

Do Chloroquine and Hydroxychloroquine Treat COVID-19?

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Abstract

Chloroquine is an anti-malarial and autoimmune disease drug, which has an anti-viral activity. *In vitro*, the Chloroquine and Hydroxychloroquine are potent at inhibiting SARS-CoV. Therefore, Chloroquine and Hydroxychloroquine are being studied for their potential treatment of coronavirus disease 2019. Those drugs are now recommended by the FDA, and multiple health organizations. This aims of this review is to explore the efficacy of the chloroquine and hydrochloroquine in the treatment of the novel COVID-19.

Keywords: COVID-19; Chloroquine; Hydroxychloroquine

Received: September 26, 2020; **Accepted:** October 19, 2020; **Published:** October 26, 2020

Introduction

Chloroquine and Hydroxychloroquine are being studied for their potential treatment of coronavirus disease 2019. This aim of this brief note is to explore the efficacy of the chloroquine and hydrochloroquine in the treatment of the novel COVID-19.

First and foremost, Chloroquine is an anti-malarial and autoimmune disease drug, which has an anti-viral activity by increasing endosomal pH, alkalize the phagolysosome, these activities are required for virus cell fusion and it interfere with the glycosylation of cellular receptors of SARS-CoV, there so inhibiting viral replication [1-4].

In vitro, the chloroquine may be more potent at inhibiting SARS-CoV-2 [5,6]. Therefore, Chloroquine phosphate is the first drug reported to display efficacy against COVID-19 [7,8] and it had demonstrated efficacy in treating COVID-19 associated pneumonia in multicenter, non-randomized, clinical trials.9.8 also it was successfully used to treat a series of more than 100 COVID-19 cases resulting in improved radiologic findings, increase viral clearance, and reduced disease progression [8].

In an open-label, multicenter, non-randomized trial in china Chloroquine showed significant efficacy in reducing the time until virus-negative conversion and returning body temperature to normal [10]. Consequently, the use of Chloroquine is recommended by US Food and Drug Administration [11]. And the European Medicines Agency concludes that the two drugs Chloroquine and Hydroxychloroquine must be used in clinical trials or national emergency use programs for the treatment of

COVID-19 on April 1, 2020 [12].

And the sixth edition chloroquine recommended chloroquine phosphate tablet, 500 mg twice per day for 10 days for patients diagnosed as mild, moderate and severe cases of novel coronavirus pneumonia and without contraindications to chloroquine and in the Seventh Edition of the Guidance, issued on March 3, 2020, recommends a reduced dosage and shortened duration of treatment to reduce the risk of adverse effects of chloroquine [13].

The dosage of chloroquine phosphate for adult patients with a body weight greater than 50 kg is 500 mg twice a day for 7 days and that for adult patients with a body weight less than 50 kg is 500 mg twice a day for the first 2 days and 500 mg once a day for the following 3-7 days [13].

Results and Discussion

However, *in vitro* anti-SARS-CoV-2 finding Hydroxychloroquine superior to Chloroquine [5,6] recommending Hydroxychloroquine sulfate 400 mg twice daily on day 1, followed by 200 mg twice daily for the next 4 days to treat COVID- 19 [14] as it has been shown by *in vitro* results were reported by the Wuhan Institute of Virology [5]. And we report that Gautret, et al. were the first

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Citation: Ayoub B, Reda B, Ilham B, Sanaa B (2020) Do Chloroquine and Hydroxychloroquine Treat COVID-19?. Arch Med Vol. 12 No.6:35

to report promising *in vivo* data of Hydroxychloroquine in a non-randomized clinical trial [5].

Furthermore, the administration of hydroxychloroquine 200 mg, three times a day led to a significant reduction in viral carriage on day 6 post-treatment compared to that in the control group, which did not receive hydroxychloroquine, adding azithromycin to hydroxychloroquine appears to more efficiently clear the virus, treatment with hydroxychloroquine and azithromycin resulted in a rapid decline in the nasopharyngeal viral load [15].

Another study showed that while hydroxychloroquine is administered orally in a loading dose of 400 mg twice daily, followed by a maintenance dose of 200 mg twice daily for four days, leads to a significant reduction of viral load and respiratory symptoms [14].

Clinical study showed that hydroxychloroquine helped reduce the time until body temperature returned to normal, it decreased the duration of cough, and it improved lung imaging findings COVID-19 [16] and it has been recommended the use of Hydroxychloroquine as a possible prophylaxis and curative treatment for COVID-19

[1,2]. Besides, azithromycin has been found to have antiviral and anti-inflammatory effects in both *in vivo* and *in vitro* studies and also it has activity against pro-inflammatory cytokines [17,18].

Azithromycin combined to hydroxychloroquine result numerically superior viral clearance compared with hydroxychloroquine monotherapy [17]. Thus, Chloroquine and hydroxychloroquine can cause rare and serious adverse effects, including QTc prolongation ventricular arrhythmias, especially when prescribed with azithromycin hypoglycemia, neuro psychiatric effects fulminant hepatic failure, and retinopathy serious cutaneous adverse reactions [19-23].

Conclusion

However, Hydroxychloroquine, a more tolerable derivative of chloroquine, also displayed potent activity against SARS-CoV-2 *in vitro*. Finally, we suggest further investigation in large scale studies, but, as those drugs show efficacy *in vitro* and *in vivo* and we may use them as treatment of COVID-19 until the discovery of a vaccine.

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