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REVIEW ARTICLE

COVID-19 HAS BROAD EFFICACY IN HEART FAILURE WITH PRESERVED EJECTION FRACTION IN PATIENTS WITH HEART FAILURE

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ABSTRACT

Since its discovery in December 2019, the coronavirus illness (COVID-19) has spread fast over the world, affecting nearly every country. The condition, caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has become a substantial clinical concern, overburdening healthcare systems and creating a public health risk. The prevalence of pre-existing cardiovascular illness is one of the major concerns for people infected with COVID-19. Patients with underlying heart diseases, such as chronic heart failure or coronary artery disease, had a higher risk of severe consequences and death from COVID-19, according to research. This is because of the virus's interaction with the circulatory system, which can result in myocardial injury, cardiac arrest, and fast decompensation in severely ill individuals. Given the general population's high prevalence of cardiovascular disease, it is critical to understand the possible impact of COVID-19 on these patients. Clinicians should give special attention to the management of patients with pre-existing cardiac disease, which should include a full re-evaluation of medication and regular monitoring of ventilation effects. The necessity of detecting and treating cardiovascular problems in COVID-19 patients cannot be emphasized. COVID-19 has become a worldwide clinical issue, and patients with pre-existing cardiovascular disorders are at a higher risk of complications and death. As a result, healthcare practitioners must be very careful in managing these patients, offering personalized care and monitoring for cardiovascular problems.

KEYWORDS

Heart Failure/complications; Pandemics; Mortality; Pneumonia

1. INTRODUCTION

In the middle of the COVID-19 controversy, a startling medical fact has emerged. The virus launches a distinct and effective attack. Nevertheless, its most deadly expression puts the elderly at risk, particularly those with cardiovascular disorders such as diabetes, hypertension, and coronary heart disease (Guang et al., 2020; Ponikowski et al., 2016). Increased cardiac damage markers, such as troponin, signal a more severe fate and occur later in the disease course, with select patients demonstrating significant elevations in natriuretic peptides, with heart failure and arrest being the causes of mortality in up to 1 in 4 cases (Shi et al., 2020). In rare situations, a fulminant myocarditis-like look has been described. Other post-mortem samples from pulmonary and cardiac arrest fatalities, on the other hand, indicate an exceptionally low number of interstitial mononuclear inflammatory infiltrates without significant damage (Zhou et al., 2020; Huang et al., 2020). As a result of these issues, a theory that suggests the involvement of underlying systemic cardiac disease and predisposition in the development of a heart failure phenotype ranging from typical heart failure with a preserved ejection fraction in the early stages of the illness in the setting of pulmonary difficulties to acute systolic heart failure as a response to COVID-19's cytokine phase is emerging.

One of the most controversial issues is the use of comorbidity medications such as hypertension and diabetes mellitus among those who are most vulnerable to COVID-19 effects. As a result, some drugs, including angiotensin-converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARB), have been called into doubt (Yang et al., 2020). This is due to the fact that COVID-19 initiates infection by binding to the Angiotensin-Converting Enzyme-2 receptor in the epithelial alveolar lining, and there is ex vivo evidence that drugs such as ACEi or ARBs can increase Angiotensin-Converting Enzyme-2 expression in organs other than the pulmonary vasculature (Yu et al., 2019). Others have speculated on the use of secretagogues in the treatment of diabetes, which might affect fluid balance. Furthermore, some doctors recommend that nonsteroidal anti-inflammatory medicines (NSAIDs) be taken with care or avoided entirely (Mehra and Ruschitzka., 2020). We feel that giving generic advice to people who do not have the illness or to young patients who are less prone to having serious problems may be harmful. Interwoven pathophysiological risk factors have a role in defining the proclivity for a more lethal infection in people with underlying cardiovascular disease and heart failure.

