Original Article

Using prefrailty to detect early disability

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ABSTRACT

Introduction: In an aging population, new strategies are required to identify individuals at risk of adverse health outcomes. Frailty syndrome is related to negative health events. This increased risk may be used to identify individuals in which interventions can delay the onset of physical and functional complications. The aim of the study was to determine the relationship between the onset of frailty and the beginning of functional disability. **Materials and Methods:** This was a cross-sectional observational study with consecutive sampling to analyze 146 patients aged seventy and older who come to the primary care center. The level of frailty was registered according to fatigue, resistance, ambulation, illnesses, and loss of weight scale. Disability for Instrumental Activities of Daily Live dependency, comorbidity, and social risk factors was registered too. **Results:** The prevalence of frailty and prefrailty was 17.8% and 39%, respectively, and were associated with age, level of disability, and the presence of gastrointestinal disease. Prefrail patients had initial levels of dependency, while those who were not frail were mostly independent. **Conclusion:** Frailty syndrome is easily detectable. The intermediate stage known as prefrailty is related to the start of the functional disability. The syndrome screening identifies individuals at risk in whom we can potentially intervene to delay the onset of the syndrome and delay functional disability. Control of comorbidity in frail patients must be studied. Screening age could be set in patients between 75 and 81 years old.

Key words: Disability, elderly, frailty, primary care

INTRODUCTION

The aging of a population leads to a higher incidence and prevalence of various health and social problems related to age, as well as the increased rates of dependency, comorbidity, and economic and social costs associated to those entities.[1] It is necessary to identify individuals at risk in order to delay the onset of health problems and the economic problems related to aging.

Frailty appears as a clinical syndrome associated with greater vulnerability of the individual to adverse health outcomes, a higher level of disability, and increased mortality. It is characterized by reduced resistance, strength, and decreased physiological functions.[2] Sarcopenia is considered the factor that initiates the pathophysiological cycle of frailty, generating structural, and metabolic changes through insulin resistance, together with the tendency to inflammatory conditions and an increased cardiovascular risk.[3,4]

The lack of a definition of frailty common to different authors makes it difficult to calculate the real prevalence of the syndrome,[5] which is said to be around 10.7% of the elderly, with 41.6% in the prefrailty situation.[6]

Fatigue, resistance, ambulation, illnesses, and loss of weight (FRAIL) scale may be used to detect frailty. This scale is easily applicable within the comprehensive geriatric assessment in primary care.[2] It establishes three frailty

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levels according to the responses obtained to five questions on comorbidity, fatigue, resistance, aerobic capacity, and unintended weight loss. Each item is scored with one point. Patients with 0 points are considered nonfrail, with 1 or 2 points for prefrail, and frail are those with 3 or more points.[7]

Frail people have less capacity for daily living activities than nonfrail patients, but this relation is not well defined since it is not known if these entities are time-related.[8] The possibility of using frailty as a screening method to detect people at risk of being unable to cope with their daily life activities might be useful to establish interventions to prevent or delay this loss.[9]

The objective of this study was to describe the functional capacities of the elderly in each frailty state according to FRAIL scale. A time-related relationship between these entities may indicate when to start rehabilitation measures by detecting the frailty level.

MATERIALS AND METHODS

A descriptive observational study was accomplished, taking as target population 70-year-olds or older patients assigned to a single primary care center. The chosen Primary Care Center was located in an urban area of the Eastern part of the city of Madrid, of a low-medium socioeconomic status. Patients who did not sign the informed consent, were institutionalized and/or had language barriers or cognitive impairment and could not understand the information provided and required were excluded.

Based on an estimated prevalence of frailty of 10.7% in previous studies with similar tools, in a similar population, the calculated sample size was 145 subjects from a reference population of 3806 patients, (5% precision, confidence interval (CI) - 95%). These individuals were selected using consecutive not randomized sampling during the months of October and November 2014 until the sample was complete.

