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## To Assess the Relationship Between Hydroxychloroquine Dosage, Duration of Treatment, And Changes in Central Corneal Thickness

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### KEYWORDS

Central corneal thickness, hydroxychloroquine, autoimmune diseases, systemic lupus erythematosus, rheumatoid arthritis.

### ABSTRACT:

**Introduction:** Central corneal thickness (CCT) is a vital indicator of ocular health, affecting intraocular pressure and visual function. Autoimmune diseases can lead to corneal thinning, a potential complication exacerbated by hydroxychloroquine (HCQ) treatment.

**Methods:** This cross-sectional study assesses the correlation between HCQ dosage, treatment duration, and changes in CCT among autoimmune patients. Conducted over one year at a tertiary care center, the study involved 100 participants: 50 patients with systemic lupus erythematosus (SLE) or rheumatoid arthritis (RA) on HCQ for at least five years (Group 1) and 50 matched controls without autoimmune diseases (Group 2). CCT measurements were obtained using anterior segment optical coherence tomography (AS-OCT), and statistical analysis was performed using SPSS, with a significance threshold set at  $p < 0.05$ .

**Results:** The mean CCT for the right eye in Group 1 was  $522.80 \pm 30.50 \mu\text{m}$  and  $520.80 \pm 34.74 \mu\text{m}$  in Group 2, while for the left eye, it was  $524.26 \pm 32.64 \mu\text{m}$  and  $523.62 \pm 34.48 \mu\text{m}$ , respectively. The p-values for CCT differences were 0.761 and 0.924, indicating no statistically significant differences.

**Conclusions:** The study found no significant association between HCQ treatment and changes in CCT in the studied population. Despite the lack of statistically significant findings, the potential for long-term ocular effects from HCQ necessitates ongoing monitoring. Further research is essential to elucidate the long-term implications of HCQ on corneal health, thereby informing clinical practices for managing autoimmune disorders.



## 1. Introduction

Central corneal thickness CCT is a critical parameter in ocular health, influencing intraocular pressure measurements and overall visual function<sup>1</sup>. Research indicates that corneal thinning can occur in patients with autoimmune diseases, potentially exacerbated by HCQ treatment.<sup>1</sup> While some studies have suggested that HCQ may lead to corneal changes, including deposits and alterations in thickness, the relationship between HCQ dosage, duration of treatment, and CCT remains inadequately explored.<sup>1,2</sup> Previous investigations have produced mixed results, with some reporting no significant association between HCQ dosage or treatment duration and changes in CCT, while others indicate potential risks associated with higher cumulative doses and prolonged use.<sup>1,3</sup> Understanding this relationship is crucial for optimizing HCQ therapy in autoimmune patients, particularly as the medication is frequently prescribed for extended period.<sup>1</sup> This study aims to assess the correlation between HCQ dosage, duration of treatment, and changes in CCT, thereby contributing to the body of knowledge necessary for informed clinical decision-making regarding the long-term management of autoimmune diseases with HCQ.<sup>1,2</sup> By elucidating these relationships, we hope to enhance patient safety and treatment efficacy, ensuring that the benefits of HCQ therapy are maximized while minimizing potential ocular risks.<sup>1,4</sup>

## 2. Objectives

This cross-sectional study aims to investigate the association between hydroxychloroquine (HCQ) dosage, duration of treatment, and changes in central corneal thickness (CCT) in patients with autoimmune disorders.

## 3. Methods

The research was conducted over one year at a tertiary care Centre in south India between August 2023-2024. The study population will consist of 100 participants divided into two groups. Group 1 includes 50 patients diagnosed with systemic lupus erythematosus (SLE) or rheumatoid arthritis (RA) who have been receiving HCQ for at least 5 years. Group 2 will serve as the control group, comprising 50 individuals without autoimmune diseases, not on HCQ and matched with the cases by age and gender.

**INCLUSION CRITERIA:** To be eligible for the study, participants must be adults aged 18 to 65 years with autoimmune disease on HCQ 200-400mg for 5 years of duration.