During an influenza outbreak, older patients with cardiovascular disease are more likely to experience acute coronary syndromes, cardiac arrhythmias, and heart failure-related events (Nguyen et al., 2016). Increased viscosity may be associated with fever issues, heightened circulatory systems, proinflammatory effects, or endothelial cell failure (Lauer et al., 2019). Immune quiescence associated with ageing may predispose the elderly to higher attack rates. As a result, impoverished groups are more likely to get infected and suffer the consequences. There is no reason to believe that the situation will be any different in the case of COVID-19 (Zhu et al., 2020). COVID-19 findings are distinguished by a high prevalence of pulmonary problems, which manifest as bilateral in-filates on computerised scanning, with a significant percentage of patients progressing to hypoxic respiratory failure. This suggests that these lung results may have a cardiac component, and that increased filling pressures and a heart failure phenotype are also present but being overlooked (Atri et al., 2020; Mehta et al.,2020). There are currently no COVID-19 studies looking at hemodynamics in the context of hypoxic failure to answer this critical question (Zheng et al., 2020).

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Because respiratory sickness occurs in the context of COVID-19, post-mortem testing shows that acute respiratory distress syndrome is commonly followed by pulmonary edoema (Shi et al., 2020). In elderly people with cardiovascular disease and diabetes, left ventricular hypertrophy, diastolic dysfunction, and even heart failure with an intact ejection fraction are prevalent. These individuals may develop high pulmonary vascular pressure if they are not cared for in the normal critical care condition of fluid infusion to maintain blood pressure and parenteral drug delivery. These people may also be given medications like NSAIDs to aid with symptoms like fever and headaches caused by a constitutional condition. Because blood sugars are typically high during the stress of acute illness, people with diabetes mellitus may additionally require insulin or secretagogues. These medications are renowned for interfering with salt and water balance, and they can exacerbate respiratory problems such as pulmonary edoema and hypoxia (Gheorghiade et al., 2005; Turner et al., 2004). When you have renal failure, it becomes significantly more difficult to tolerate salt and water. Similarly, ACEi have been associated with bronchial hyperreactivity and coughing in certain people with pulmonary illness, indicating that their bradykinin-up-regulating actions may have a direct effect on the respiratory system (Oudit et al.,2009; Crackower et al., 2002). Although there is a slight reason to discontinue ACEi in the asymptomatic carrier state or in the early stages of COVID-19 infection without lung complications, ACEi and even ARBs should be avoided if COVID-19 causes pulmonary inflammation and acute respiratory distress syndrome because vasoplegia and renal dysfunction are likely. Clinicians should use caution when administering intravenous fluids to COVID-19 patients over the age of 19 (Zhao et al., 2008; Tikellis and Thomas, 2012).

In the latter stages of COVID-19 illness, a hyper-inflammatory state develops, similar to the cytokine release syndrome seen in response to cancer therapy, as demonstrated by immune checkpoint suppression and T-cell-engaging therapies such as chimeric antigen receptor T cells (Zhu et al., 2020). This multi-systemic syndrome is distinguished by elevated cytokines and dysregulated T cells, as well as lymphopenia (a common early finding), significant increases in C-reactive protein, cytokines such as interleukin (IL) 2 and IL-6, elevated natriuretic peptides (suggesting cardiac inflammation or dysfunction), and high serum ferritin. There appears to be an increase in cardiovascular events following the discovery of these biomarkers, with patients dying from cardiac arrhythmias and heart failure. These myocardial manifestations resemble stress cardiomyopathy or cytokine-related myocardial dysfunction, which occurs during COVID-19 infection and mimics the syndromes seen in secondary hemophagocytic lymphohistiocytosis syndrome or macrophage activation syndrome, both of which are characterised by lethal cytokine release. To avert a catastrophic occurrence at this time, anticytokine treatments such as the IL-6 inhibitor tocilizumab and corticosteroids can be administered selectively (Xu et al., 2020; Li et al., 2020). Of course, these assumptions must be tested in clinical trials.

