Change in the pattern of frailty among socially vulnerable older adults over a 36-month period and associated factors: a follow-up study

Mudança do padrão de fragilidade entre idosos socialmente vulneráveis no período de 36 meses e fatores associados: um estudo de seguimento


Abstract

Objective: To investigate changes in the frailty levels of older adults in a context of high social vulnerability. Methods: We conducted a prospective cohort study. Data were collected from 2 surveys conducted in 2015 and 2018. The frailty phenotype and sociodemographic and health characterization instruments were used. Descriptive statistical analysis was performed, including non-parametric tests, test for equality of proportions, and multivariate multinomial logistic regression. The use of the database was authorized, and the research was approved by the Ethics Committee. Results: In 2015, 346 community-dwelling older adults participated in the study. After 36 months, a final sample of 223 participants was obtained. In 2015, the prevalence of non-frail, pre-frail, and frail older adults was 13.0%, 56.5%, and 30.5%, respectively. In 2018, 22.9% were non-frail, 56.0% were pre-frail, and 21.1% were frail. Higher education and better quality of life reduced the likelihood of becoming pre-frail and frail, respectively. Conclusion: There was a change in the pattern of frailty among socially vulnerable older adults over a 36-month period.

Keywords: frail elderly; health of the elderly; social vulnerability.
INTRODUCTION

Older adults in unfavorable social contexts are at increased risk of frailty, a multifactorial syndrome with reduced activities and metabolic reserves, impaired homeostasis, and decreased resistance to stressors, resulting in cumulative decline in multiple systems and increased risk of health problems.\(^1,2\)

Frailty is a dynamic state with frequent transitions,\(^3,4\) which requires research to help prevent it. Especially in the Brazilian context, there are few studies that aim to investigate this transition.

Social vulnerability is an essential dimension to be considered when sharing information for care and service planning.\(^1\) However, it remains understudied in relation to frailty, highlighting the need for research in this area.

The objective of this study was to investigate changes in the frailty levels of highly socially vulnerable older adults and the association with sociodemographic and health variables, providing information for health promotion and preventive actions.

METHODS

This prospective cohort study was conducted in a Regional Health Administration in the city of São Carlos, state of São Paulo, Brazil, classified as an area of high social vulnerability by the São Paulo Social Vulnerability Index.

Two assessments were conducted: baseline (2015) and after 36 months (2018). At baseline, the target population consisted of 346 older adults registered in the Family Health Units. At the second stage (2018), this initial sample of 346 older adults was used.

Eligible participants were all older adults aged ≥ 60 years registered in the Family Health Units who had participated in the baseline assessment and were able to understand and verbally communicate. Exclusion criteria were diseases or sequelae that precluded testing (severe motor deficits, auditory deficits, or aphasia).

The researchers contacted the older adults by telephone and made home visits to schedule home interviews.

In both assessments, the following instruments were used:

- Sociodemographic questionnaire: sex (female and male), age (60–69, 70–79, ≥ 80 years), race (non-white and white), and education level (years of schooling).
- Frailty phenotype, assessed by the 5 criteria of Fried et al.\(^2\):
  1. Unintentional weight loss of ≥5% of body weight in prior year;
  2. Muscle weakness, as assessed by grip strength of the dominant hand using a hydraulic dynamometer, adjusted for sex and body mass index;
  3. Gait speed measurement, as assessed by the average time spent to walk a 4.6 m distance, adjusted for sex and height;
  4. Fatigue, as indicated by self-report in 2 questions from a depression scale. Feeling the need for extra effort or inability to perform usual tasks on 3 or more days of the week fulfilled the frailty criterion for this item;
  5. Low physical activity level, as assessed by the International Physical Activity Questionnaire (IPAQ). Those engaged in ≥150 minutes of moderate activity per week were considered active, whereas those engaged in < 150 minutes were considered insufficiently active. Cutoff values were stratified by sex;

- Scores on 3, 4, or 5 criteria classified the older adult as frail; scores on 1 or 2 criteria, as pre-frail; and no scores on any criterion, as non-frail;
- The 15-item Geriatric Depression Scale (GDS): assesses depressive symptoms in older adults, with scores ranging from 0 to 15;\(^5\)
- Short Form-6 Dimension (SF-6D Brazil): assesses health-related quality of life, with scores ranging from 0 to 1.\(^6\)

Descriptive statistical analysis was performed. Quantitative variables with non-parametric distribution, as assessed by the Shapiro-Wilk test, were expressed as medians. To analyze differences between the frailty groups (non-frail, pre-frail, and frail) in quantitative and independent variables, the Kruskal-Wallis test was used, followed by Dunn’s post hoc test for multiple comparisons. Nominal qualitative variables were analyzed using a test for equality of proportions. A multivariate multinomial logistic regression analysis was performed to model the odds of being in each frailty group (non-frail, pre-frail, and frail), using “non-frail” as the reference category. The significance level was set at 5% (p ≤ 0.05) for all statistical tests.

