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HYDROXYCHLOROQUINE AS PROPHYLAXIS FOR COVID-19 AMONG HEALTHCARE WORKERS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background- With the ongoing COVID-19 pandemic, scientific research on chemoprophylaxis for the virus is still lacking. Hence, we investigated the efficacy of Hydroxychloroquine as a potential prophylactic in healthcare workers. **Objective**- The purpose of this study was to assess the use of Hydroxychloroquine as a prophylactic for COVID-19, among healthcare workers in a tertiary healthcare centre in Bangalore, India. **Method**- This is a retrospective cohort study of 230 healthcare personnel, who worked at the Trauma and Emergency care centre attached to Bangalore Medical College and Research Institute in Bangalore, India. It included staff who dealt with COVID patients, who were on Hydroxychloroquine prophylaxis. In this study we assessed the number of healthcare workers who contracted the virus after stopping the prophylaxis. **Result**- It was seen that none out of the 230 healthcare workers contracted the virus while they were taking the HCQ prophylaxis. Out of the 226 members who ended the prophylaxis in May 2020, 25.6% (N=58) were infected with SARS-CoV-2 between the months of June 2020 - January 2021. In addition to this it was seen that 3 out of 4 members (75%) who ended the HCQ prophylaxis in August 2020 also tested positive for the virus between the months of September 2020 - January 2021. **Conclusion**- From this retrospective cohort study involving healthcare workers in a tertiary healthcare centre of Bangalore, India, it is seen that Hydroxychloroquine when used as a pre-exposure prophylaxis significantly reduced the risk of infection with SARS-CoV-2 in our hospital.

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INTRODUCTION

The COVID-19 pandemic has led to a global healthcare crisis that is associated with substantial mortality and morbidity worldwide. What was then an unknown cause of respiratory ailments in the patients of Wuhan, China, the disease has now grown into a lethal threat to mankind in the form of a pandemic. The World Health Organization (WHO) had declared it as a public health emergency of international concern on 31 January 2020. Initially referred to as the 2019 novel coronavirus (2019 n-CoV) and controversially the Wuhan virus, it was later officially named by WHO as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[(1)] Early on in the pandemic, Hydroxychloroquine (HCQ) was suggested as a possible prevention method or treatment for COVID-19, given evidence of in-vitro inhibition of SARS-CoV-2 by the advisory.[(2)] Hydroxychloroquine is a derivative of Chloroquine (CQ), formulated by introducing a hydroxyl group into CQ and was demonstrated to be much less (~40%) toxic than CQ in animals. Both share similar chemical structures and mechanisms of action as a weak base and immunomodulator and have exhibited, in-vitro, potent antiviral properties against various viruses.

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They are both concentrated in organelles with low pH like the lysosomes and endosomes hence are also called lysosomotropic agents. CQ increases lysosomal pH and prevents its fusion with auto-phagosomes in-vitro. It can also inhibit endosomal acidification, thus preventing viral entry into host cells. Apart from interfering with lysosomal and endosomal activities, it also inhibits terminal glycosylation of the ACE2 receptor which is involved in viral entry.[3]

SARS-CoV-2 is known to utilize the surface receptor ACE2 for cellular entry. Therefore, when the SARS-CoV-2 S protein binds to it, the ACE2 receptor undergoes glycosylation and gets activated. In this case, CQ/HCQ plays an essential role where it prevents the glycosylation of ACE2 receptors, thus preventing entry of SARS-CoV-2 into the host organisms.[1]

The Indian Council of Medical Research, under the Ministry of Health and Family Welfare, had recommended chemoprophylaxis with hydroxychloroquine (400 mg twice on day 1, then 400 mg once a week thereafter) for asymptomatic health-care workers treating patients with suspected or confirmed COVID-19, and for asymptomatic household contacts of confirmed cases. [4-5] However, data on its prophylactic role is still incomplete.[3] The interest of this study was therefore to assess the efficacy of Hydroxychloroquine as a prophylactic for COVID-19 among healthcare workers in a tertiary healthcare centre in Bangalore, India.

METHODOLOGY

This is a retrospective cohort study of 230 healthcare personnel, who worked at the Bangalore Medical College and Research Institute Trauma and Emergency Care Centre, Bangalore, India. It included 160 Nursing officers, 50 Group D staff and Security personnel, 20 Office staff and Doctors dealing with COVID-19 patients from the month of April 2020.

