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# Comparison study of Human resourced ellipsoid method vs kidney volumetry using artificial intelligence in Polycystic kidney disease

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**Objectives :** As the Mayo imaging classification (MIC) for polycystic kidney disease (PKD) has established itself as a crucial basis for clinical treatment decisions, volumetric assessment for its evaluation has been a tedious and inaccurate process that required labor. While the ellipsoid method measuring total kidney volume (TKV) in PKD patients provides a practical TKV estimation using MRI or CT, its limitations highlight the need for improved, accessible techniques in real world clinics. Accurate TKV assessment is essential for guiding PKD therapy, predicting progression, and optimizing PKD outcomes.
**Methods :** This study evaluates the agreement between manual ellipsoid methods and AI-based kidney volumetry methods for measuring total kidney volume (TKV) in patients with PKD. Total 32 PKD patients in tertiary single hospital were evaluated. Manual ellipsoid volumetry by two ADPKD specialists were compared to a cloud-based AI platform. Bland-Altman analysis and intraclass correlation coefficient (ICC) were used to evaluate agreement and reliability.
**Results :** Median age was 56 years old, average TKV was 1200.24 ml. We included all five MIC 1A to 1E. Most of the patients allocated to MIC 1B to 1C by ellipsoid method which was similar by AI volumetry. AI volumetry outperformed with highly correlated score (AI vs. nephrology professor ICC: r=0.99, 95% confidence interval (CI) 0.9780 to 0.9948, $p < 0.01$), AI vs. trained clinician ICC: r=0.98, 95% CI 0.9608 to 0.9907, $p < 0.01$). The Bland-Altman plot also showed the mean differences between professors and AI volumetry were statistically insignificant (mean difference 159.5ml, 95%CI -11.8368 to 330.7817, $p = 0.07$).
**Conclusions :** AI-based kidney volumetry demonstrates strong agreement with expert manual measurements and offers a reliable, labor-efficient alternative for TKV assessment in clinical practice. Its consistent performance across imaging modalities makes it a valuable tool for managing PKD and optimizing therapeutic outcomes. Serial volumetry evaluation may improve accuracy and expand its utility.

AI_vs_Professor.png

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