

Contribution of physical, psychological and socioeconomic factors to frailty and quality of life in Chinese people living with HIV and comorbidities

BACKGROUND

Frailty is increasingly being recognized as an important geriatric syndrome in the aging population of people living with HIV (PLWH). Improving quality of life is currently regarded as one of the major goals in healthcare delivery for PLWH. Identifying the determinants predisposing PLWH to frailty and poorer quality of life would help to implement effective intervention to improve long-term health outcomes.

This study was conducted to determine the burden of frailty and level of health-rated quality of life in HIV-infected individuals with one or more comorbidities in Hong Kong.

METHODOLOGY

We performed a prospective cross-sectional observational study. Adult HIV-infected individuals with one or more comorbidities followed up at the Infectious Diseases Clinic at the Prince of Wales Hospital were enrolled. Frailty was determined by the frailty index and frailty phenotype. Self-rated physical and mental health using SF-36 were administered. Co-variables include demographic data, lifestyle factors, HIV-related and non-HIV-related physical health, neurocognitive impairment and mood disorder, social support and stigma were collected. Variables associated with frailty and quality of life were determined in multivariate linear regression models.

STUDY RESULTS

General characteristics of the cohort

A total of 157 people living with HIV with one or more comorbidities were enrolled in this project. Their mean age was 62 years, with 85% being male. The majority of participants had hypertension and diabetes. The median duration of HIV diagnosis was 13 years. All participants were on anti-retroviral therapy and 92% had HIV RNA <50 copies per mL. The nadir CD4 was 112 (26 – 251)/uL. About half (57, 46%) had obesity (BMI≥25 kg/m²). Multimorbidity, as defined by two or more comorbidities included in the Charlson Comorbidity Index, was present in 84 (54%). Polypharmacy, referring to the prescription of 5 or more non-ART medicines, was noted in 68 (43%).

Measurement of geriatric syndromes, physical and mental function, frailty and quality of life

For the assessment of geriatric syndromes, 29 (20%) had a fall in the past 12 months, 45 (30%) had urinary incontinence (with 23 [15%] having stress incontinence and 35 [23%] having urge incontinence), 10 (7%) had difficulty in hearing, and 38 (31%) had difficulty in vision.

Assessment of depression by PHQ-9 showed that 39 (32%) had mild, 11 (9%) had moderate and 4 (3%) had severe degree of depression. For cognitive assessment, 127 (81%) had an international HIV Dementia Scale (IHDS) of 10 points or less, while 32 (21%) had Hong Kong version of the Montreal

Cognitive Assessment (MoCA) score less than or equal 21. Assessment of physical performance showed that Short Physical Performance Battery (SPPB) score was 11 (IQR 9.5 – 12), with 39 (25%) had a low performance score.

Assessment of social support using Lubben scale showed that 70 (57%) had poor social support with a score of less than 12. For assessment of stigma, stigma was common in all four domains: personalized stigma 68%, disclosure concerns 91%, public attitudes 71%, and negative self-image 68%. For the assessment of disability, 3 (2%) had impairment in activities of daily living, as assessed by Katz score, and 17 (11%) had impairment in instrumental ADL, as assessed by Lawton scale.

In this cohort, 98 (62%) had pre-frailty, while 8 (5%) had frailty, according to the Fried frailty phenotype. Frailty index was 0.28 ± 0.09 .

Health-related quality of life was assessed using SF-36. The Physical Component Score (PCS) was 45.3 (IQR 37.4 – 51.6), and the Mental Component Score (MCS) was 54.2 (IQR 42.3 – 61.2).

Variables correlating with frailty phenotype

On univariate analyses, frail and pre-frail status were associated with older age, lower than secondary education level, polypharmacy, underweight, urinary incontinence, poorer performance with chair-stand test, low IHDS score, low MoCA, poorer social support, higher urea and lower ALT levels (Table 1). Multivariable analyses showed that older age, low IHDS score and higher urea concentration were independently associated with frail or pre-frail status.

