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"COMPARISON OF CENTRAL CORNEAL THICKNESS USING CONTACT AND NON- CONTACT METHODS-SYSTEMATIC REVIEW AND META-ANALYSIS"

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ABSTRACT

Background: This systematic review and meta-analysis aimed to assess the differences and similarities of CCT values and repeatability measured by contact [Ultrasound Pachymetry, Ultra biomicroscopy) and other non-contact devices in normal eyes (unoperated eyes, refractive error eyes without corneal disease or topographic irregularity).

Method: To identify potentially relevant articles, the following searched electronic databases were: MEDLINE (PubMed), Elsevier (Scopus), Web of Science (Clarivate Analytics), Elsevier (Clinical Key), Springer link from 2004 to 2020 for prospective, observation and cross-sectional studies describing CCT comparison, repeatability measurements by contact and non- contact devices in normal eyes. Quality assessment was done. Random or fixed-effects models were used according to heterogeneity. A Funnel plot was used to assess publication bias.

Results: A total of 35 studies with 2652 patients (3,895 eyes) from clinical studies were included. The pooled effect of CCT measurements between all the available contact and non-contact devices; USP and AS-OCT; USP and Pentacam found to be statistically significantly different ($P < 0.0001$). The mean difference was 5.08 µm with the 95% confidence interval (CI) (1.93 µm, 8.23 µm) between all contact and non-contact devices was and the heterogeneity was $I_2 = 85\%$), ($p = 0.002$); between USP and AS-OCT mean difference was 7.66 µm with the 95% confidence interval (CI) (2.54 µm, 12.77 µm) and the heterogeneity was $I_2 = 46\%$), ($p = 0.003$); between USP and Pentacam was -5.33 µm with the 95% confidence interval (CI) (-8.64 µm, -2.01 µm) and the heterogeneity was $I_2 = 19\%$), ($p = 0.002$). The mean difference in the CCT measurement with USP and NCSM was 15.34 µm with the 95% CI (-4.15 µm to 34.63 µm) and was not statistically significant ($P = 0.12$). The pooled intraclass correlation coefficient (ICC) obtained from intra-rater repeatability measurements for all the available contact and non-contact devices found to be statistically significantly different ($P < 0.0001$) with the mean coefficient of ICC=0.99 (95% CI: 0.99 and 1.00) and heterogeneity ($I_2 = 87\%$) for contact devices and ICC=0.99 (95% CI: 0.99 and 1.00) and a high heterogeneity ($I_2 = 86\%$) for non-contact. The pooled coefficient of repeatability (Rco) Test-retest repeatability (TRT) obtained from intra-rater repeatability measurements for all the available contact and non-contact devices found to be statistically significantly different ($P < 0.0001$) with the mean coefficient of Rco/ TRT=10.51 (95% CI: 2.95 and 18.06) and a high heterogeneity ($I_2 = 100\%$) for 9

contact devices and Rco/ TRT=10.73 (95% CI: 8.06 and 13.40) and a high heterogeneity (I_2=97%) for non-contact devices.

Conclusion: CCT measurements in normal eyes between all combined contact and non-contact devices; USP and AS-OCT; USP and Pentacam were statistically significantly different. This difference is small and is not considered clinically significant. In the matter of comparison between USP and NCSM, our result showed no significant difference in CCT measurement values in normal eyes. NCSM could offer as exact CCT as the gold standard USP in normal eyes. The repeatability values also showed good result in most of the studies for both contact and non-contact studies.