Transition between frailty levels in elderly persons from Belo Horizonte, Minas Gerais, Brazil

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Abstract

Objective: To observe possible changes in frailty phenotype classification over time. *Method:* 40 individuals of both genders aged over 65 years, living in the metropolitan region of Belo Horizonte, Minas Gerais and identified in a base line Rede FIBRA assessment as frail, who could walk independently or with the aid of devices and who had no illnesses that would prevent tests being carried out, , were considered. A standardized survey previously established by Rede FIBRA was administered. *Results:* The initial sample was composed of 40 individuals with a mean age of 78.03 (±6.46) years. After 24 months, a follow up of the 22 individuals from the initial sample that could be found was performed. The frailty phenotype classification scores of the same 22 subjects from the two samples were compared. After comparing the groups, it was found that 16 individuals had a lower number of frailty phenotype positive items in the follow up, three had higher positive scores and there was no change in the score of three individuals between assessments (p=0.004). *Conclusion:* This study found that a large majority of individuals showed improvement in their frailty phenotype classification.

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INTRODUCTION

Frailty is a clinical syndrome which is multifactorial in nature. It is characterized by a state of physiological vulnerability resulting from the reduction of the energetic reserves, based on a triad of aging-related disorders, namely sarcopenia, neuroendocrine dysregulation and immunological dysfunction, in addition to the decrease in the ability to maintain or restore homeostasis after a destabilizing event.[1-3]

One of the criteria used for the classification of frailty is that proposed by Fried et al.[3], which proposes a phenotype consisting of five items: unintentional weight loss, physical exhaustion, decreased muscle strength, low level of physical activity and slow gait speed. This phenotype characterizes individuals who do not present any positive items as not frail, those with one or two positives as pre-frail, and elderly persons with three or more positive items as frail.[3]

Gill et al.[4] investigated the possibility of stages of frailty being dynamic. This means it would be possible for an individual to transit between the stages of frail, pre-frail and not frail. The authors observed that transitions are frequent over time, and that this is a characteristic of the frailty process.[4] However, this dynamism takes place most frequently in one direction, with individuals moving from the not frail stage to the pre-frail stage and culminating in the frail stage.[4,5] This is due to deterioration of the human physiological systems over time, suggesting a gradual progression of a previously existing condition.[4] Thus, it is believed that an individual previously classified as frail will remain in that state or die.[5-7]

However, the possibility of the transition occurring in the opposite direction has been increasingly investigated. Although the state of frailty of individuals has a tendency to deteriorate,

an improvement in the condition is possible in certain situations.[8] This is because, in cases where there is a possibility of resolution or better control of depression, incontinence and obesity, it is likely that an individual will transit from the frail stage to pre-frail, or from this stage to not frail.[4,8] It is also worth noting that, according to Gill et al.,[4] these transitions are possible only between adjacent stages.[4]

Given that frailty is a multifactorial syndrome that can be affected by the health conditions of the individual, it is necessary to investigate the behavior of the variables associated with the condition over time. A better understanding of how the transitions occur between frailty levels may benefit clinical decision-making related to prevention and intervention. Hence, the present study aimed to observe possible transitions between frailty levels, according to the frailty phenotype in elderly persons from Belo Horizonte, Minas Gerais, over a period of 24 months.

METHOD

A longitudinal exploratory study was conducted between 2010 and 2013. It included elderly people of both genders, who were not institutionalized nor bedridden, aged over 65, living in the metropolitan region of Belo Horizonte, Minas Gerais and who had been classified as frail in the initial evaluation. The individuals were required to have the capacity to walk with or without assistance, and to be free of orthopedic or neurological disorders that would make it impossible to perform the tests. Individuals who did not achieve a score of 17 points or above in the mini–mental state examination (MMSE)[9] or who were bedridden or in a wheelchair were excluded.

The elderly participants of a study entitled Rede FIBRA[10] were subjected to a baseline assessment

by means of a standardized analysis established by the study which included: MMSE;[9] socio-demographic data; anthropometric measurements; health assessment (perceived physical health and self-reported health, falls, use of medication, hearing and vision deficit, blood pressure and use of health services); verification of functional capacity by means of the Lawton & Brody[11] and Katz-Brasil[12] scales; and identification of psycho-cognitive dominions through the application of the Falls Efficacy (FES-I Brazil)[13], and Geriatric Depression (EDG-15) scales.[14] After 24 months, the same protocol was applied to determine if a transition had occurred between frailty levels. Previously trained researchers conducted the data collection during both evaluations, and the same researcher was responsible for both evaluations. The assessments were carried out from August to December of 2010 (baseline assessment) and from August to December of 2012 (follow-up), at the homes of the volunteers.

The frailty phenotype[3] was characterized by means of five items:

- Unintentional weight loss in the last year (≥ 4.5 Kg or ≥ 5% of body weight of the previous year): assessed by self-report.[3]

- Exhaustion criteria: assessed using two questions from the depression scale of the Center for Epidemiological Studies (CES-D).[3]

- Level of physical activity: assessed by means of the short version of the Minnesota Leisure Time Activity Questionnaire[15] validated for the Brazilian population.