Table 1. Univariate and multivariate analyses of variables associated with frailty phenotype

| Variables | Frail/Pre-frail | Robust | p | Adjusted odds ratio (95% CI) | P |
|------------------------------|-------------------|-------------------|--------|------------------------------|-------|
| Age | 63.5 ± 8.2 | 59.0 ± 7.5 | 0.001 | 1.09 (1.03 – 1.16) | 0.007 |
| No or primary education only | 31 (29%) | 6 (12%) | 0.016 | | |
| Polypharmacy | 53 (50%) | 15 (29%) | 0.015 | | |
| Underweight | 9 (9%) | 0 (0%) | 0.032 | | |
| Stress incontinence | 20 (19%) | 3 (6%) | 0.040 | | |
| Five chair stand | 12.1 (9.9 – 14.9) | 10.1 (8.7 – 12.0) | <0.001 | | |
| Lubben score | 9 (5-14) | 12 (8-16) | 0.034 | | |
| IHDS ≤ 10 | 93 (88%) | 34 (67%) | 0.002 | 2.90 (1.08 – 7.78) | 0.034 |
| MoCA ≤ 21 | 27 (26%) | 5 (10%) | 0.026 | | |
| Urea | 6.5 ± 2.6 | 5.6 ± 1.4 | 0.018 | 1.37 (1.01 – 1.84) | 0.041 |
| ALT | 24 (18 – 32) | 31 (20 - 47) | 0.010 | | |

Variables correlating with frailty index

Correlation between frailty index and various domains was examined. Multivariate analyses were performed for each group of variables, adjusted by age and sex. Among the sociodemographic and lifestyle factors, pre-secondary education was associated with higher frailty index, while full or part-time employment and regular vigorous or moderate physical activity were associated with lower frailty index.

Among the variables associated with physical health, multimorbidity, lipodystrophy and worse performance on five chair stand test were associated with higher frailty index. Duration of HIV diagnosis, history of AIDS-defining illnesses, and the current CD4 count were the HIV-related variables associated with frailty index. (Table 2) Among the geriatric syndromes, polypharmacy, fall, urinary incontinence, impaired vision and lower MoCA score were associated with higher frailty index. Higher level of anxiety and lower level of social support were the psychosocial factors associated with higher frailty index. Lastly, higher triglyceride level, insulin resistance, creatinine and D-dimer were also associated with higher frailty index.

Table 2. Correlation between frailty index and HIV-related variables

| Variables | B | P | B ¹ | p |
|---------------------------|----------|--------|----------------|--------|
| Duration of HIV diagnosis | 0.003 | <0.001 | 0.005 | <0.001 |
| History of AIDS | 0.044 | 0.001 | 0.041 | 0.006 |
| Duration of ART | 0.004 | <0.001 | | |
| Nadir CD4 | -0.0002 | <0.001 | | |
| Current CD4 | -0.00008 | 0.001 | -0.0001 | <0.001 |

¹ Adjusted by age and sex and other variables in this domain

Variables correlating with physical component score (PCS) of quality of life

The correlation between various domains and PCS of health-related quality of life was investigated. Multivariate analyses were performed for each group of variables, adjusted by age and sex. Among the sociodemographic and lifestyle factors, pre-secondary education was associated with lower PCS, while regular vigorous or moderate physical activity or walking for at least 10 minutes a day were associated with higher PCS. Among the variables associated with physical health, multimorbidity, higher waist circumference and slower gait speed were associated with lower PCS. Current use of NNRTI and current CD4 count were the HIV-related variables associated with PCS. Among the geriatric syndromes, polypharmacy, urinary incontinence, impaired vision and pre-frail or frail phenotype were associated with lower PCS. Anxiety, depression, stress, social support and personalized stigma were the psychosocial factors associated with PCS.

Variables correlating with mental component score (MCS) of quality of life

The correlation between various domains and MCS of health-related quality of life was explored. Multivariate analyses were performed for each group of variables, adjusted by age and sex. Regular vigorous or moderate physical activity and current NNRTI use were associated with higher MCS. Depression, AST level, HIV RNA level, frailty index, and anxiety, depression and stress levels were associated with lower MCS.

CONCLUSIONS

In this cohort of older PLWH with one or more comorbidities, 67% had pre-frailty or frailty. Frailty was associated with poorer health-related quality of life. Quality of life was determined by demographic factors, physical health, as well as psychosocial factors. Multi-prong interventions are required to improve quality of life in aging PLWH.