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Prevalence of frailty and association with intrinsic capacity decline among community-dwelling older people in Cameroon: a cross sectional study

Marie-Josiane Ntsama Essomba[1,2*], Régine Mylène Mballa Mba[1], Landry Ekwalla Kameni[3], Patrick Tchebegna[4], Florence Denise Mvondo Lema[1] and Maturin Tabue-Teguo[5,6]

Abstract

Background Frailty and impairment in intrinsic capacity (IC) have been shown to increase the risk of poor outcomes in older people. We aimed to determine the prevalence of frailty and its association with decline in IC among people aged 60 and over in Cameroon.

Methods This cross-sectional study included community-dwellers aged ≥ 60 years. Frailty was assessed using Fried's criteria and IC decline using step 1 of the Integrated Care for Older People (ICOPE). Any abnormality reported for one of the six IC domains was considered as a positive screening. The significance level was $p < 0.05$.

Results Among 108 participants included (64.8% women, median age 70 years (65–75)), all had a decline of at least one IC. The prevalence of frailty was 52.8%.The main domains involved were cognition (93.5%), vision (88%) and hearing (87%). Compared to participants without frailty, the frail group was older, achieved lower education, had fewer children, had a more frequent history of falls and a higher number of deficits in IC domains. In the multivariable model, after adjusting for age, sex and comorbidities, the participants with preserved mobility (OR 0.18, 95%CI 0.068–0.49) and vitality (OR 0.11 95%CI 0.04–0.28) were likely to have a lower risk of frailty.

Conclusion Frailty and IC impairment were common in this group of older Cameroonians. Further research with the monitoring of trajectories of IC and frailty as a research outcome may allow better comparison to tailor interventions taking into account our local resources.

Clinical trial number Not applicable.

Significance

What is already known on the topic? A growing body of evidence supports the validity of IC to assess healthy aging across various settings. Frailty and IC decline are two distinct constructs that share underlying mechanisms.

*Correspondence:
Marie-Josiane Ntsama Essomba
ebomaj2012@yahoo.fr

Full list of author information is available at the end of the article

What this study adds? Our results highlight the relationship between frailty and IC impairment among a group of older community-dwellers from Cameroon, a country with about 1 million older people and scarce policies on aging. This study may serve as a template for further research with the monitoring of trajectories of IC and frailty as a research outcome. This may also allow better comparison between the impacts of interventions and tailoring these interventions taking into account our local resources.

Keywords Frailty, Intrinsic capacity, Community-dwelling older, Geriatric epidemiology, Cameroon

Introduction

The older population is expected to double in the majority of African countries during the current decade and a major policy shift will undoubtedly be necessary to meet the needs of this ageing population [1, 2, 3]. Health systems in sub-Saharan Africa (SSA) are struggling with the heavy burden of infectious diseases while facing the rising trend of non-communicable diseases (NCDs) [4]. In a context where health services dedicated to older people are scarce and few personnel are trained in geriatrics, little consideration has been given on issue of aging in SSA. Despite efforts to improve level of care, mortality remains high in this age group and the role of frailty and geriatric syndromes has also been recognized in many African countries [5, 6, 7]. According to a systematic review conducted in 2021 by O'Caoimh et al., the highest prevalence of physical frailty was reported in Africa compared to other regions of the world [8]. To cope with the growing burden of frailty and dependency in the older population, an innovative approach known as the Integrated Care to Older People (ICOPE) has been proposed by the World Health Organization (WHO). It emphasizes the optimization of intrinsic capacity (IC) as the most important focus to promote healthy ageing and reduce dependency [9]. According to WHO, IC is the composite of an individual's physical and mental capacities at any given time [9, 10]. The ICOPE approach aims to improve, maintain and slow the decline in IC by assessing and monitoring six core domains of IC, namely cognition, locomotion, mood, hearing, vision and vitality [9]. Although frailty and IC are two distinct constructs, the trajectory of an individual's IC may help the clinicians to identify decline before clinical manifestations and evaluate the effectiveness of interventions. Previous studies have shown that impairment of IC affects self-care, thereby increasing dependency, and is associated with a higher risk of incident frailty among older adults [11, 12]. There is evidence that frailty is linked to dysregulation of multiple systems including stress-response, metabolism and musculoskeletal systems that are involved in IC decline [13, 14]. Limited mobility, depressive symptoms and visual impairment are associated with a higher incidence of frailty [12]. Reliance solely on frailty manifestations to identify older adults with declining functional reserves may result in missed opportunities for earlier intervention. Thus, screening for IC impairments identifies older adults at higher risk of incident frailty and incident disability. In 2019, the prevalence of frailty was estimated to be 36% among community-dwellers aged 55 years and above in Cameroon [15].Despite several evidence suggesting that frailty is associated with poor outcomes, frailty screening has not been widely incorporated in routine care in Cameroon. Furthermore, geriatric medicine is still at its infancy and for now policies on aging are not available in the country. To the best of our knowledge, no studies have been conducted to date in Cameroon. Therefore, we aimed to determine the prevalence of frailty, and its association with impaired IC, among community-dwelling older people in Cameroon.

