

ABSTRAK

Latar Belakang: Infertilitas pria merupakan salah satu masalah kesehatan reproduksi yang dapat dipengaruhi oleh kualitas sperma, meliputi konsentrasi, motilitas, dan morfologi sperma. Pemeriksaan analisis sperma secara manual berdasarkan standar WHO 2021 masih menjadi metode baku emas (*gold standard*), namun memiliki keterbatasan berupa subjektivitas pemeriksa dan variasi hasil antar operator. LensHooke X1 Pro merupakan alat analisis sperma digital otomatis yang dikembangkan untuk meningkatkan efisiensi, objektivitas, dan konsistensi hasil pemeriksaan sperma.

Tujuan: Penelitian ini bertujuan untuk mengetahui perbedaan hasil pemeriksaan konsentrasi, motilitas, dan morfologi sperma antara metode manual standar WHO 2021 dengan metode digital otomatis LensHooke X1 Pro.

Metode: Penelitian ini merupakan penelitian deskriptif komparatif dengan pendekatan *cross-sectional*. Sampel penelitian sebanyak 60 sampel semen yang diperiksa di Laboratorium Andrologi Rumah Sakit Sadewa. Setiap sampel diperiksa menggunakan metode manual standar WHO 2021 dan metode digital otomatis LensHooke X1 Pro. Analisis data dilakukan menggunakan uji *Shapiro-Wilk*, *Wilcoxon Signed Rank Test*, korelasi *Spearman*, dan *Bland-Altman*.

Hasil: Hasil penelitian menunjukkan tidak terdapat perbedaan signifikan pada parameter konsentrasi sperma ($p=0,682$), total motilitas ($p=0,123$), dan immotilitas ($p=0,123$). Terdapat perbedaan signifikan pada motilitas progresif ($p=0,007$), motilitas non progresif ($p=0,001$), dan morfologi sperma ($p<0,001$). Uji korelasi *Spearman* menunjukkan hubungan sangat kuat pada konsentrasi sperma ($r=1,000$), hubungan kuat pada motilitas progresif ($r=0,676$), total motilitas ($r=0,691$), dan immotilitas ($r=0,691$). Parameter morfologi menunjukkan hubungan sangat lemah dan tidak signifikan ($r=0,188$; $p=0,149$). Analisis *Bland-Altman* menunjukkan sebagian besar data berada dalam batas limits of agreement, meskipun parameter morfologi menunjukkan tingkat kesesuaian yang rendah.

Kesimpulan : Metode digital otomatis LensHooke X1 Pro memiliki kesesuaian yang baik dengan metode manual WHO 2021 pada parameter konsentrasi sperma dan motilitas umum, namun belum optimal pada pemeriksaan morfologi sperma.

Kata Kunci : Analisis Sperma, LensHooke X1 Pro, WHO 2021, Motilitas Sperma, Morfologi Sperma, Konsentrasi Sperma.

ABSTRACT

Background : Male infertility is one of the reproductive health problems that may be influenced by sperm quality, including sperm concentration, motility, and morphology. Manual semen analysis based on WHO 2021 standards remains the gold standard method; however, it has limitations such as examiner subjectivity and inter-operator variability. LensHooke X1 Pro is an automated digital semen analyzer developed to improve the efficiency, objectivity, and consistency of semen examination results.

Objective : This study aimed to determine the differences in sperm concentration, motility, and morphology results between the WHO 2021 standard manual method and the LensHooke X1 Pro automated digital method.

Methods : This study used a descriptive comparative design with a cross-sectional approach. A total of 60 semen samples examined at the Andrology Laboratory of Sadewa Hospital were included in this study. Each sample was analyzed using both the WHO 2021 standard manual method and the LensHooke X1 Pro automated digital method. Data were analyzed using the Shapiro-Wilk test, Wilcoxon Signed Rank Test, Spearman correlation test, and Bland-Altman analysis.

Results : The results showed no significant differences in sperm concentration ($p=0.682$), total motility ($p=0.123$), and immotility ($p=0.123$). Significant differences were found in progressive motility ($p=0.007$), non-progressive motility ($p=0.001$), and sperm morphology ($p<0.001$). Spearman correlation analysis demonstrated a very strong correlation in sperm concentration ($r=1.000$), and strong correlations in progressive motility ($r=0.676$), total motility ($r=0.691$), and immotility ($r=0.691$). Sperm morphology showed a very weak and non-significant correlation ($r=0.188$; $p=0.149$). Bland-Altman analysis demonstrated that most data points were within the limits of agreement, although morphology parameters showed low agreement.

Conclusion : The LensHooke X1 Pro automated digital method showed good agreement with the WHO 2021 manual method in sperm concentration and general motility parameters, but it was not optimal for sperm morphology examination.

Keywords : Semen analysis, LensHooke X1 Pro, WHO 2021, Sperm motility, Sperm morphology, Sperm concentration.