- Muscular strength: assessed by means of a handgrip strength test, adjusted according to gender and body mass index, utilizing a Jamar® type dynamometer, model NC701/42–North Coast. Three kilogram force (kgf) measurements were obtained from the dominant hand and the average of these measurements was considered.

- Gait speed adjusted according to height: calculated by means of the time (in seconds) to walk a distance of 4.6 meters at normal speed.[16,17] Three measurements were taken and the average of these was considered.[10]

All participants agreed to sign a Free and Informed Consent Form (FICF). The present study was approved by the Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais (The Research Ethics Committee of the Federal University of Minas Gerais) (COEP-UFMG), registration number ETIC 187/07.

Statistical analysis

The statistical software SPSS version 17.0 for Windows (SPSS Inc, Chicago IL, USA) was used for all analyses and a significance level of $\alpha=0.05$ was considered. Frequency analyzes were performed for the groups of variables related to the frailty phenotype syndrome, in order to observe how many individuals scored positively for the presence of the phenotype and how many individuals altered their final classification.

RESULTS

The initial sample consisted of 40 individuals (Table 1), with an average age of 78.03 (± 6.46), who were classified as frail in the baseline assessment. The average number of years studied was 4.88 (± 3.57) and the average score obtained in the MMSE was 22.25 (±3.32).

Table 1. Characteristics of the sample studied (N=40). Belo Horizonte, Minas Gerais, 2013.

	n (%)	Yes (%)	No (%)	Average	Standard- deviation
Women	28 (70)	-	-	-	-
Age (in years)	-	-	-	78.03	6.463
Lives alone	-	8 (20)	32 (80)	-	-
Number of comorbidities	-	-	-	2.35	1.777
Number of medications	-	-	-	5.75	3.462
MMSE	-	-	-	22.25	3.319
Lawton Scale	-	-	-	16.98	3.117
Katz Scale	-	-	-	0.54	0.913
FES-I	-	-	-	29.93	10.489
GDS	-	-	-	8.63	1.996

MMSE= Mini Mental State Exam; FES-I= Falls Efficacy Scale-International; GDS= Geriatric Depression Scale.

After 24 months, the individuals were contacted again. Of the 40 individuals initially classified as frail, three elderly people were not located due to change of address and/or phone number; four refused to participate again; another four had a score below the minimum required in the MMSE; three had a clinical diagnosis of dementia; three had passed away and one was bedridden. Therefore, 22 individuals remained for inclusion in the second assessment.

In order to carry out the comparison of the scores obtained for the two frailty phenotype classifications, the same 22 individuals were considered for both evaluations. In terms of the frequency of occurrence of positive items for the frailty phenotype criteria in both assessments, the item with the highest incidence of positive results was the handgrip strength test, with 90.9% in the baseline test and 86.4% after 24 months. This data is shown in Table 2.

Table 2. Number of individuals (N=22) at baseline assessment and after 24 months, who scored positively and negatively for each of the items related to the frailty phenotype. Belo Horizonte, Minas Gerais, 2013.

Phenotype items	Baseline		After 24 months	
	Positive n (%)	Negative n (%)	Positive n (%)	Negative n (%)
Level of physical activity (MLTAQ)	16(72.7)	6(27.3)	10(45.5)	12(54.5)
Unintentional weight loss (self-report)	14(63.6)	8(36.1)	7(31.8)	15(68.2)
Exhaustion criteria (CES-D)	12(54.5)	10(45.5)	5(22.7)	17(77.3)
Muscle strength (handgrip strength)	20(90.9)	2(9.1)	19(86.4)	3(13.6)
Gait speed	18(81.8)	4(18.2)	14(63.6)	8(36.4)

MLTAQ= Minnesota Leisure Time Activity Questionnaire; CES-D= Center of Epidemiological Studies.

Overall, two individuals moved to the not frail level, eight to the pre-frail level and 12 individuals remained classified as frail, but with a smaller number of items with positive scores (Table 3).

Table 3. Number of individuals classified according to the frailty phenotype proposed by Fried et al.[3] in each of the evaluations. Belo Horizonte-MG, 2013.

	Frail	Pre-frail	Not frail	Total
Baseline assessment	22	0	0	22
Assessment after 24 months	12	8	2	22

It was observed that the vast majority of the individuals showed improvement in their frailty phenotype classification. However, among the losses observed, there was a large number of individuals who had cognitive disorders (four had scores below the minimum required by the MMSE and three had a clinical diagnosis of dementia). Moreover, one individual was bedridden due to a fall/fracture, while three passed away.