Subjects selected were verbally informed about the study features and were asked to complete the informed consent in writing by a letter. This enabled the investigators to consult their medical records and proceed with a personal interview.

The following variables were recorded: Sex, age (grouped into 5-year groups), frailty level according to FRAIL scale,[7] comorbidities, and pluripathology following the instructions for development of clinical guidelines of the Spanish Primary Care Societies (illnesses are classified in eight groups, depending on the organ or system affected),[10] instrumental daily life activities capacity through

Lawton-Brody scale,[11] and the social risk following the Gijón social risk scale adapted to the Spanish population.[11]

A dissociated database was created, ensuring that the processing of data was anonymous. Frequencies and 95% CI were calculated for qualitative variables. Age was also measured as a continuous quantitative variable, calculating the median and standard deviation. Bivariate analysis was performed with Chi-square test for measuring the association between variables, taking frailty as the dependent variable, and using the Pearson's regression ratio to quantify the association power if any. A logistic regression was performed in order to reject those variables that worked as confounding factors. SPSS 22.0 (SPSS 22.0, copyright by IBM, USA) program was used for the statistical analysis.

Ethical issues were considered, respecting personal privacy, obtaining patients consent for the recruitment and the use of the data only for the purpose of this study. This investigation was approved by the Investigation Committee of the East Health Assistance Area of Madrid.

RESULTS

Classified as frail was 17.81% (CI 12–24%) of the population and 39.72% (CI 32–48%) as prefrail. There were no differences in the proportion of frailty by sex. Frailty was more common in the older subgroup as shown in Figure 1. The median age of frail individuals was 84 years with a standard deviation of 1-year. The median age of prefrail individuals was 81, with a standard deviation of 1-year. The youngest prefrail person was 75 years old.

Of the population, 45.20% were male and 54.8% were female. The distribution of age groups and variable frequencies by sex is shown in Table 1.

Total disability for instrumental daily living activities comprised 3.42% (CI 0.5–6.4%) of the population, severe
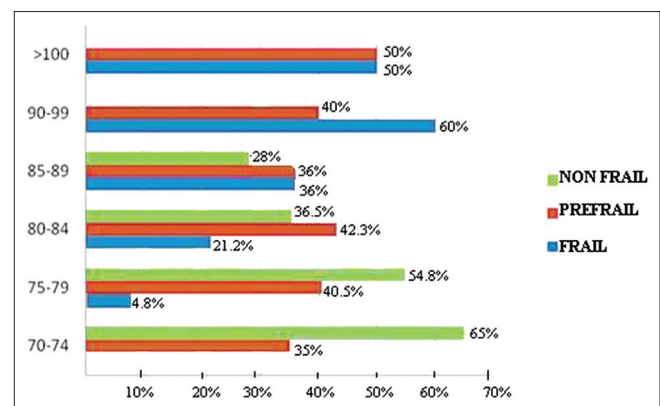

Figure 1: Prevalence of frailty by age group

Table 1: Percentage distribution and 95% CI for sociodemographic characteristics of the study population by gender

