Physical Function Impairment on Quality of Life among Persons Aging with HIV Infection

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ABSTRACT

Background: Impairments in physical function are seen among aging, HIV-infected persons on effective antiretroviral therapy (ART). The impact of physical function impairments on quality of life (QoL) during ART is unknown.

Methods: Cross-sectional study of 45-65 year-old HIV-1-infected subjects, on ART >6 months, plasma HIV-1 RNA <48 copies/mL. Medical history, QoL questionnaire (SF-36), and objective physical function assessment for 400-m walk speed (m/sec), power (chair rises/sec), and grip strength (kg) were completed on all subjects. Veterans Aging Cohort Study (VACS) Index scores were calculated as previously described. SF-36 scores were normalized to a population mean of 50 points. Objective physical function, physical activity (>500 versus ≤500 Kcal/week), and VACS scores were used to estimate each QoL subscale in a multivariable linear regression model.

Results: Of 359 subjects, 85% were male, 74% Caucasian, 18% Hispanic, median age 51 (48-56) years, median CD4+ lymphocyte count 551 (361-768) cells/μL, and 5% had detectable HIV-1 RNA. Median SF-36 scores and results of the regression model are shown in the table below. For every 1 m/sec increase in walking pace, we saw an estimated 11.8 point increase in the physical function scale with smaller differences in QoL points across all subscales. For every increase in chair rise pace of 1 rise/sec, we saw an estimated 16.0 point increase in physical function score and 15.0 point increase in social function score with smaller differences in QoL across all subscales. Subjects reporting greater physical activity had QoL scores between 2.8 and 5.7 points higher than those with lower physical activity. A 1 kg increase in grip strength was associated with a 0.2 higher mental health score, but was not significantly associated with differences in other subscales. Inclusion of a comorbidity/mortality index (VACS Index) did not improve the model.

Conclusions: Among aging persons with well-controlled HIV, faster 400-meter walk pace, faster chair rise pace, and greater physical activity were associated with both higher physical and mental QoL, independent of HIV-related mortality risk as estimated by the VACS Index. Targeted exercise programs to increase physical activity and improve speed and power should be evaluated as interventions to improve QoL during ART.

BACKGROUND

- Preserving a high quality of life is a cornerstone of successful aging
- Among older adults without HIV infection, there is a strong association between objective measures of physical function and quality of life
- Research from our group and others have shown greater than expected physical impairment among adults aging with effectively treated HIV.
- The impact of these physical function impairments on quality of life is unknown.
- Hypotheses:
  - Impairment in physical function is associated with lower quality of life.
  - Physical function impairments will have a similar impact on quality of life as HIV-associated mortality risk

METHODS

- Cross-sectional study of participants age 45-65 years, on ART for ≥ 6 months with HIV-1 RNA <48 copies
- Completed physical activity & quality of life (SF-36) questionnaires, physical function assessment (400-m walk, 5-time chair rise test, and grip strength. Veterans Aging Cohort Study (VACS) index scores were calculated as previously described
- Analyses: SF-36 scores were normalized to a population mean of 50 points.
- Correlations were described with Pearson (400-m walk, chair rise, grip) or Spearman (physical activity, VACS Index) coefficients.
- A multivariable regression model was estimated for each SF-36 Domain & parameterized with the covariates: Age, gender, era of HIV diagnosis, race, ethnicity, tobacco use, body mass index, current & nadir CD4 count, 400-m walk speed, chair rise pace, grip strength, physical activity, and VACS Index scores.
- Each final model included: 400-m walk speed, chair rise pace, grip strength, dichotomized physical activity, and VACS Index.

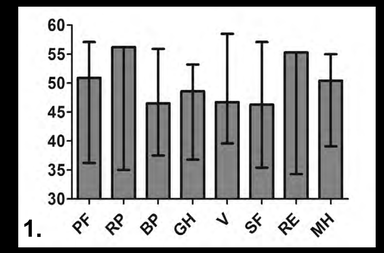
RESULTS

Characteristic	*N= 359*
Age (yrs)	**52.0 (5.2)**
Female	**54 (15)**
Hispanic or Latino	**65 (18)**
Caucasian	**265 (74)**
Current Smoker	**123 (34)**
Current CD4 T-cell count	**594 (303)**
CD4 nadir	**167 (159)**
HIV-1 viral load <48 copies/mL	**17 (5)**
HIV diagnosis pre-1996	**193 (54)**
Body mass index	**26.4 (6.0)**
400-m walk pace (m/sec)	**1.4 (0.37)**
Chair rise pace (rises/sec)	**0.5 (0.2)**
Grip strength (kg)	**39.0 (9.3)**
Physical activity >500kcal/wk	**249 (70)**
VACS Index Scores	**18 (6, 24)**

 # (%), mean (SD), or median (25th,75th%ile)

RESULTS

Figure 1. Median (IQR) normalized SF-36 scores



Key
PF= Physical Functioning
RP=Role Physical
BP=Bodily Pain
GH=General Health
V= Vitality
SF=Social Functioning
RE=Role Emotional
MH=Mental Health
*** <0.05; † <0.01; ‡ <0.001**

Figure 2. Correlation between summary scores and measures of physical function, comorbidity, or physical activity