We feel that until universal COVID-19 testing, antiviral clinical trials, and a better knowledge of the late stages of illness are available, heart failure specialists must take a systematic approach to their treatment and be involved early in the creation of management algorithms. Discontinuation of angiotensin-converting enzyme inhibitors (ARBs) in asymptomatic or early-stage difficulties should be avoided, according to concerned societies (Akmerow and Marban, 2020; Zhu et al., 2020; Soldati et al., 2020; Buonsenso et al., 2020). However, if a proinflammatory respiratory phase has developed, with inflammatory infiltrates and hypoxia, they should be avoided. Excessive fluid consumption, as well as medications that alter salt and water balance, such as NSAIDs, should be avoided in the elderly. In the elderly with underlying structural cardiac illness, biomarkers should be utilised with caution, and clinicians should be cautious when recognising and treating developing heart failure at the hyperinflammation stage.

2. Infection by Covid-19 and The Failing Heart

Due to physiopathological processes implicated in COVID-19 infection, heart failure is a recognised susceptibility during respiratory viral infections. Such processes enhance the likelihood of heart failure decompensation as well as arrhythmic and ischemia risk (Clerkin et al., 2019). The infection's inflammatory state and cytokine production enhance blood stiffness and coagulability, impede endothelial function, and induce electrolyte and hemodynamic mismatches. A cytokine storm with a rise in interleukin (IL) 3, IL-6, IL-7, granulocyte-colony stimulating factor, interferon-inducible protein 10, monocyte chemoattractant protein 1, and macrophage inflammatory protein seems to characterise the advanced stages of the illness (Huang et al., 2020; Meng et al., 2020).

COVID-19, like other viruses, can cause stress cardiomyopathy and cytokine-related cardiac dysfunction, with fast decompensation of CHF aggravating underlying damage in otherwise healthy people (Gautret et al., 2020; Gopinathannair et al., 2020). Aside from the inflammatory state, viral infection-induced respiratory failure can aggravate the imbalance between the restricted supply of oxygen and the higher energy demand of the heart, leading to myocardial dysfunction (Rothan and Byrareddy, 2020).

The myocardial damage induced by pulmonary hypertension, particularly in the right ventricle, was another aspect to consider. Furthermore, raising positive end-expiratory pressure during mechanical ventilation raises right ventricular afterload and wall stress, increasing the risk of further lowering cardiac output in a failing heart. Hypotension, tachycardia, bradycardia, cardiomegaly, and arrhythmia are all prevalent symptoms in COVID-19 patients, as they were in prior SARS and MERS epidemics (Chan et al., 2020; Yang et al., 2020). Intensive care patients have higher blood pressure values than regular care patients. A hypertensive profile looks promising in terms of requiring inotropic support and experiencing cardiogenic shock.

Several investigators identified subclinical diastolic impairment of the left ventricle during earlier coronavirus epidemics, which appeared to be curable on clinical recovery, whereas systolic impairment was related with a greater need for mechanical ventilation. COVID-19 is associated with diastolic impairment in patients with pre-existing subclinical heart problems during the early stages, when pulmonary complications and hemodynamic instability predominate, while systolic impairment rises later as a result of cytokine consequences, according to (Mehra and Ruschitzka, 2020).

3. Heart Failure and Covid-19

Heart failure is associated with significant morbidity and death, as well as high health-care costs, and it is the ultimate manifestation of many cardiovascular illnesses. The incidence of heart failure has remained consistent in recent decades, but the prevalence has grown over time, primarily in connection to heart failure with preserved ejection fraction, most likely attributable to patients' extended longevity due to accessible treatment resources (Zhu et al., 2020; Zhu et al., 2020; Li et al., 2020).

Heart failure patients with an intact ejection fraction are typically older, female, and have high blood pressure. Other risk factors are more common depending on the criteria employed in the technique to identify and select patients with heart failure and an intact ejection fraction (Chapman et al., 2020). In this high-risk population, biomarkers with CVD predictive value may be useful. Natriuretic peptides, D-dimer, and troponin levels should all be examined in hospitalised patients. Troponin, in particular, can help detect cardiac problems early on.