DISCUSSION

The present study not only showed a reduction in the number of items that scored positively for the frailty phenotype proposed by Fried et al.,[3] but also a regression of the frailty syndrome in a sample composed of elderly persons, who were all classified as suffering from frailty, from a Brazilian community-dwelling population. The results of this study demonstrate that it should not be assumed that individuals classified as frail are necessarily in an extreme and irreversible health condition. Furthermore, it was observed that reduction in muscular strength and gait speed were the most frequently occurring positive items for the presence of the frailty phenotype at both the baseline assessment and after 24 months, which corroborates with previous studies[8]

In the present study, approximately 45% of the individuals transitioned to the milder stages of the phenotype and 55% showed a reduction in the number of items that scored positively. This fact corroborates the idea of the possibility of transition among the classification stages of the frailty syndrome that has also been observed in previous studies.[4,18] However, literature most frequently reports deteriorating transitions in the condition, and only describes transitions between adjacent stages.[4] In contrast, the present study observed transitions between classifications in both directions, with regression occurring more often than progression. The transitions were also not limited to changes between adjacent stages. One hypothesis for this difference is that in the present study, while being classified as frail in the baseline evaluation, participants showed satisfactory levels of independence and functionality. In previous studies,[4] however, it was not possible to make inferences about the functional state of the participants due to the fact that such assessments were not carried out.

On the other hand, the study by Silva et al.,[18] like the findings of the present study, also considered elderly individuals with a satisfactory functional level, and described transitions in the direction of clinical improvement. However, the study[18] dealt with all stages of the frailty phenotype in its baseline evaluation while the initial sample of the present study was composed only of elderly persons with frailty.

As a transition pattern of improvement of frailty was observed in the sample, there was a reduction in the number of items that scored positively for the frailty phenotype over time. Items such as level of physical activity, unintentional loss of weight and exhaustion criteria displayed a tendency of

improvement over time in elderly individuals considered frail in the baseline evaluation. On the other hand, muscle strength and gait speed remained relatively stable over time, and were the items that were most often positive for the phenotype in both evaluations, agreeing with the findings of previous studies.[5,8,18]

A study carried out in 2012 by Espinoza et al.[5] observed that muscle strength and gait speed are the most prevalent variables in frail elderly persons. Associated with this, previous studies concluded that the reduction of muscle strength is not only the main variable that contributes to the establishment of the frailty syndrome,[19] but also that lower muscle strength identified in the baseline assessment is associated with a negative evolution of the phenotype.[18] Thus, it is believed that muscular strength and gait speed are of the utmost importance for elderly people, since it has been observed that loss of muscle mass[19] and low gait speed [20] are associated with negative outcomes in elderly persons,[20] among which are the establishment of frailty syndrome [19,20] and death.[5] Literature reports that this occurs due to the aging process tending to reduce muscle mass.[21] In this context, one can hypothesize that possible interventions and changes, even if subtle, such as for example, an increase in overall muscle strength and mobility of elderly individuals, could further enhance the transition towards improving their condition.

The fact that no differences in muscle strength or gait speed were observed can be explained by the large number of losses between the evaluations, and is considered the main limitation of the present study. Thus, individuals who could possibly have registered a reduction of muscle strength and gait speed were not reassessed. These losses were probably observed due to conditions such as the deterioration in the cognitive state and death of the individuals, as ten of the 18 losses observed in the reassessment occurred because of such outcomes, equivalent to approximately 55% of the losses. In general, these losses may have resulted from the fact that the variables relating to cognitive issues are an important factor in the evolution of frailty syndrome, considering that they act as a protective factor for the installation/evolution of possible dementia, corroborating previous findings.[8] Moreover, it is already known that cognitive disorders are associated with the frailty syndrome,[22] including among elderly Brazilians.[23] Concomitantly, there is the possibility that the losses observed in the present study were related to elderly individuals who, in the initial assessment, had a higher degree of biopsychosocial impairment, with consequent deterioration of their health condition.

Another limitation of this study is that the older people were not instructed, during the baseline assessment, to avoid engaging in any health interventions, allowing them to engage in physical activity programs and physiotherapy after the first evaluation. This could possibly explain the improvement observed in a large number of the elderly persons initially evaluated, since these individuals may have changed their lifestyle habits and started a program of diet control and increased physical activity. Agreeing with well-established previous findings, this occurs because, by becoming physically active, an individual reduces and/or prevents a number of functional declines associated with aging.[24]

For future studies, it is suggested that the real impacts of cognitive factors on the syndrome of frailty, defined in accordance with the model proposed by Fried et al.,[3] are investigated, when assessing the transition between stages of the frailty phenotype of elderly Brazilians.

CONCLUSION

Transitions in the frailty phenotype were observed over time and the majority of these changes took the form of a decline in the number of items with positive scores, with a consequent positive regression in the final classification of frailty. These results did not assess the influence of any intervention, but if a spontaneous improvement of frailty is possible, it is reasonable to deduce that the interventions of health professional in this population can reverse frailty and even rehabilitate an elderly person who was previously considered frail.

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