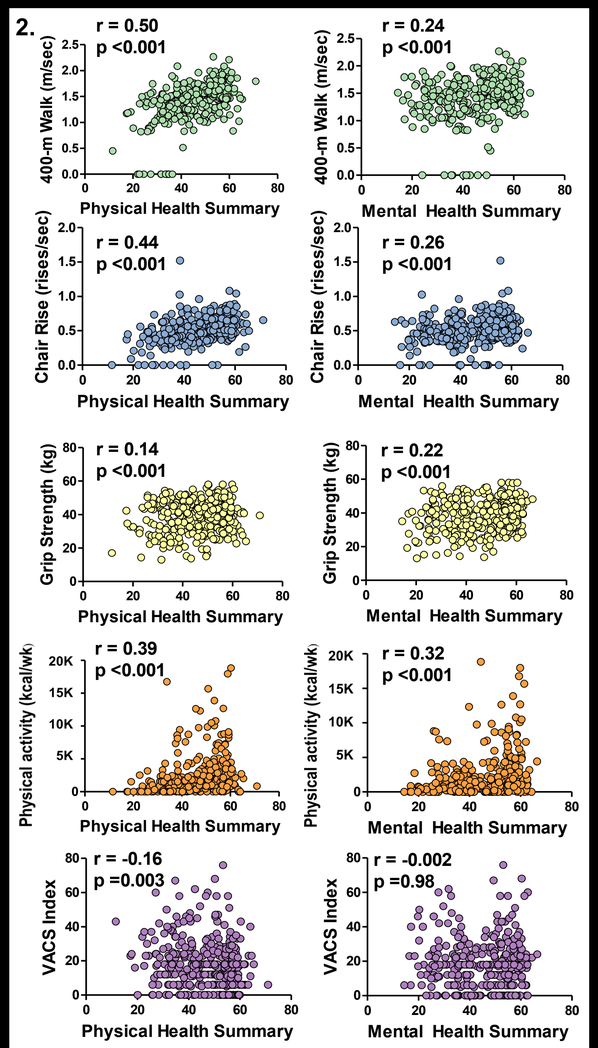
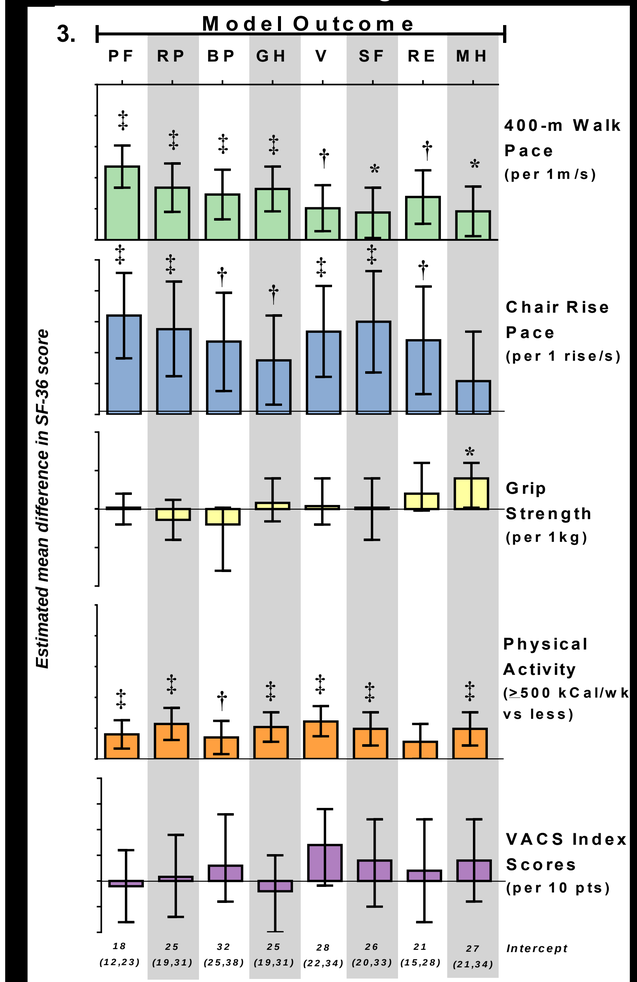


Figure 3. Estimated mean difference in SF-36 domains in multivariable regression models



SUMMARY

- Normalized score medians were lower than the population mean for bodily pain, general health, vitality, and social functioning
- Physical health quality of life scores were moderately correlated with physical function, the VACS index, & physical activity
- Mental health quality of life scores were moderately correlated with physical function & physical activity but weakly with the VACS index
- For every 1 m/sec faster pace on 400-m walk, there was an estimated increase in 4.4-11.8 points on SF-36 subscales
- For every 1 rise/sec faster pace on chair rise, there was an estimated increase of 8.8-16.0 points on all subscales except mental health
- Those with greater physical activity had an estimated 3.5-6.1 points higher on all subscales except role emotional.
- Inclusion of the VACS Index did not improve the model.

CONCLUSIONS

- Among aging persons with well-controlled HIV, faster walking speed and chair rise time and higher levels of physical activity are associated with both higher physical and mental quality of life, independent of HIV-related mortality risk as estimated by the VACS Index.
- Targeted exercise programs to increase physical activity and improve speed (400-m walk) and power (chair rise) should be evaluated as interventions to improve quality of life during ART.

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