Pre-existing disorders may cause minor increases (2–3 times the limit).High increases (more than 5 times the threshold) might suggest COVID-19-induced severe respiratory failure, tachycardia, hypoxia, or shock, or they could signal direct cardiac damage such as myocarditis, Takotsubo syndrome, or even type 1 acute myocardial infarction. These markers, along with O2 saturation, have not been examined in an outpatient context, although they may be useful for monitoring the severity of symptoms in this high-risk group.

4. Covid-19 Myocardial Injury

Myocardial injury, as seen by the reported increase in troponin (Tn) during COVID-19, might be triggered by routes other than those previously discovered (e.g., systemic inflammation and hypoxia), which is especially problematic in those with pre-existing cardiovascular disease . The aminopeptidase Angiotensin-Converting Enzyme 2 (human Angiotensin-Converting Enzyme 2), which is overexpressed in people with cardiovascular disease, is one of the most talked-about elements of COVID-19.

Indeed, as demonstrated during the SARS epidemic, viral infection of cells via Angiotensin-Converting Enzyme 2 binding can induce direct cardiac injury. Angiotensin-Converting Enzyme 2 expression in the heart is a key regulator of function, and Angiotensin-Converting Enzyme 2 knockout animals have significant left ventricular failure. Infection with COVID-19 appears to lower Angiotensin-Converting Enzyme 2, which is a risk factor for cardiac dysfunction (Chieffo et al., 2020). Despite the fact that a precise mechanism of cardiac damage has yet to be determined, autopsy in myocarditis patients revealed direct viral involvement in 35% of cases, along with hypertrophy and poor Angiotensin-Converting Enzyme 2 expression.

Furthermore, angiotensin-converting enzyme 2 deficiency increases TNF

production and TGF signalling in cardiac muscle, both of which worsen local inflammatory responses and fibrosis (Fruhbeck et al., 2020). Angiotensin-converting enzyme 2 appears to mitigate the negative effects of angiotensin II, particularly when the renin-angiotensin-aldosterone system (RAAS) is activated, as in AH, atherosclerosis, and heart failure. As a result, COVID-19 binding may alter Angiotensin-Converting Enzyme 2 signalling pathways, potentially leading to a worse outcome in people with cardiovascular disease and an increased risk of developing catastrophic conditions (Bornstein et al., 2020). Increases in high-sensitivity Tn (hs-Tn) have been shown to be a poor predictor of systolic and diastolic CHF, as well as rapid decompensation.

According to more than half of "non-survivor" patients had hs-Tn levels greater than 28 ng/mL, with a peak 16 days after symptoms begin. A study of 416 COVID-19 patients at Wuhan's Renmin Hospital yielded data on CHF. Patients were defined as having myocardial damage if their hs-Tn blood levels were higher than the 99th percentile at the time of admission. Patients with myocardial injury exhibited a higher risk of CHF and higher levels of N-terminal-pro-B-type natriuretic peptide when compared to those without (NTproBNP). NT-proBNP levels greater than 900 pg/mL at admission were related to increased, but not statistically significant, mortality (Zhou et al, 2020). After correcting for other factors such as NTproBNP and cardiovascular disease such as CHF in a multivariate analysis, myocardial injury was found to be a significant predictor of mortality in people with COVID-19. The long-term implications of myocardial injury during COVID-19 remain unclear at this time. While statistics on the degree of fibrosis or indirect indicators such as delayed enhancement are still lacking, the majority of patients maintain a stable ejection fraction, which may signal a good prognosis.

