

## SHORT COMMUNICATION

# Frailty, health-related quality of life and mental well-being in older adults with cardiometabolic risk factors

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**SUMMARY**

**Objective:** Frailty is an emergent health-related problem in older adults. The aim of this study was to examine the health-related quality of life (HRQOL) and the effect of frailty in elderly patients with cardiometabolic risk factors. **Methods:** One-hundred and one patients 65 years or older responded to an HRQOL assessment using the World Health Organization Quality of Life (WHOQOL)-26 questionnaire. Frailty was assessed using two indices: the Hebrew Rehabilitation Center for Aged (HRCA) vulnerability index and the Vulnerable Elders Survey (VES) index. In addition, these patients completed self-rating questionnaires assessing mental well-being [the 28-item version of the General Health Questionnaire (GHQ-28)] and depression (Geriatric Depression Scale). **Results:** Based on the combination of HRCA and VES indices, 24 subjects (23.7%) met the criteria of frail. Persons  $\geq 75$  years old and those with depressive mood or lower creatinine clearance had significantly lower WHOQOL-26 scores than their counterparts. Diabetes and macrovascular complications did not associate with the WHOQOL-26 scores. Compared with non-frail patients, the frail scored lower on the WHOQOL-26 questionnaire after adjusting for age, kidney dysfunction and depressive mood. Frail patients also reported significantly higher the GHQ-28 scores compared with non-frail patients. **Conclusions:** Frail older adults had a significant lower HRQOL, as well as lower mental well-being, independent of age, diabetes, macrovascular complication, kidney dysfunction and depressed mood.

**What's known**

Frail older adults with cardiometabolic risk factors had impaired health-related QOL independent of diabetes, macrovascular complication, kidney dysfunction and depression.

**What's new**

This study is the first to identify association between frailty and health-related QOL in older adults with cardiometabolic risk factors.

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**Disclosure**

None.

**Introduction**

Frailty is an emergent health-related problem in elderly patients. It has been defined as a condition that describes individuals who lack function reversal and are at risk for functional decline (1,2). Older adults exhibit widely heterogeneous health states, ranging from robust to frail, and nearly 50% of them have three or more chronic medical conditions (3). In particular, patients with diabetes are at increased risk for a number of geriatric syndromes and exhibit diminishing well-being (4). Few studies of the health-related quality of life (HRQOL) have been performed in this older population and the HRQOL is found to be poorer among elderly patients with diabetes compared with other people of the same age (5,6). Mental problems may also contribute to a diminished HRQOL (7), and depression is twice as prevalent among persons with diabetes (8). To our knowledge, limited information is available on the association between frailty and HRQOL in elderly patients with

cardiometabolic risk factors. The aim of this study was to identify possible roles of frailty on HRQOL.

**Methods****Subjects**

A cross-sectional study was conducted among elderly patients 65 years and older at the Division of Cardiology, Nephrology and Metabolic Disease, Nara Medical University Hospital, Kashihara City, Japan. A total of 122 elderly patients with cardiometabolic risk factors (diabetes, hypertension, dyslipidaemia or chronic kidney disease) who attended consecutively at our outpatient clinic were approached between March and December 2007. This study was performed in accordance with the Helsinki Declaration and written informed consent was obtained from each participant.

**Clinical and laboratory data**

Clinical and laboratory data were abstracted from medical records on comorbidities, current

medication including anti-hypertensive drugs and lipid-lowering medications, total cholesterol, triglycerides and high-density lipoprotein-cholesterol. Serum creatinine was measured by an autoanalyser and creatinine clearance was calculated using the Cockcroft–Gault formula (9). Body mass index was calculated as weight in kilograms divided by the square of height in metres. Sitting blood pressure was measured three times using a standard mercury sphygmomanometer after a 5-min rest. The average of the last two readings was used in the analysis. Macrovascular diseases were defined as follows: coronary heart disease (CHD), diagnosis of CHD or previous myocardial infarction; cerebrovascular disease, history of transient cerebral ischaemia or hemiparesis; peripheral artery disease, history of claudication.