Methods

Study design and setting

We carried out a cross-sectional study from May to July 2022 in Yaounde, the capital of Cameroon. The participants came from the seven districts of Yaounde, comprising both urban and semi-urban areas. Participants were recruited during community activities organized by senior citizens' associations, including health screening campaigns, meetings and physical activity sessions.

Study population

Inclusion criteria We included people aged 60 years and above, who provided written informed consent. Participants with severe disability, severe dementia were not included.

Sample size calculation Sample size was calculated using the OpenEpi sample size calculator available on www.openepi.com with the prevalence of frailty reported by Tay et al. [16], giving a minimal sample size of 43.

Data collection

Demographic and clinical data

Demographic data included: age (in years), gender, marital status, current professional activity and educational level (illiterate, primary, secondary, university), number of children, and number of people in the household. Clinical data encompassed past medical history including falls history, comorbidities (such as hypertension, diabetes, osteoarthritis, dementia, obesity, HIV infection) and the number of drugs being taken. Polypharmacy

was defined as the concomitant use of more than 5 medications.

Frailty assessment

Frailty was defined based on Fried's criteria, as the presence of at least 3 of 5 of the following conditions: unintentional weight loss, weakness, slow walking speed, low physical activity and exhaustion [17]. Weight loss was defined as the unintentional loss of ≥5 kg during the 12 past months. Muscle strength was assessed by grip strength, measured in the patient's dominant hand using an electronic Jamar Plus® dynamometer. We recorded the average value from 2 consecutive attempts. Weakness was defined as a grip strength < 20 kg for women and < 30 kg for men. Walking speed was assessed by measuring the 4 m gait speed at normal pace for each participant. We reported the average of 2 attempts for each participant. Gait speed < 1 m/s was considered as slow walking speed. Physical activity was assessed by self-reported exercising habits. Participants who reported "never" or "rarely" being active at least once a week were categorized as physically inactive. Exhaustion was defined by self-reported tiredness or difficulty to get going.

Domains of intrinsic capacity screening

Decline in IC was screened based on step1 of the ICOPE tool, which includes assessment of the following 6 domains, as proposed by WHO [9]:

- Cognition: Participants were asked to remember three words, then they are asked questions about orientation in time and space, then asked for recall of the three words. Incapacity to answer on orientation or to recall the three words was considered abnormal.
- Mobility was assessed by asking the participants to rise from the chair five consecutive times without using their arms. Failure to complete the five chair rise in less than 14 s was considered abnormal.
- Vitality was assessed by questioning about unintentional weight loss of more than 3 kg over the previous 3 months, and loss of appetite. The participant was considered to have a decline in vitality if the answer was "yes" to either the questions.
- Vision was assessed subjectively by asking the participant about difficulties in seeing far, reading, eye diseases or currently under medical treatment for eye disease. If the answer was "yes" to one question, the test was considered abnormal.
- Hearing was assessed by the whispering test for each ear. The examiner stands 1 m behind the participant and whispers 2 words at each ear. Failure to repeat one word was considered abnormal.
- Mood was assessed by asking if the participant felt down, depressed or hopeless, and if he/she had little interest or pleasure in doing things. If the answer was "yes" to both questions, it was considered suggestive of depressive symptoms.

Any abnormality reported for one of the six IC domains was considered as a positive screening.

Data analysis

Data were analyzed with the Statistical Package for Social Sciences for Windows (SPSS 23.0, Chicago, Illinois, USA). Quantitative variables are presented as mean and standard deviation (SD) or median and interquartile range (IQR). Categorical variables are presented as number and percentage. Quantitative variables were compared using Student's T test or the Mann-Whitney U test as appropriate, and categorical variables using the Chi-squared or Fisher's exact test. Variables that yielded a $p < 0.20$ by univariable analysis were included in the multivariable logistic regression analysis, which estimated odds ratios (OR) and 95% confidence intervals (CI) with the non-frail group as reference group. A p-value < 0.05 was used to define statistical significance.