This study is linked to the surveys “Tool for monitoring frailty levels and associated factors in older adults cared for at the Family Health Support Center in the city of São Carlos” and “Tool for monitoring frailty levels in older adults cared for in primary care: Evaluation of its effectiveness and efficiency,” both approved by the Research Ethics Committee of Universidade Federal de São Carlos, approval number 860 653 (CAAE: 36167914 9 0000 5504) and 2 424 616 (CAAE: 660760173 0000 5504 5504), respectively.
In 2015, 346 older adults participated in the study. After 36 months, 83 were not located or found after 3 attempts, resulting in 263 older adults invited to participate in the study again. However, 8 refused to participate, 31 had died, and 1 was not evaluated. The final sample consisted of 223 participants reassessed in 2018. In 2015, 13% of older adults were classified as non-frail, 56.5% as pre-frail, and 30.5% as frail. In 2018, 22.9% of older adults were classified as non-frail, 56% as pre-frail, and 21.1% as frail.

Of the non-frail older adults, 37.9% remained non-frail, whereas 58.7% became pre-frail and 3.4% became frail. Of the pre-frail older adults, 25.4% became non-frail, 57.9% remained pre-frail, and 16.7% became frail. Of the frail older adults, 36.8% remained frail, 11.8% became non-frail, and 51.5% became pre-frail.

In both assessments, most participants were women (56.4% and 57.4%, respectively), who self-reported as non-white (58.1% and 51.1%, respectively), with a median of 2 years of schooling, without depressive symptoms (68.2% and 72.2%, respectively), and with good quality of life (medians of 0.7 and 0.8, respectively).

Education level, in years of schooling, was identified as a predictor of pre-frailty, and health-related quality of life was identified as a predictor of frailty (Table 1).

### DISCUSSION

This cohort study, involving 263 older adults in a context of high social vulnerability, showed a change in frailty levels over a 36-month period. In 2015, the prevalence of non-frail, pre-frail, and frail older adults was 13.0%, 56.5%, and 30.5%, respectively. In 2018, 22.9% were non-frail, 56% were pre-frail, and 21.1% were frail. Higher education and better quality of life reduced the likelihood of becoming pre-frail and frail, respectively.

Similar results were obtained in the systematic review conducted by Kojima et al. Among 42,775 community-dwelling older adults from 16 studies with a mean follow-up of 3.9 years (range: 1–10 years), 13.7% (95% CI, 11.7–15.8) improved, 29.1% (95% CI, 25.9–32.5) worsened, and 56.5% (95% CI, 54.2–58.8) maintained the same frailty status. It is important to consider the factors that could potentially explain why a reduction in the prevalence of frailty was observed. Studies point to the dynamic nature of this syndrome, emphasizing that older adults can transition between frailty states over time according to their life and health conditions. Frailty remission rates may vary by follow-up duration, country income level, and study sample size, being higher in women and in certain regions, such as North America. Factors resulting from physiological and functional mechanisms can disrupt the process of frailty remission, such as comorbidities and advanced age. Investigating these factors in future studies is essential to better understand reversion of frailty in socially vulnerable older adults, as this condition has a significant impact on health deficit accumulation and is a risk factor for frailty.

In the current study, a reduction was observed in the prevalence of frailty, although still considered high compared with studies conducted in other settings, such as the study by Duarte et al., who identified a prevalence of 8.5% of frail older adults in the city of São Paulo.

Further research is warranted to investigate the relationship between frailty and social vulnerability in various settings in order to gain a more comprehensive understanding of the role and influence of social vulnerability on frailty, compared with more privileged settings. These investigations will provide information
on factors associated with frailty and enable the development of more effective interventions for vulnerable older adults.

In the current study, higher education and better quality of life were associated with a lower risk of frailty. Schooling promotes access to information and healthy behaviors, while quality of life reflects physical, mental, and social well-being. These results highlight the importance of education and promotion of quality of life to prevent frailty in older adults.\(^1\),\(^1\)

Strengths of this study include its prospective design and a community-dwelling sample of older adults from primary health care units. However, some limitations must be considered: follow-up of only 36 months; subjective questions of the frailty instrument; different evaluators at the 2 assessment time points; low education level of the participants, which may have led to poor understanding of the questions; impossibility of generalizing the results and losses resulting from refusals; and change of address and death over time between the 2 assessment time points. Such losses may be one of the reasons for the reduction in the prevalence of frailty observed in the present study, since it remains unknown whether these older adults have progressed to frailty.

Therefore, it is crucial to conduct more studies that overcome these limitations and demonstrate care provision strategies that encompass this change in frailty status, focusing on risk and protection factors so that evidence-based practices can be developed with the objective of reversing and preventing this syndrome in older adults.

**CONCLUSION**

The current study showed a change in the pattern of frailty among socially vulnerable older adults over a 36-month period. Of frail older adults, 51.5% returned to a pre-frailty status and 11.8% became non-frail. Of pre-frail older adults, 25.4% became non-frail and 16.7% became frail. Among those initially classified as non-frail, 58.7% became pre-frail and 3.4% became frail.

**Conflicts of interest**

The authors have no conflicts of interest to declare.

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**Author contributions**

ALCM: Conceptualization, Writing – original draft, Writing – review & editing, Investigation. HPT: Formal analysis, Conceptualization, Investigation, Methodology, Software, Writing – review & editing. AASO: Conceptualization, Writing – review & editing, Validation. GAOG: Conceptualization, Writing – review & editing, Validation. LPPG: Conceptualization, Writing – review & editing, Validation. SCIP: Conceptualization, Writing – review & editing, Validation. ACO: Conceptualization, Writing – review & editing, Validation. MSZ: Project administration, Investigation, Methodology, Funding acquisition, Resources, Supervision. FSO: Project administration, Formal analysis, Conceptualization, Writing – review & editing, Supervision.

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