### Evaluation of frailty

Frailty was assessed using two questionnaires: the Hebrew Rehabilitation Center for Aged (HRCA) Vulnerability Index (10) and the Vulnerable Elders Survey (VES) (11). The HRCA questionnaire consists of two components (components A and B) (10). The A component of frailty includes self-reported requirements for help in preparing meals, taking out the garbage, doing ordinary work around the house, walking up and down stairs, needing to use a walker or cane, and identifying the current year. The B component of frailty includes self-reported answers for leaving their residence, needing help in dressing, and having health impediments (e.g. 'how much of the time does bad health keep you from doing things you would like to be doing?'). A component A score > 1 or equal to 1 point and a component B score > 0 point indicates that the respondent is frail.

The VES provides a 13-item function-based scoring system that considers age, self-rated health, limitations in physical functions and functional disabilities (11). The total score can range from zero to 10 points and a total score of three or more indicates that the respondent is vulnerable. In the present study, subjects with a positive score on either of these two indices were categorised in the frail patient group.

### Health-related quality of life measurements

The HRQOL was assessed using the WHOQOL-26 questionnaire, a 26-item self-reported questionnaire generating four domain scores (12). This questionnaire asks respondents to rate their overall 'quality of life' and 'satisfaction with health' and 24 further items from four domains: physical, psychological, social relationships and environment. Overall, quality of life was rated a five-point scale (very poor, poor, neither poor nor good, good and very good). Other

items were rated on five-point scales of either A type (not at all, a little, moderately, mostly and completely) or B type (very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied and very satisfied). Each domain score was calculated and higher scores denoted a better quality of life.

### Assessment for mental well-being, depressed mood and self-assessed exhaustion

The patients completed the self-rating questionnaires assessing mental well-being [the 28-item version of the General Health Questionnaire (GHQ-28)] (13). The GHQ-28 encompasses four domains: somatic symptoms, anxiety and insomnia, social dysfunction, and depression. A total GHQ-28 score of  $\geq 6$  points indicates the presence of impaired mental health. Depressed mood was evaluated using the Geriatric Depression Scale (GDS-15) (14), comprised of 15 items with answers in yes/no format; a score of  $\geq 5$  points indicates a depressed mood. Exhaustion was assessed using two items from the Center for Epidemiologic Studies Depression scale (15): 'I felt that everything I did was an effort' and 'I could not get motivated'. The items asked, 'How often in the last week did you feel this way?' and subjects responded on a four-point scale: zero indicated rarely or one time; one indicated some or a little of the time; two indicated a moderate amount of the time and three indicated most of the time. The total points ranged from zero to six, with a higher score indicating increased exhaustion.

### Statistical analysis

All statistical analyses were performed using the SYSTAT statistical package (Systat Software, Inc., San Jose, CA). Differences between mean values of continuous variables were tested using Student's *t*-test. To confirm the independent association between frailty and HRQOL, we performed a multi-way ANCOVA.  $p < 0.05$  were considered statistically significant.

### Results

Among the 122 patients, three patients who had dementia or obviously could not answer the questionnaire were excluded. We also excluded five patients with physician-diagnosed major depression, end-stage kidney failure and cancer. An additional five patients declined to participate and eight patients eliminated because of incomplete answers. The remaining 101 subjects completed the questionnaires (57 men and 44 women; mean age,  $72.9 \pm 5.1$  years; range: 65–85 years). Sixty-three patients were in the old age group (65–74 years) and 38 were in the very

**Table 1** Patient characteristics

	< 75 years	≥ 75 years	p-Value
<i>n</i>	63	38	
Age (years)	69.8 ± 2.9	78.2 ± 3.1	
Female (%)	34.9	57.9	0.026
Body mass index (kg/m <sup>2</sup> )	23.9 ± 3.2	22.8 ± 3.1	0.100
Anti-hypertensive drug (%)	66.7	76.3	0.297
Lipid-lowering medication (%)	36.5	36.9	0.973
Diabetes (%)	61.9	63.2	0.901
Macrovascular disease (%)	14.3	21.1	0.403
Total cholesterol (mg/dl)	198.1 ± 34.4	207.3 ± 37.9	0.224
Triglycerides (mg/dl)	156.9 ± 94.9	130.5 ± 82.9	0.155
HDL-cholesterol (mg/dl)	57.5 ± 15.5	58.0 ± 15.2	0.898
Creatinine clearance (ml/min)	92.2 ± 20.4	51.2 ± 17.3	< 0.001

Data were mean ± SD (range) or %. HDL, high-density lipoprotein.

old age group (≥ 75 years). The characteristics of subjects are presented in Table 1. Seventy per cent of them were treated with anti-hypertensive drugs and 36% with lipid-lowering medications. Approximately 60% of subjects had diabetes, but none of them had serious diabetic complications (blindness, foot ulcer, amputation and end-stage kidney failure). Macrovascular diseases occurred in 16.8% of the patients and kidney dysfunction (creatinine clearance < 60 ml/min) in 41.5%. Thirty-seven of 101 patients (36.6%) had a GDS score of ≥ 5, indicating at least a depressed mood, while only five (4.9%) had a score of > 10, implying more severe depression.

