Abstract: To compare hand grip (HG) strength with estimates of muscle strength measured using body composition and bioelectrical impedance analysis (BIA) in HIV-infected women.

Methods: In 256 drug naïve women (WHO Stage 1 and 2; CD4 cell count > 250 cells/µL), hand grip strength was measured using standardized dynamometers and bioelectrical impedance analysis using standardized technique and compared to BIA estimates. The muscle areas of the mid upper-arm, mid-thigh, and mid-calf were estimated using bioelectrical impedance analysis were calculated with standardized equations.

Results: The mean (SD) for age and CD4 were 36.7 (8.1) yrs and 535(236) cells/µL respectively. Significant correlations (r=0.05-0.41) were found between HG (right and left hands) and estimates of muscle area on the arm, thigh, and calf. FFM and TBW were strongly correlated with HG strength and body mass index; correlations were not significant with fat mass estimates.

Conclusions: HG strength, when compared to estimates of BIA, has a relationship to FFM, at baseline, in drug naive asymptomatic HIV-infected rural Kenyan women enrolled in an 18 month randomized nutrition intervention field trial that measures the impact of animal protein and energy on BC and HG.

Hand Grip Strength and Body Composition in HIV-Infected Rural Kenyan Women

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Introduction

Hand grip strength (HGS) is used as a functional measure of body protein loss and is not confounded by inflammation or hydration status. These tests are simple to administer, inexpensive, portable, and therefore may be useful in a rural field setting to capture early signs of muscle wasting in HIV-infected patients. Measures of HGS have been shown to correlate with:

- lean muscle mass in chronic renal failure
- chronic pulmonary disease
- immune response, lean mass and protein status in elderly women
- mortality in post surgery patients and the elderly
- CD4 measures in HIV-infected adults

Normative data exists for HGS in adults.

Overall Objective

To determine if meat in the diets of HIV-infected rural Kenyan women prevents the loss of strength and body mass in those not yet ill enough to warrant antiretroviral drugs.

Population

N = 256
256 drug naïve HIV-infected rural Kenyan women
CD4 > 250 cells/µL
WHO Stage 1 and 2
no opportunistic infections

Mean (SD)
Age 36.7 (8.1) years
CD4 535(236) cells/µL

Hand Grip
Lateral Finger Pinch
2 Point Finger Pinch
3 Point Finger Pinch

Outcome Measures*

- Estimates of muscle strength
  - Hand Grip (Left and Right hands)
  - Finger Pinch (Left and Right hands)
- Estimates of lean body mass
  - Anthropometry: muscle areas of the:
    - mid upper-arm (MAMA)
    - mid-thigh (MTMA)
    - mid-calf (MCMA)
  - Bioelectrical Impedance Analysis (BIA)
    - fat-free mass (FFM)
    - total body water (TBW)
- Estimate of HIV progression
  - CD4 lymphocyte count (CD4)

Values of Hand Grip and Finger Pinch Strength at Baseline for 256 HIV-Infected Kenyan Women

<table>
<thead>
<tr>
<th>Values</th>
<th>Hand Grip</th>
<th>Finger Pinch</th>
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<tbody>
<tr>
<td>Right</td>
<td>0.25*</td>
<td>0.23*</td>
</tr>
<tr>
<td>Left</td>
<td>0.28*</td>
<td>0.26*</td>
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Correlations at Baseline for 256 HIV-Infected Kenyan Women

<table>
<thead>
<tr>
<th>Measures</th>
<th>Anthropometry</th>
<th>BIA</th>
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<tbody>
<tr>
<td>Hand Grip</td>
<td>MAMA, MTMA, MCMA</td>
<td>FFM, TBW, CD4</td>
</tr>
<tr>
<td>Finger Pinch</td>
<td>Lateral Right, Lateral Left</td>
<td>0.24*, 0.25*, 0.14***</td>
</tr>
</tbody>
</table>

References

2. Heijdra VF, 2003, American College of Cest Physicians 124:75-82

Conclusions

Hand strength, as measured by hand grip and finger pinch dynamometry, when compared to estimates of body composition, shows a relationship to FFM, at baseline, in drug naive asymptomatic, HIV-infected rural Kenyan women enrolled in an 18 month randomized nutrition intervention field trial that measures the impact of animal protein and energy on body composition and hand strength.

Repeated measures, every 3 months during the intervention and 6 months post the intervention will be assessed and compared for a treatment effect.