Results

Characteristics of participants

Overall, 108 participants were included; of whom 64.8% ($n = 70$) were female. The median age(IQR) was 70 (65–75) years. Around half were retired (49% ($n = 53$)). About 79.6% of participants ($n = 86$) presented at least one comorbidity. Polypharmacy was present in 7.4%, and 48.1% of participants used over-the-counter medications. Overall, 14.8% of participants have experienced falls and 16.7% have been hospitalized during the previous 12 months. The main characteristics of the study population are presented in Table 1.

Frailty and screening for decline in intrinsic capacity

The prevalence of frailty was 52.8%. All participants have been screened positive for impairment in at least one domain of IC. The main domains involved were cognition (93.5%, $n = 101$), vision (88%, $n = 95$) and hearing (87%, $n = 94$) (see Table 2). In the univariable analysis, compared to participants without frailty, the frail group was older with a median age (IQR) of 72(66–75) vs. 68(65–72) ($p = 0.031$), achieved lower education ($p = 0.013$), had fewer children ($p = 0.003$), had a more frequent history of falls ($p = 0.013$), had impaired mobility($p < 0.001$)), impaired vitality($p < 0.001$) and a higher number of impaired IC domains($p < 0.001$). In the multivariable model, after adjusting for age, sex and comorbidities, preserved mobility (OR 0.18, 95%CI 0.068–0.49) and vitality

Table 1 Sociodemographic and clinical characteristics of participants and frailty

	Frail (%) *N* = 57	Non-frail (%) *N* = 51	All (%) *N* = 108	uOR	95%CI	*p*-value
Male	18(47.4)	20(52.6)	38(35.2)			
Female	39(55.7)	31(44.3)	70(64.8)	/	/	0.407
Median age in years (IQR)	72(66–75)	68(65–72)	70(65–75)	/	/	**0.031**
Educational level						
None	13(22.8)	3(5.9)	16(14.8)	**4.72**	**1.26–17.7**	**0.013**
Primary	21(36.8)	18(35.3)	39(36.1)	/	/	1.000
Secondary	20(35.1)	28(54.9)	48(44.4)	**0.44**	**0.21–0.96**	**0.039**
University	3(5.3)	2(3.9)	5(4,7)	/	/	0.740
Current activity						
Working	1(1.8)	1(2)	2(1.9)	/	/	0.917
Retired	28(49.1)	25(49)	53(49.1)	/	/	0.991
Self-employed	8(14)	10(9.6)	18(16.7)	/	/	0.438
Unemployed	20(35.1)	15(29.4)	35(32.3)	/	/	0.529
Number of children						
0–1	13(22.8)	4(7.8)	17(15.7)	**3.47**	**1.1–11.7**	**0.003**
2–4	13(22.8)	24(47.1)	37(34.3)	**0.33**	**0.2–0.8**	**0.008**
5 and above	31(54.4)	23(45.1)	54(50)	/	/	0.335
Comorbidities						
Hypertension	33(61.1)	21(38.9)	54(50)	/	/	0.083
Diabetes	9(40.9)	13(59.1)	22(20.4)	/	/	0.711
Osteoarthritis	25(55.6)	20(44.4)	45(41.7)	/	/	0.625
Obesity	14(24.6)	8(15.7)	22(20.4)	/	/	0.253
Polypharmacy	7(12.3)	1(2)	8(7.4)	/	/	0.064
Falls	13(22.8)	3(5.9)	16(14.8)	**4.7**	**1.3–17.7**	**0.013**
Hospitalisations	21(36.8)	18(35.3)	39(36.1)	/	/	1.000

CI confidential intervall, IQR interquartile range, uOR unadjusted Odds Ratio

Table 2 Intrinsic capacity domains and frailty

		Frail (%) *N* = 57	Non-frail (%) *N* = 51	All(%) *N* = 108	uOR	95%CI	*p*-value
Mean of domains impaired(SD)		4.35 (0.89)	3.24 (0.91)	3.82 (1.06)	/	/	**< 0.001**
Domains of IC							
Cognition	yes	54(94.7)	47(92.2)	101(93.5)	/	/	0.705
	no	3(5.3)	4(7.8)	7(6.5)			
Mobility	yes	34(59.6)	10(19.6)	44(40.7)			
	no	23(40.4)	41(80.4)	64(59.3)	**0.17**	**0.07–0.39**	**< 0.001**
Vitality	yes	47(82.5)	16(31.4)	63(58.3)			
	no	10(17.5)	35(68.6)	45(41.7)	**0.1**	**0.04–0.24**	**< 0.001**
Vision	yes	52(91.2)	43(84.3)	95(87.9)	/	/	0.210
	no	5(8.8)	8(15.7)	13(12.1)			
Hearing	yes	50(87.7)	44(86.3)	94(87.1)	/	/	0.524
	no	7(12.3)	7(13.7)	14(12.9)			
Psychosocial	yes	11(19.3)	5(9.8)	16(14.8)	/	/	0.132
	no	46(80.7)	46(90.2)	92(85.2)			