Based on the combination of HRCA and VES indices, 24 subjects (23.7%) met our definition of frailty. Table 2 summarises the WHOQOL-26 total score across several different patient categories. Persons aged ≥ 75 had significantly lower WHOQOL-26 scores than those who were younger. Persons with lower creatinine clearance, depressed mood and frailty had significantly lower WHOQOL-26 scores than their counterparts. Diabetes and macrovascular complications did not associate with the WHOQOL-26 scores.

Table 3 represents the data for the WHOQOL-26 total score and the subdomain scores, the GHQ-28 total score, and self-assessed exhaustion between the frail and non-frail patient groups. Compared with non-frail patients, frail patients scored lower on the

**Table 2** The WHOQOL-26 scores across several different patient categories

Patient characteristics	<i>n</i>	WHOQOL-26	p-Value
<b>Age ≥ 75 years</b>			
No	63	3.543 ± 0.539	0.006
Yes	38	3.253 ± 0.479	
<b>Female</b>			
No	57	3.492 ± 0.537	0.216
Yes	44	3.559 ± 0.526	
<b>Hypertension</b>			
No	30	3.549 ± 0.555	0.176
Yes	71	3.386 ± 0.520	
<b>Dyslipidaemia</b>			
No	64	3.417 ± 0.575	0.656
Yes	37	3.464 ± 0.459	
<b>Diabetes</b>			
No	38	3.555 ± 0.511	0.244
Yes	63	3.482 ± 0.545	
<b>Macrovascular disease</b>			
No	84	3.434 ± 0.557	0.998
Yes	17	3.434 ± 0.414	
<b>Low creatinine clearance</b>			
No	59	3.535 ± 0.559	0.019
Yes	42	3.292 ± 0.465	
<b>Depressive mood</b>			
No	64	3.632 ± 0.453	< 0.001
Yes	37	3.093 ± 0.493	
<b>Frail</b>			
No	77	3.596 ± 0.441	< 0.001
Yes	24	2.913 ± 0.474	

Data were mean ± SD.

WHOQOL-26 questionnaire regarding total score, physical health domain, psychological domain and environmental domain after adjusting for other conflicting factors such as age, kidney dysfunction and depressed mood. The total GHQ-28 and exhaustion scores were also significantly higher in the frail patients than in the non-frail patients after adjusting for age, kidney dysfunction and depressed mood.

## Discussion

Frailty is an adverse health condition regarded as frequent with ageing and having severe consequences. Various assessment tools have been developed to determine specific service needs of the elderly and chronically ill older adults and several methods for the evaluation of frailty are currently available (16). Of these, one approach is based on the identification of persons as vulnerable who have physical impairments that severely limit their ability to perform activities in the home environment. We used two types of questionnaires for assessing frailty in the

**Table 3** The WHOQOL-26 total score and the subdomain scores, the GHQ-28 total score, and self-assessed exhaustion between the frail and non-frail patient groups

	Non-frail	Frail	p-Value*
<b>WHOQOL-26</b>			
Total score	3.549 ± 0.050	3.066 ± 0.097	< 0.001
Physical health domain	3.645 ± 0.060	3.069 ± 0.116	< 0.001
Psychological health domain	3.609 ± 0.061	3.107 ± 0.118	< 0.001
Social relations domain	3.293 ± 0.072	3.144 ± 0.139	0.369
Environmental health domain	3.591 ± 0.041	3.084 ± 0.119	< 0.001
<b>GHQ-28 total score</b>	3.940 ± 0.511	7.692 ± 0.993	0.002
<b>Self-assessed exhaustion</b>	0.512 ± 0.178	2.268 ± 0.342	< 0.001

Data were mean ± SE. \*After adjusting for age, creatinine clearance and depressed mood. GHQ-28, the 28-item version of the General Health Questionnaire.

present study. One is a screening instrument that has been developed by the HRCA – the HRCA Vulnerability Index (10). The set of questions are clinically meaningful and useful for assessing vulnerability. The second tool is the VES questionnaire (11), a 13-item function-based scoring system that considers age, self-rated health, limitations in physical function and functional disabilities. In a report by the VES, those in the vulnerable group (scores ≥ 3) had 4.2 times the risk of death or functional decline over a 2-year period compared with those with scores < 3 (12). In the present study, we defined the frail condition when subjects had a positive score on either of these two indices. We provided a systematic examination of frailty in elderly patients and revealed a significantly lower HRQOL among frail persons compared with non-frail ones.