4.1 Pneumonia or Congestion on Instrumental Evaluation?

The need to discriminate between viral lung damage and acute pulmonary oedema in patients with CHF, allowing for improved prognostic classification and treatment planning, was one of the first issues raised following the introduction of COVID-19. Because a chest X-ray has low sensitivity in this situation, a combined CT and lung ultrasound scan appears to be required. According to both clinical illnesses can have a ground glass region and thickened interlobular septa Zhu et al., 2020). In pulmonary oedema, these alterations are more prevalent in the hila and dorsally, and they are frequently linked with pleural effusion, cardiomegaly, pulmonary vein enlargement, and rapid recovery after diuretic medication (Chieffo et al., 2020). Lung ultrasonography often reveals a well-defined B-line pattern with "white lung" development in severe instances of cardiogenic pulmonary oedema. In the early stages of COVID-19, lung ultrasonography typically displays uneven pleural lines, unexpected B-lines, and limited patches of "white lung." This pattern is more likely to spread consensually when lung parenchyma is implicated, and it is followed by subpleural consolidation with or without an air bronchogram. Some authors report a C pattern with lateral and posterior subpleural consolidation when B-lines disappear anteriorly (due to breathing support).

4.2 Cardiovascular Disease and Prognosis in COVID-19

According to preliminary data from the COVID-19 case series, hypertension was connected to poorer outcomes when compared to other metabolic illnesses. The use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers was associated with this discovery rather than hypertension itself (Fruhbeck et al., 2020. This alleged relationship was extensively publicised within medical groups, prompting the abrupt discontinuation of these drugs among COVID-19 patients. COVID-19 endocytosis, which is controlled by the angiotensin-converting enzyme-2 receptor and necessary for viral life, appears to be associated with this breakdown. There is conflicting information on the effect of renin-angiotensin-aldosterone system inhibitors, such as angiotensin-converting enzyme inhibitors and ARB, on angiotensin-converting enzyme 2 activity in diverse human tissues and the associated vulnerability to COVID-19 infection (Bornstein et al., 2020). All available evidence is insufficient to advocate stopping angiotensin-converting enzyme inhibitors, or ARBs, in those who already have a prescription for them, and the major medical societies strongly advised that therapy be continued.

An open, randomised trial is being conducted to see if eliminating angiotensin-converting enzyme inhibitors, or ARBs, as a prophylactic step is effective. Although COVID-19 may enter cells through the Angiotensin-Converting Enzyme-2 receptor, free circulation viruses can inactivate the virus, preventing it from attaching to membrane Angiotensin-Converting Enzyme-2 receptors and thereby entering pulmonary endothelial cells. However, the amount of angiotensin-converting enzyme-2 in the blood may not be enough to protect the angiotensin-converting enzyme-2 receptors attached to the COVID-19coupling membrane (Xue et al., 2020). Mineralocorticoid receptor antagonists like spironolactone, which have a well-studied safety and risk profile, have been shown to enhance soluble ECA-2 expression in the plasma by 3 to 5 times, in addition to circulating soluble angiotensin-converting enzyme-2.

COVID-19 patients receiving ARBs were studied in three large-scale studies recently (angiotensin-converting enzyme inhibitors). An examination exploring the possible deleterious effects of ACE inhibitors and ARBs in COVID-19 patients discovered no link between their use and hospital mortality in this clinical scenario (Hoffmann et al., 2020). Another study, which looked at patients with severe COVID-19 infection and found that the use of angiotensin-converting enzyme inhibitors and ARBs was more common in COVID-19 patients than in the control group, found no link between the use of ARBs and a severe or fatal COVID-19 infection. The found no evidence of a link between the use of angiotensin-converting enzyme inhibitors, ARBs, beta-blockers, calcium channel blockers, and thiazide diuretics with the risk of major issues (Batlle et al., 2020;Reynolds et al., 2020). The advantages of spironolactone in people with heart failure were identified to minimise the incidence of heart failure hospitalizations and to maintain ejection fraction. Spironolactone is a regularly prescribed hypertensive medicine that is used as a fourth-line therapy for resistant arterial hypertension.

