction with CVD medications. There is numerous deliberation to the care of CVD patients and minimize the risk of transmission of COVID-19 to the patient and hospital staff.The mechanism responsible for cardiac injury due to direct viral involvement in cardiomyocytes cell. The report given by the national health commission of China (NHC) in confirmed COVID-19 cases, some patients showed cardiovascular symptoms such as heart palpitation, chest pain instead of respiratory symptoms.[16,17,18]

COVID-19 and Diabetes mellitus:

People with diabetes mellitus, hypertension, and hyperlipidemia are more susceptible to be infected to COVID-19 and at high risk of complications. In the United States (US) 10% older people who aged 65 years have diabetes mellitus.[19] Those people have a high risk for death from COVID-19. Health care workers provide clinical care to COVID-19 patients. The incubation period is 5-6 days for those who having initial symptoms. To better understand for COVID-19 patient with diabetes mellitus, hospital unit should be provide better clinical care and increase awareness of pathophysiology. COVID-19 made up of four proteins, spike, membrane, and nucleocapsid and envelops protein. ACE2 receptors are cellular receptor for SARS-Cov2 that utilizes the dipeptide peptidase 4 (DPP4).An Infected cell undergo necrosis by activation of cytokines and chemokines which causes recruitment of CD4 cells and inflammatory cells. T-helper cells and CD4 cells regulate antigens and immunity against virus. SARS-CoV-19 or MERS-CoV-19 infect immune cells and decrease the CD3, a CD4 cell which causes lymphocytopenia which is linked with SARS-CoV-2.[20,21] Lowering of T-helper cells function inhibit the innate immunity which causes release of cytokines. Diabetes mellitus increase mortality and morbidity in Covid-19 patients. Risk of COVID-19 patients with diabetes mellitus: 1) involve cytokinin storm syndrome, 2) inhibit Tcell function 3) affinity to cell binding and virus entry. Diabetes mellitus inhibit neutrophils chemotaxis, phagocytosis, when people with DM infected by virus, it must be harder to treat due to fluctuation in blood sugar level and due to diabetic complications. Require long duration of time to recover, virus can bloom in an environment of increased blood glucose level. It is important to take precautions for diabetic patients to avoid virus [22]

In adult warning symptoms are:

1) Shortness of breathing.

2) Pain in chest.

3) Blueish lips.

Precautionary measures for patient with pre-existing medicinal condition:

1. Washing hands with soaps, sanitizer frequently for 20sec.
2. Avoid touching faces.
3. Avoid crowded area.
4. For diabetic patient, maintain blood glucose level
5. Increase water level adequate supply in body.
6. Make sure about availability of medicines,essentials at Home.[24]

Conclusion:

COVID-19 virus acts on Angiotensin Converting Enzyme (ACE2) receptor cell and produce organ injury.These cells present in lungs, intestine, heart, and kidney. Kidney injury caused by SARS-CoV2 increases the severity in patient. And CD4 and T cells in diabetes mellitus patients which shows direct effect on immune function and patient become more susceptible to COVID-19 infection.Current reports on COVID-19 describe renal, cardiovascular and diabetic manifestations in the patients. Certain racial groups are highly prone to develop diabetes and cardiovascular diseases. The patients with DM, renal failure, CVD are highly vulnerable to COVID-19. We need to develop ways to care of patients with this disease. There is urgent need to address clinical investigation to obstruct this global pandemic. Further research is required to know the mechanism, clinical presentation and outcomes of pre-existing medical conditions in COVID-19 patients.

References

[1] Qifang Bi et al. Epidemiology and Transmission of COVID-19 in Shenzhen China: Analysis of 391 cases and 1,286 of their close contacts. MedRxiv. 2020 Jan 1.

[2] Nanshan Chen et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. The Lancet. 2020; 395(10223):507-513

[3] Coronavirus disease (COVID-19) Situation Report 106 Data as received by WHO from national authorities by 10:00 CEST, 5 May 2020 https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200504-covid-19-sitrep-105.pdf?sfvrsn=4cdda8af_2

[4] Sohrabi C, Alsafi Z, O Neill N, Khan M, Kerwan A, Al-Jabir A, Iosifidis C, Agha R. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). International Journal of Surgery. 2020 Feb 26.