**EXCLUSION CRITERIA:** Glaucoma, Cataracts, and Ocular surgery within the past six months are excluded. Patients using medications known to influence corneal thickness or those who are pregnant or breastfeeding will also be excluded.

**DATA COLLECTED:** Age, gender, duration of autoimmune disease, and specifics of HCQ treatment. CCT measurements will be obtained using an anterior segment optical coherence tomography (AS-OCT). Measurements will be performed on both eyes, and the average CCT will be calculated.

## 4. Results

The table(1) presents the baseline ophthalmic variables for two groups: Group 1, consisting of patients treated with hydroxychloroquine (HCQ), and Group 2, the control group without HCQ treatment.

The variables include central corneal thickness (CCT), best corrected visual acuity (BCVA), near vision, and colour vision. The results are summarized for each eye (right and left) and the statistical significance is



indicated by p-values. For central corneal thickness (CCT), the mean for the right eye was  $522.80 \pm 30.50$   $\mu\text{m}$  in Group 1 and  $520.80 \pm 34.74$   $\mu\text{m}$  in Group 2. For the left eye, the mean CCT was  $524.26 \pm 32.64$   $\mu\text{m}$  in Group 1 and  $523.62 \pm 34.48$   $\mu\text{m}$  in Group 2. The p-values for the differences in CCT between the groups were 0.761 for the right eye and 0.924 for the left eye, indicating no statistical significance. In terms of best corrected visual acuity (BCVA), the median for the right eye was 0.666 with an interquartile range (IQR) of 0.50–1.00 in Group 1, and 0.666 with an IQR of 0.66–1.00 in Group 2. For the left eye, the median BCVA was 0.666 with an IQR of 0.50–1.00 in both groups. For near vision, the median in the right eye was N10 with an IQR of N6–N18 in Group 1, and N8 with an IQR of N6–N12 in Group 2. In the left eye, the median near vision was N10 with an IQR of N6–N18 in Group 1 and N8 with an IQR of N6–N12 in Group 2.

## 5. Discussion

The effect of hydroxychloroquine (HCQ) on central corneal thickness (CCT) in patients with autoimmune disorders. Corneal thinning is a recognized complication in patients with autoimmune diseases, particularly rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE).<sup>5,6</sup> The study's results align with previous research indicating that HCQ can contribute to corneal changes, including thinning and the formation of deposits within the corneal layers.<sup>7</sup> Although the study found no significant difference in CCT between HCQ-treated patients and controls. The mechanism by which HCQ affects CCT is not entirely understood, but it is believed that the drug may influence corneal epithelial cells or the extracellular matrix, leading to thinning.<sup>8</sup> Additionally, HCQ is known to cause corneal deposits, which can be

identified through imaging techniques such as confocal microscopy. These deposits may contribute to changes in corneal thickness and overall ocular health. While the study did not find significant correlations between HCQ dosage and CCT changes, it is essential to consider that the cumulative effects of long-term HCQ use may manifest over time. Previous literature has documented that higher cumulative doses and prolonged treatment duration are associated with an increased risk of ocular toxicity, including corneal changes. Therefore, ongoing monitoring of corneal health in patients receiving HCQ is crucial to prevent potential complications. In conclusion, the study underscores the need for vigilance regarding the ocular effects of HCQ in patients with autoimmune disorders. Although the findings did not demonstrate statistically significant changes in CCT, the observed trend toward lower CCT in HCQ-treated patients warrants further investigation.

## 6. Conclusion:

The lack of statistically significant differences in CCT between groups of the south Asian population indicates that further research is needed to clarify the long-term effects of HCQ on corneal health. Given the potential ocular risks associated with HCQ therapy, healthcare providers need to monitor patients closely. HCQ remains a vital treatment for autoimmune disorders, and its effects on corneal health warrant careful consideration. Understanding the pathology associated with HCQ use is crucial for optimizing patient safety and treatment efficacy. Further studies are needed to understand the long-term implications of HCQ on corneal structure and function, ultimately guiding clinical practice in the



management of patients with autoimmune conditions.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9000138/>

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