As per the ICMR guidelines dated 23 March, 2020 regarding the use of Hydroxychloroquine for chemoprophylaxis against COVID-19[5], all 230 healthcare personnel as mentioned above were started on a course of Hydroxychloroquine 400 mg twice on day 1, followed by 400 mg once week for the next 7 weeks from the month of April 2020. In the last week of May 2020, all of the above healthcare workers excluding 4 of them ended the HCQ prophylaxis course. However, the other 4 members continued to take the drug till the last week of August 2020. The number of healthcare personnel who had contracted the virus during and after the stoppage of HCQ prophylaxis was noted and analysed.

RESULTS

Table 1: Number of Healthcare workers

		N
1.	Nursing Officers	160
2.	Group D Staff and Security Personnel	50
3.	Office Staff and Doctors	20
	Total	230

Upon analyzing the data it was seen that none out of the 230 healthcare workers contracted the virus while they were taking the HCQ prophylaxis.

Table 2. Duration of HCQ Prophylaxis

Month (2020)	No. of Healthcare workers
April - May	226
April - August	4

Table 3: COVID-19 cases in the 1st wave after ending the HCQ prophylaxis in the last week of May 2020

	N	%
COVID-19 positive from the month of June 2020 - January 2021	58	25.6
COVID-19 negative from the month of June 2020 – January 2021	168	74.3
Total	226	

Table 4: COVID-19 cases in the 1st wave after ending the HCQ prophylaxis in the last week of August 2020

	N	%
COVID-19 positive from the month of September 2020 - January 2021	3	75
COVID-19 negative from the month of September 2020 – January 2021	1	25
Total	4	

However, out of the 226 members who ended the prophylaxis in May 2020, 25.6% (N=58) were infected with SARS-CoV-2 between the months of June 2020 - January 2021. In addition to this it was seen that 3 out of 4 members (75%) who ended the HCQ prophylaxis in August 2020 also tested positive for the virus between the months of September 2020 - January 2021.

DISCUSSION

The COVID-19 pandemic, caused by the coronavirus SARS-CoV-2 has brought the entire world to a standstill. With the number of cases and deaths rising rapidly, there is an urgent need for effective preventive and therapeutic interventions. While intensive efforts are being directed towards treatment discovery and vaccine development, repurposing existing medications is a more swift and economical approach to fulfill a time-sensitive need for effective prophylaxis. Hydroxychloroquine (HCQ) and its congener chloroquine (CQ) have received huge attention both by the scientific community and by the lay public due to its proposed antiviral properties.[6-7] As of June 25, 2021 the total number of cases was 180M and the number of deaths reached 3.9M.[8] In a rapidly evolving situation such as this, we have often had to resort to repurposing old drugs to expedite the process of prevention or treatment of an unfamiliar disease. For treating viral illnesses, often there is a “one bug - one drug” approach which however fails in times of emerging and re-emerging infections. This is especially true during pandemics - when drug discovery races against time.[3] A retrospective case-control analysis at ICMR has found that there is a significant dose-response relationship between the number of prophylactic doses taken and frequency of occurrence of SARSCoV-2 infection in symptomatic healthcare workers who were tested for SARS-CoV-2 infection. Another investigation from 3 central government hospitals in New Delhi indicates that amongst healthcare workers involved in COVID-19 care, those on HCQ prophylaxis were less likely to develop SARS-CoV-2

infection, compared to those who were not on it. The benefit was less pronounced in healthcare workers caring for a general patient population. An observational prospective study of 334 healthcare workers at AIIMS, out of which 248 took HCQ prophylaxis (median 6 weeks of follow up) in New Delhi also showed that those taking HCQ prophylaxis had lower incidence of SARS-CoV-2 infection than those not taking it.[9]

Through this retrospective cohort study which aimed to establish the efficacy of Hydroxychloroquine as pre-exposure prophylaxis for COVID-19 among healthcare workers, it was observed that none of them contracted the virus as long as they were on the HCQ prophylaxis. All of them tolerated the drug well and had no major side effects except gastric irritation and occasional headache. Once the drug was discontinued, an increase in the incidence of the COVID-19 infections was noticed. Among the healthcare workers who stopped taking HCQ in the last week of May 2020, 25.6% (N=58) of them tested positive during June 2020 - January 2021. On the other hand, 4 healthcare workers who continued to take HCQ till the last week of August 2020 were also successful in escaping the infection till the time they were on the drug. But upon its discontinuation 3 out of 4 of them were infected between September 2020 - January 2021.

CONCLUSION

Correct scientific approach is the key to understanding and accepting whether prophylactic HCQ can really represent an effective strategy in preventing COVID-19. From this retrospective cohort study involving healthcare workers in a tertiary healthcare centre of Bangalore, India, it is seen that Hydroxychloroquine when used as a pre-exposure prophylaxis significantly reduced the risk of infection with SARS-CoV-2.

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