Blocking the angiotensin 1 receptor (AT1R) has recently been proposed as a treatment for COVID-19. AT1R antagonists are commonly used in hypertensive patients, and they have been found in rats to enhance cardiac expression and urine levels of Angiotensin-Converting Enzyme 2. As a result, enhanced Angiotensin-Converting Enzyme 2 expression after long-term angiotensin receptor blocker therapy may protect COVID-19 patients against acute lung injury. In this context, the role of neprilisin (NEP) and its sacubitrile inhibitor should be explored. This finding supports the biological feasibility of starting sacubitril and valsartan early in COVID-19 patients in order to maximise sacubitril's anti-inflammatory benefits while limiting angiotensin I's influence on the lungs (Cadegiani, 2020). It should be mentioned, nevertheless, that no clinical trials assessing the cardiovascular effects of this approach have been done.

4.3 Cardiovascular Disease Therapeutics for COVID-19

Considering that the viral functional receptor is the Angiotensin-Converting Enzyme 2, the mode of action of ACEIs and angiotensin receptor blockers (ARBs) has been instantly linked to COVID-19. There is conflicting information about the potential of these drugs to promote enzyme expression (Mehra et al., 2020). Nonetheless, because there is no conclusive link between COVID-19 infections and these drugs, medical communities around the world have long advised against discontinuing such treatments.

The were among the first to explore the impact of ACEIs and ARBs on COVID-19 patient prognosis. They looked at 20 hypertensive people who were using ACEIs and ARBs, as well as 30 people who were taking other medications (Huang et al.,2020). There was no statistically significant difference in in-hospital mortality, time from admission to discharge, a negative test, or worsening chest CT during the hospitalisation. Although the ACEI/ARB group had lower Tn-I and NT-proBNP levels, there was no significant difference between the two groups in patients with markers over the pathological threshold, and this difference was not significant in people over or under 65. The findings of 42 hypertension patients treated at Shenzhen Third People's Hospital were the first to indicate that inhibiting the renin-angiotensin system had a beneficial therapeutic effect in COVID-19.

The ability of ACE2 to protect the lungs in COVID-19 has piqued everyone's interest. Indeed, the virus appears to inhibit angiotensin-converting enzyme 2, leading to increased angiotensin II activity and vascular permeability. Losartan, for example, has previously been shown to protect against numerous forms of "lung damage," and specialised trials to evaluate its therapeutic usage in COVID-19 are presently underway. However, the effect of RAAS inhibitors on bradykinin levels is a significant element to consider. On the one hand, there is no need to withhold therapy in individuals who do not have lung involvement; yet, it is required when severe pneumonia and acute respiratory distress syndrome emerge (Mancia et al., 2020).

The use of diuretics, as well as fluid resuscitation, in people with COVID-19 must be strictly monitored to ensure preservation of a neutral fluid balance and reduce the danger of infectious lung damage and cardiogenic pulmonary oedema developing (Huang et al., 2020; Mancia et al.,2020). Acute kidney damage worsens 3–50% of severe pneumonia cases with the

beginning of the first 15 days, as shown in patients with CHF during earlier respiratory virus epidemics and later confirmed in the initial reports on COVID-19 cases, resulting in a major predictor of mortality.

Antiviral medications can compromise myocardial function in those with heart failure, so the risk of cardiotoxicity must be carefully assessed. It is probable that CHF drugs will interact with those now used to treat COVID-19, resulting in combination cardioactive effects (Zhu et al., 2020; Soldati et al., 2020). Furthermore, hydroxychloroquine and ritonavir may impede digoxin elimination. Long-term hydroxychloroquine users may experience arrhythmogenic consequences, whilst tocilizumab may cause hypertension. Despite the danger of increased QTc prolongation, practitioners in some countries have begun to use azithromycin and hydroxychloroquine in the treatment of COVID-19 (Shi et al., 2020; Yu et al.,2019; Reynolds et al.,2020).

Torsade de pointes caused by drugs is caused by structural heart dysfunction, electrolyte problems, and hepatic/renal insufficiency, all of which necessitate vigilant monitoring in these individuals. A history of long QT syndrome, a baseline QTc of more than 500 ms, or a QTc spike of more than 60 ms should prompt a dose adjustment or drug discontinuation. Finally, those with heart failure who have had CAD appear to be more prone to plaque rupture during systemic inflammation caused by viral infections, highlighting the need for anti-ischemic and plaque stabilisation medication in this setting. If infected with COVID-19, patients with heart failure who have a stable ejection fraction and several comorbidities have a considerable risk of death. As a result, preventive measures must be put in place.