[5] Li W, Moore MJ, Vasilieva N, Sui J, Wong SK, Berne MA, et al. Angiotensin-converting enzyme 2 is a functional receptorfortheSARScoronavirus.Nature.2003;426:450-4. doi:10.1038/nature02145.

[6] Bandyopadhyay AR, Chatterjee D, Ghosh K, COVID-19: An epidemiological and host genetic appraisal. 2020, volume 11.

[7] Li F, Li W, Farzan M, Harrison SC. Structure of SARS coronavirus spike receptor-binding domain complexed with receptor. Science. 2005 Sep 16;309(5742):1864-8

[8] Diao B, Feng Z, Wang C, Wang H, Liu L, Wang C, et al. Human kidney is a target for novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. MedRxiv. 2020.doi:10.1101/2020.03.04.20031120

[9] Kumar D, TellierR, Draker R, Levy G, HumarA. Severe acute respiratory syndrome (SARS) in a liver transplant recipient and guidelines for donor SARS screening. Am J Transplant.2003;3:977-81.

[10] TangB,LiS,XiongY,TianM,YuJ,XuL,etal.Coronavirus Disease 2019 (COVID-19) Pneumonia in a Hemodialysis Patient. Kidney Med. 2020. doi:10.1111/ajt.15853.
[11] Heymann DL, Shindo N. COVID-19: what is next for public health? Lancet.2020;395(10224):542-5.
[12] HwangSJ.GuidelinefordialysisfacilitiesduringCOVID-19 outbreak. Taiwan Society of Nephrology. Available at: https://tinyurl.com/yx3zc5up. Accessed March 16,2020.
[13] Li Z, Wu M, Yao J, GuoJ, Liao X, Song S, et al. Caution on Kidney Dysfunctions of COVID-19 Patients. MedRxiv. 2020.doi:10.1101/2020.02.08.20021212.
[14] Hulot JS. COVID-19 in patients with cardiovascular diseases. Arch cardiovas dis. 2020 apr 1;113(4):225-6
[15] He H, Chai X. Zhou Y. Pan X, Yang,G. Assocition Of Lactate Dehydrogenase With In-Hospital Mortality in Patients with Acute Aortic Dissection. A Retrospective Obsevational Study. Internatinal Journal of Hypertension, 2020
[16] EuropeanSocietyofHypertension.Statement oftheEuropeanSocietyofHypertension(ESH)on hypertension. Renin Angiotensin System blockers and COVID-10. Available at: https://www.eshonline.org/spotlights/esh-statement-on-covid-19/. Accessed on March 12,20
[17] FerrarioCM,JessupJ,ChappellMC,etal.Ef-fect of angiotensin-converting enzyme inhibition and angiotensin II receptor blockers on cardiacangiotensin-converting enzyme 2. Circulation 2005;111:2605 10.
[18] International Society of Hypertension. A Statement From the International Societyof Hypertension on COVID-19. Available at:https://ish-world.com/news/a/A-statement-from-the-International-Society-of-Hypertension- on-COVID-19/. Accessed March 27,2020.
[19] YangJK,FengY,YuanMY,YuanSY,FuHJ,WuBY,SunGZ,Yang GR,ZhangXL,WangL,XuX,XuXP,ChanJC.Plasma glucose levels and diabetes are independent predictors for mortality and morbidity in patients with SARS. Diabet Med 23: 623 628, 2006. doi:10.1111/j.1464- 5491.2006.01861.x.
[20] Lacobellis G.COVID-19 and diabetes: can DPP4 inhibition play a role? Diabetes clinical practice. 2020 Apr 1;162
[21] Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? The Lancet. Respiratory Medicine.2020 Apr 1
[22] Zhu N et al. A novel coronavirus from patients with pneumonia in China. N Engl J Med. 2020; 382:727 733.
[23] Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun. 2020;109:102433.
[24] Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020; 382: 1708