

**Review Article** 

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# Chloroquine and Hydroxychloroquine in Coronavirus Disease-19: The Real Savior or a False-Positive Testament

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#### Abstract

**Objective:** A novel coronavirus disease (COVID-19) has spread all around the world. The progression from initial signs to a diagnosis of acute respiratory failure is usually related to spontaneous cytokine production. There is a growing need to classify appropriate medicines for treatment care. The inhibitory effect of chloroquine (CQ) is potential. However, CQ can lead to serious side effects. Various studies recommend hydroxychloroquine (HCO) have similar antiviral effect as of CQ and maybe a better therapeutic solution. Therefore, we aim to explore the mechanism by which HCQ can inhibit replication of coronavirus. Materials and Methods: A retrospective study was carried out using online databases from 2003 to 2020, Results: The obtained results showed that HCQ can inhibit viral replication and entry inside the cell through raising lysosomal pH and hinding to specific receptors on cells, thereby, preventing viral entry. Conclusion: HCQ has a better safety profile than CQ and also modulates cytokine syndrome. However, further studies are needed to explore this mechanism.

**Keywords:** Chloroquine; Coronavirus disease-19; Hydroxychloroquine; Severe acute respiratory syndrome

#### Introduction

In late December 2019, an emerging coronavirus disease (COVID-19) outbreak: caused by a novel coronavirus (named severe acute respiratory syndrome coronavirus. [SARS-CoV-2]) Later started in Wuhan, China, and expanded rapidly in China and worldwide. On March 12, 2020, the World Health Organization announced the COVID-19 outbreak pandemic. According to recent studies, approximately more than 80% of the infected patients presented with moderate level infections [1-3] and the total case-fatality rate is more than 5% but exceeds 12% in patients aged 70-79 and 20% in those aged 80 years. Therefore, there is an immediate need for adequate care to treat symptomatic patients but also to decrease the length of the propagation of the virus to reduce population transmission. Among potential candidate drugs to treat COVID-19. Repositioning old drugs for use as antivirals are an interesting strategy because of information about the safety profile, side effects, and dosage and drug interactions a number of studies have been recently shown to evaluate an appropriate therapeutic protocol for COVID-19. A recent study about chloroquine (CO) phosphate which is a antimalarial agent endorsed its inhibitory effect on the growth of SARS-CoV-2. According to the clinical trial conducted among COVID-19 Chinese patients, findings an old showed that CO had a significant effect, both in terms of clinical outcome and viral clearance when compared to control groups, On March 28, 2020, the U.S. Food and Drug Administration permitted CQ and hydroxychloroquine (HCO) to be utilized among severely infected COVID-19 patients, especially if they hospitalized. Moreover, for decades, these two drugs (CQ and HCQ) have been widely used for the treatment and management of malaria and several autoimmune diseases. Several clinical trials in China have shown that CQ is effective against COVID-19. CQ has also played. A positive role in handling outbreaks of the Zika virus and SARS-COV Experts suggest that patient diagnosed with mild, moderate, and severe cases of COVID-19 pneumonia, without CO contraindications, be treated with 500 mg of CQ twice daily for 10 days. Studies revealed that CQ confers its significant wide-spectrum antiviral effects through interrupting the fusion process of these viruses by increasing the intracellular endosomal and lysosomal pH CQ also alters the glycosylation [4-6] of the cellular receptors of coronaviruses. Further, another study demonstrates that CQ and HCQ act as zinc ionophores, allowing zine to enter into the cells, zine concentration increases in cytosol and i zinc inhibits RNAdependent RNA polymerase HCQ. which is an analog of CQ, also shown to have similar in vitro anti-SARS-CoV activity. However, the clinical safety profile of HCQ is greater than that of CQ and allows for a higher daily dose, with fewer concerns about drug-drug interactions Replacement of N-diethyl group of CO with N-hydroxyethyl side chain in HCO makes it more soluble with fewer side effects. HCQ increases PH just like CQ and therefore exhibites antiviral effect. In addition, it shows a modulating effect on activated immune cells and downregulates the expression of toll-like receptors (TLRs) and, therefore, ultimately decreases the production of interleukin-6. Retinopathy is a dosage limiting side effect of HCQ, and a secure daily dosage seems to correlate to an ideal body weight of 6.5 mg/kg and actual bodyweight of 5.0 mg/kg. Although more clinical data are available on CQ anticoronavirus activity as compared to HCQ, both drugs are theoretically identical with respect to antiviral activity. Furthermore, CQ may show interaction with lopinavir/ritonavir in patients with COVID-19 and lead to prolongation of QT interval. Hence, HCQ consideration is safer than CQ in this perspective as well since other therapeutic agents for COVID-19, that is, antiviral agents (oseltamivir, lopinavir/ritonavir, ribavirin, etc.), interferons, and intravenous immunoglobulins that do not show drug interaction with HCQ [7,8].

## Methodology

A retrospective study from the literature was extensive literature review about CQ and HCQ studies done during early. Months (February

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2020 June 2020) of COVID-19 pandemic .The main objectives were determined and finalized.

### Statistical analysis

For data analysis, descriptive statistics were used and data were analyzed using statistical package for the social science version 24.0.

## Results

This study had some main valuable points that were explored.

# Discussion

Several antiviral drugs were tested for effectiveness in inhibiting replication of COVID-19 (SARS-CoV-2) in cell culture, and CQ is a drug renowned due to its efficacy in the management of malaria and autoimmune disease, Many trials were carried out to assess the action of CQ and HCQ in overline COVID-19 patients. Therapeutic outcomes were more prevalent in fever suppression, changes in CT imaging, as well as disease retardation In the sixth edition of the latest pneumonia diagnosis and treatment program published through China's National Health and Care Commission in February 2020, CQ has officially declared a therapeutic agent for mathcal C OVID-19 The suggested regimen in adults is 500 mg/ day that is the human body average safe dose.

# Conclusion

It is recommended that HCQ for the treatment of SARS CoV-2 infection in COVID-19 patients could function as a better therapeutic option than CQ because HCQ dampens the extreme advancement of COVID-19 infection by suppressing storm of cytokine release through decreasing the expression of CD154 on T cells. Furthermore, HCQ can have comparable antiviral effect in both early and later infection stages than CQ and due to the fact that it has fewer side effects, is healthy individuals, especially in pregnant women, and is widely available than

CQ Given the increasingly rising COVID-19-infected patients, with the immediate requirement of efficient and safe medicines, it is also more realistic to identify and develop precise, particular, and more suitable medications than the secondary supportive medication such as CQ and HCQ.

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