Body Impedance Analysis and Skinfold Measurements as Low-cost Alternatives to DXA for Monitoring Lipodystrophy in CLWH

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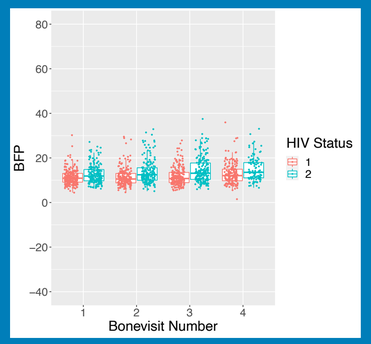
Research Question: How do skinfold measurement and body impedance analysis equations (BIA) perform as alternatives to dual x-ray absorptiometry (DXA) for monitoring body fat percentage (BFP) in a population of children living with HIV (CLWH) in South Africa.

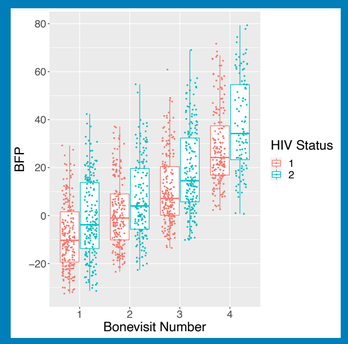
BACKGROUND

Children living with HIV experience lipodystrophy, which can lead to stigma which may affect treatment adherence.[1] It is important for clinicians to be able to monitor fat distribution in their patients so that they can make early interventions. The gold-standard method for measuring BFP, which is used to monitor lipodystrophy, is DXA. This technology may be cost-prohibitive in under-resourced settings.[3] Skinfold and BIA tools are both more affordable alternatives to DXA. However, they rely on equations calibrated to populations that may not be representative of the children included in this study, affecting their performance. Many of the equations have been generated with reference populations in the US or Europe, and children with HIV excluded from the reference group.

RESULTS



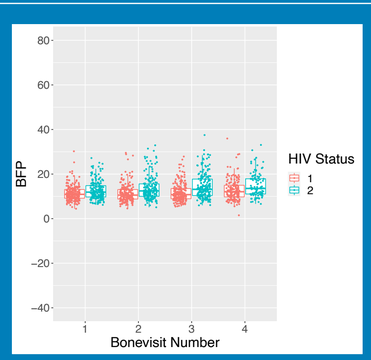
a) **DXA** BFP



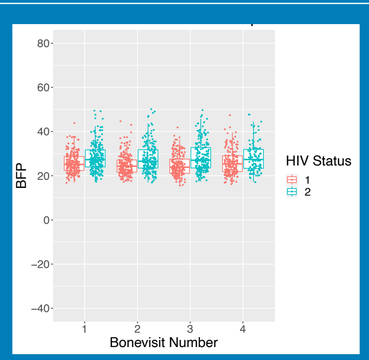
b) Cameron **Skinfold** BFP Equation

Figure 1: a) Plot showing the BFP of all participants in the study as measured by DXA. The data is presented by "Bonevisit Number" which represents subsequent visits for the same participants over the course of several years, showing the time-dependence of the measurement. b) Plot showing the BFP of all participants in the study who have skinfold measurements, as measured by the skinfold equation in the publication by Cameron et al.

RESULTS



a) **DXA** BFP



b) Cameron **Skinfold** BFP Equation

Figure 2: a) Plot showing the BFP of all participants in the study as measured by DXA. b) Plot showing the BFP of all participants in the study who have BIA measurements, as measured by the BIA equation in the publication by Slaughter et al.

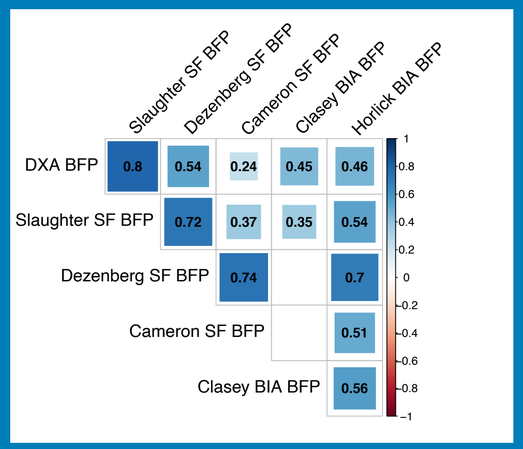


Figure 3: A correlation chart showing the Spearman's rank correlation coefficients for the relationships between several BFP measurement tools. SF is a skinfold measurement tool and BIA is a body impedance analysis tool. Any correlation with a p-value of less than 0.05 is left blank.

METHODS

- 410 children were included in this study with 53.4% of them children living with HIV
- The study participants were enrolled at the Empilweni Services and Research Unit and the Perinatal HIV Research Unit in Johannesburg, South Africa
- Spearman coefficients were used to analyze correlation between BFP measurement methods, with p-values calculated to check if the correlations were significant

The performance of BIA and Skinfold measurement as an alternative to DXA varies widely based on the selected equations

DISCUSSION

This results shows that published BIA and skinfold equations can perform poorly in re-producing the "gold-standard" results of DXA. However, the high correlation between DXA and some BIA and skinfold equations demonstrates their potential to be useful tools. Further study is needed before implementation for measuring BFP in CLWH in South Africa.

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