Health-related quality of life is a broad, multi-dimensional instrument that includes the domains of physical and psychological health, independence/mobility, social relationships, environmental health, and religion/spirituality. HRQOL measures are important for evaluating the burden on patients and may provide a comprehensive health profile of older people. Recently, the research field in HRQOL has increased enormously, but somewhat conflicting results are shown because of different questionnaires used (17). Several studies estimated HRQOL using the generic instrument Euroqol 5D (EQ-5D) (18,19). Although EQ-5D is a widely used generic instrument

that makes it feasible to rapidly assess QOL from large numbers of subjects, a major limitation is that it consists of only five questions. Whether the EQ-5D is too simple to detect clinically relevant differences in HRQOL between patient groups has been questioned. In the present study, we used a brief version of the WHOQOL questionnaire (WHOQOL-26), which can measure global QOL and four subscales (physical, psychological, social relationship and environmental). To date, the WHOQOL-26 has been widely used in clinical and epidemiological studies to evaluate HRQOL. Even for older people, the respondent's burden in completing a questionnaire of this brief version is small, yet it has excellent reliability and validity. To our knowledge, there is no information concerning the association between frailty and HRQOL assessed using this tool. In the present study, persons ≥ 75 years old and those with depressive mood or lower creatinine clearance had significantly lower WHOQOL-26 scores than their counterparts. Surprisingly, no difference in WHOQOL-26 scores was seen between groups with and without diabetes in our data. Indeed, several studies have demonstrated that diabetes has a strong negative impact on the HRQOL (20–22). It seems likely that diabetes affects the HRQOL through microvascular complications, macrovascular diseases, kidney dysfunction or impaired functional ability (17,21–23). One possible explanation may be that none of participants in this study had serious diabetic complications such as blindness, foot ulcer, amputation and end-stage kidney failure. If the functional ability of elderly diabetic persons is comparable with that of non-diabetic persons, the association of diabetes with HRQOL may become weaker. These issues need to be further investigated.

It is often assumed that ageing is associated with more depressed (4). Depression may also affect HRQOL in elderly patients. In the present study, patients with depressed mood had lower WHOQOL-26 scores compared with those without. We then evaluated the HRQOL between frail and non-frail groups, excluding those conflictive factors. After adjusting for age and depressed mood, significant differences in all domains of WHOQOL-26 were found except for the social relationship domain. The social relationship domain consists of the quality of personal relations, practical social support and sexual activity. The lack of impact of social engagement on frail individual's HRQOL is interesting, but the number of frail subject was relatively small in this study. These issues need to be further investigated.

The results of this study have some implications in clinical setting. It must be emphasised that frailty is not synonymous with old age. Clinicians should

recognise that frail individuals have a significant lower HRQOL than in the non-frail ones. Action should be taken to reinforce their strengths to maintain better HRQOL.

This study has several limitations. First, it is questionable whether self-administered questionnaires might be more valid than interviewer-administered ones. Impaired vision or problem with writing may cause older people to be unwilling to self-complete questionnaires. The present study did not evaluate cognitive function using a precise test. Educational levels of subjects in the study population were not available. However, the WHOQOL-26 can be completed without difficulty by older adults even if they have limited formal education. All subjects were thought to be cognitively intact because they completed the questionnaires without help. Second, the study sample was limited to outpatients. This study did not examine people who were hospitalised or stayed in a nursing home. Future investigations may need to include those vulnerable elders. Finally, the number of subjects was relatively small and statistical power may not be strong enough to detect some variables between the frail and non-frail groups. There may be some selection bias in terms of the study subjects who recruited from a single institution. This may limit the extrapolation of the study results to the overall population.

In conclusion, the present study confirmed that frailty is associated with impaired HRQOL, independent of age, diabetes, macrovascular complications, kidney dysfunction or depressed mood.

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