Currently, there is no vaccine available to protect against COVID-19. The most effective method of prevention is to avoid virus exposure (Mehra and Ruschitzka, 2020; Xu et al., 2020; Xiong et al., 2020). Hand washing with soap or disinfection with a hand sanitizer containing at least 70% alcohol, avoiding contact with ill people, keeping an adequate distance, and refraining from touching the eyes, nose, and mouth with unwashed hands are all typical precautions. Patients with an intact ejection fraction should also be immunised against pneumococcal pneumonia and influenza. To avoid COVID-19, social isolation does not automatically mean sedentary behaviour. Regular aerobic exercise improves functional capacity and diastolic function in people with stable ejection fraction who have heart failure in functional classes II and III.

When possible and within the limitations of pulmonary contamination precautions, exercise should be resumed. To control comorbidities in female patients with heart failure with preserved ejection fraction, angiotensin-converting enzyme (ACEI) inhibitors, diuretics, statins, oral hypoglycemic agents, and some medications that can reduce hospitalisation due to heart failure decompensation, such as spironolactone, candesartan, nebivolol, and sacubitril/valsartan, are used.

Such outdated medications must be kept on hand in the event of a pandemic and subsequent viral disease. CQ has been shown to have antiviral activities against HIV and other viruses in the past. Endosomal maturation, the process by which endosomes are translocated from the cell to central hubs, is thought to be inhibited by CQ and hydroxychloroquine (HCQ) (Acanfora et al., 2020; Adhikari et al., 2020). Furthermore, CQ might inhibit SARS-CoV1 viral multiplication in vitro. A further investigation found that HCQ, a less toxic derivative, had equal efficacy and that the mechanism of impaired endosomal maturation did indeed apply to COVID-19 infection in vitro. So far, only non-blind, non-randomized, and low-quality trials have been conducted to assess the function of HCQ in COVID-19 (Mehra et al., 2020).

The Federal Council of Medicine had approved clinical off-label use of CQ and HCQ at the time of authoring this article. Clinical investigations are now underway to evaluate the in vivo results of this potential trait. CQ and HCQ also increase the likelihood of a pro-arrhythmic effect by prolonging the QT interval (Tarantini et al., 2020). Exercise should be continued whenever feasible and within the limits of pulmonary contamination precautions. To regulate comorbidities in female patients with heart failure with preserved ejection fraction, angiotensin-converting enzyme (ACEI) inhibitors, diuretics, statins, oral hypoglycemic agents, and some treatments that can decrease hospitalisation due to heart failure decompensation, such as spironolactone, candesartan, nebivolol, and sacubitril/valsartan, are being used.

5. Conclusion

Heart failure with an intact ejection fraction is a complex disease with multiple comorbidities such as hypertension, diabetes, obesity, atrial fibrillation, advanced age, and atherosclerosis. These factors typically cause a systemic inflammatory response. COVID-19 incidence and death vary according to the host, despite having a well-defined etiological agent. The relationship that explains the clinical condition's development appears to be a strong systemic inflammatory response. Based on its description, comorbidities have emerged as indications of poor prognosis in COVID-19 infection, and they are the pernicious and sad characteristics of both heart failure with preserved ejection fraction and COVID-19. If you have both heart failure with maintained ejection fraction and COVID-19, you should proceed with great care. The prevalence of risk factors that put infected people at risk of having heart failure is substantial in the COVID-19-prone group. As a result, increasing awareness of the clinical implications and prognostic significance of COVID-19 in this vulnerable population is a top priority. The therapy of these patients, in particular, must be founded on the early diagnosis of abnormal clinical and instrumental patterns by extensive cardiologic monitoring, which allows the clinician to foresee results and target therapeutic modifications.

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