CI confidential interval, IQR interquartile range, uOR unadjusted Odds Ratio

Table 3 Factors associated with frailty in a multivariable model

	aOR	95%CI	*p*-value
Educational level	/	/	0.721
Number of children	/	/	0.426
Falls	/	/	0.572
Polypharmacy	/	/	0.304
Mobility	**0.18**	**0.068–0.49**	**< 0.001**
Vitality	**0.11**	**0.04–0.28**	**< 0.001**
Psychosocial	/	/	0.336

IC; intrinsic capacity; aOR adjusted Odds Ratio

(OR 0.11 95%CI 0.04–0.28) were associated with a lower risk of frailty (see Table 3).

Discussion

Our study aimed to determine the prevalence of frailty and its association with IC decline among older community-dwellers in Cameroon. The main findings are the high prevalence of IC decline and frailty among older Cameroonians. The most common domains involved were cognition, vision and hearing. Compared to participants without frailty, the frail group was older, with less education, fewer children, a more frequent history of falls and a higher number of deficits in IC domains. Participants with preserved mobility and the vitality domain were likely to have a lower risk of frailty.

The prevalence of frailty was 52.7% in our study. This result is consistent with the prevalence reported among older people attending a geriatric center in Nigeria [18]. In 2023, another hospital-based cross-sectional study conducted in Nigeria found that 40.8% of older adults lived with frailty [19]. However, our prevalence is higher than the 35.7% found by Metanmo et al in a group of 403 retired community-dwellers Cameroonians using the Study of Osteoporotic Index (SOF) tool [15]. The prevalence of frailty in our study was also higher than the 23% reported in a Chinese population [20] and the 10.9% found by Tay et *al* in Singapore [16].The operational definitions for frailty and the populations varied between studies, which might largely explain the variation in reported frailty prevalence. Furthermore, we acknowledge that individuals living with frailty might be underrepresented in community-based studies compared to hospital-based ones. Our study population was recruited among senior citizens engaged in various activities in their associations, suggesting that they can be healthier compared to those who do not attend social activities. The choice of recruiting older people with stable social support may show the natural interaction of IC and frailty in order to avoid potential confounders. However, larger population-based studies are needed for generalizability.

In parallel, positive screening for deficit in at least one domain of IC using ICOPE step 1 was present in all the older adults in our study. Our findings corroborate those reported in a study including 18,000 older adults in France, where 94% of participants had a positive screening [21]. However, our prevalence was higher than the 69% of impairment on IC domains reported in China [22]. The high prevalence of positive screening in our study can be explained by the fact that, at the stage of screening, it is expected that there will be high prevalence of impairment that will require further assessment. However, the step 1 ICOPE screening can correctly identify IC impairment, which permits assessors to be confident to recommend older adults to be referred and undergo full assessment when the screening tests yield positive results [23]. IC domains impairment is quite common among community dwelling older adults but there is great variability in their trajectories and some components may remain stable, decrease, or even increase over the life course [10, 20, 24]. Monitor the trajectories of IC is a core component of the ICOPE approach as some older may present with alert in particular domain which may require in-depth assessment and interventions. The screening phase is the entry point but identification of older adults at risk of functional decline remains difficult in Cameroon. Geriatric medicine is still at its infancy, aging specialists are scarce thus programmes to promote early identification of older people at risk in the community can foster community-based interventions. This would probably implies empowerment for meaningful community engagement of older adults in our setting.

The number of deficits in IC domains in the older adults living with frailty was significantly higher compared to those without frailty. Our findings are in line with other studies [12, 22, 25]. Several lines of evidence have shown that the ICOPE step 1 tool is useful to screen for IC decline among community-dwellers at high risk of poor functional outcomes [21]. Those poor functional outcomes include incident frailty, incident disability in activities of daily living (ADLs) and instrumental activities of daily living (IADLs) [12, 26]. Furthermore, each additional domain impairment identified by the screening tool increased the risk of incident frailty by 47% [12]. Our findings suggest that a higher IC decline is associated with frailty. Although frailty and IC are two distinct constructs [14, 27], it has been argued that the two entities share underlying mechanisms [14], and IC decline may overlap with frailty status. There is evidence that frailty is linked to dysregulation of multiple systems including stress-response, metabolism and musculoskeletal systems that are involved in IC impairment. The construct of IC appears to provide valuable predictive information on an individual's subsequent functioning [11]. Reliance solely on frailty manifestations to identify older adults with declining functional reserves may result in missed opportunities for earlier intervention.

We found that participants with preserved mobility or vitality had a lower risk of frailty compared to those with impairment in either mobility or vitality. In a study conducted in China, newly impaired locomotion and vitality domains were associated with a higher possibility of transition from non-frail to frailty [20]. Yu et al. found that across the five domains, loss of vitality was a strong predictor of frailty in a group of Chinese older people [26]. In Singapore, frailty progressors were significantly more likely to have exhibited decline in locomotion and cognition domains at baseline [16]. Impaired mobility and vitality therefore play an important role in the mechanisms underlying frailty and disability [28, 29]. Indeed, mobility impairment can cause or result in low physical performance and low gait speed, which are hallmarks of frailty [17]. On the other hand, frailty is also characterized by low-grade inflammation, weight loss and low muscle strength. This raises the possibility that decreased energy production or increased use, as in wasting conditions, may be involved in the transition toward frailty [30, 31]. Poor nutritional status is frequent among Cameroonians older dwellers and remain underdiagnosed [32]. Our findings suggest that mobility and vitality in particular warrant further study among older adults living in Cameroon.

A high number of participants has reported falls in the past twelve months, which is consistent with previous studies [33, 34]. Compared to the non-frail group, the participants living with frailty had previous falls although they did not differ in terms of IC impairment in this study. However, other authors reported the relationship between decreased IC and risk of falls [33, 34]. Shen et al. identified that higher IC, especially those related to the preservation of cognitive, vitality, locomotion, and psychological independence, were associated with a lower risk of falls [34]. Liu et al. demonstrated that impaired vitality, locomotion, and psychology domains predicted the incidence of future falls within two years [35]. Falls are influenced by multiple factors among which IC domains are involved. The complex interaction between cognitive, musculoskeletal and sensory components is essential to ensure ambulation. Impaired cognitive functions may influence the sensory information related to maintaining balance while walking and the ability to perceive falls risk. Furthermore, poor nutritional status may lead to decreased muscle mass and function. Older adults may therefore exhibit slow gait and poor balance, thereby increasing the risk of recurrent falls.

Limitations

We acknowledge several limitations, including the cross-sectional design, possible selection bias and the small sample size. Indeed, we choose to recruit among members of senior citizens associations thus older people living with frailty are probably underrepresented in this population. Furthermore, we performed only the screening phase of the ICOPE, which may lead to an overestimation of IC decline in our study population. However our study highlights the necessity to pay attention to issues of aging in our country. Our findings suggest that preserved mobility and vitality may be associated with a lower risk of frailty. Thus interventions to maintain locomotion and vitality can be relevant to delay transition toward frailty in this group. The ICOPE approach could be a real opportunity for Cameroon: universal health coverage is in its infancy, there is only one geriatric unit in the whole country. Programmes to promote primary prevention in the community are not only relevant, but also necessary. Our findings suggest that primary care providers who might have used this evaluation preferentially among individuals with signs of functional loss or frailty, should be trained to assess also older people who are likely to be healthier and active. ICOPE can serve as a template for further national guidelines to allocate available local resources and improve meaningful community engagement of older adults.

Conclusion

The high prevalence of frailty and IC impairment in this group of active older people in Cameroon warrant the need to follow their trajectory. A pro-active screening approach could help to foster early interventions to maintain IC in order to delay the transition to frailty. Despite growing interest, IC translation into clinical practice remains challenging. Further research are needed with the monitoring of trajectories of IC and frailty as a research outcome to allow better comparison and tailor interventions taking into account our local resources.

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Author contributions

MJNE and MTT conceived the study. MRMM and FDML collected data. MJNE performed analysis and drafted the manuscript. MRMM, LEK, FDML, PT and MTT provided substantial feedbacks on the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All participants provided written informed consent to participate. This study is in compliance with the Declaration of Helsinki on research on humans and/or human data and was approved by the board of Yaounde Central Hospital under the reference number N°: 17/ACE/CIE/MINSANTE/DHCY/PCE/SG.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Geriatrics Unit, Yaounde Central Hospital, Yaounde, Cameroon
[2]Department of Internal Medicine and Specialties, Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon
[3]Geriatrics Unit, Rive de Seine Hospital, Neuilly-sur-Seine, France
[4]Geriatrics Unit, Centre Hospitalier Intercommunal de Haute-Comté, Pontarlier, France
[5]Clinical Epidemiology and Aging Team, French West Indies University, French West Indies, France
[6]Institut National de la Santé et de la Recherche Médicale U1219, Bordeaux University, Bordeaux, France

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