	Total (*n*=146) % (CI)	Men (*n*=66) % (CI)	Women (*n*=80) % (CI)
Median age	80 (79-81)	81 (80-82)	80 (79-80)
70-74	13.70 (6.2-21.2)	15.2 (6.5-23.8)	12.5 (5.3-19.7)
75-79	28.77 (18.8-37.7)	28.8 (17.9-39.7)	28.8 (18.8-38.7)
80-84	35.62 (25.1-46.1)	33.3 (22-44.7)	37.5 (26.1-48.1)
85-89	17.12 (8.9-25.4)	16.7 (7.7-25.7)	17.5 (9.2-25.8)
90-99	3.42 (0-7.4)	4.6 (0-9.6)	2.5 (0-5.9)
>100	1.37 (0-3.9)	1.5 (0-4.5)	1.2 (0-3.6)
Total		45.2 (37.1-53.3)	54.8 (46.7-62.9)
Frailty (by FRAIL scale)			
FRAIL	17.81 (12-24)	16.67 (7-9-25.9)	18.75 (10.2-27.3)
Pre-FRAIL	39.72 (32-48)	34.85 (23.3-46.3)	43.75 (32.9-54.6)
Non-FRAIL	42.47 (34-50)	48.48 (36.4-60.5)	37.50 (26.8-48.1)
Pluripathology (following the instructions for the development of clinical guidelines of the Spanish primary care societies)			
Yes	45.20 (37.1-53.3)	51.52 (39.5-63.6)	40 (29.3-50.7)
Comorbidity (following the instructions for the development of clinical guidelines of the Spanish primary care societies)			
Osteoarticular disease	49.31 (42.6-58.8)	33.33 (22-44.7)	65 (53.5-73.5)
Cardiovascular disease	28.76 (21.4-36.1)	28.79 (17.9-37.9)	28.75 (17.8-39.7)
Diabetes mellitus	17.81 (11.6-24)	19.70 (10.1-29.3)	16.25 (7.3-25.2)
Respiratory disease	16.43 (10.4-14.4)	18.18 (8.9-27.5)	15 (6.4-23.6)
Vasculitis and/or renal disease	11.45 (7.6-11.45)	18.18 (8.9-27.5)	8.75 (1.9-15.6)

FRAIL: Fatigue, resistance, ambulation, illnesses, and loss of weight

8.22% (CI 3.9–12.7%), moderate 15.07% (CI 9.8–20.9%), and mild 27.4% (CI 20.3–34.6%). There was no limitation in those activities for 45.20% (37.1–53.3%) of the population.

There were no differences in levels of dependency by sex. The level of disability was greater in the higher age subgroups. A marked increase in the level of dependence occurred when the nonfrail and prefrail groups were compared as shown in Figure 2.

Of the total sample, 0.68% (CI 0.2–2.02%) presented a high social risk, 23.29% (CI 16.4–30.1%) moderate, and for 76.03% (CI 69.1–82.9%) there was no risk at all. There were no significant differences in social risk by sex.

The bivariate analysis between frailty and the different variables showed *p* values [Table 2] which allowed the establishment of a possible association between the frailty and the level of dependence in instrumental activities of daily living, the presence of comorbidity such as cardiovascular, musculoskeletal and digestive diseases, and age. All these variables besides sex were tested to a logistic regression. The only association found was between frailty and disability, age dependency and diseases of the digestive system [Table 3].
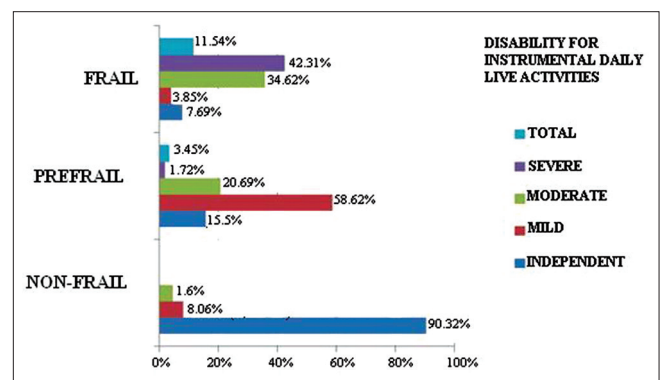

Figure 2: Distribution of dissability for Instrumental Activities of Daily Live by different levels of frailty

DISCUSSION

The prevalence of frailty similar to the previous studies with similar scales and population (5.8–27.3%) was found although the criteria for the diagnosis of this entity are not the same in all of the literature. Further research in this field must be done to establish common criteria so that the real impact of this syndrome can be described. Prefrailty prevalence was also within the limits of previous publications (34.6–50.9%).[12] Although we have used a different methodology in sampling, the use of the same scales makes the comparison with other studies plausible. The results are applied to the population studied, but

Table 2: *P*-values for association between frailty (dependent variable) and the rest of the study variables in a bivariate analysis

	p-value
Disability	<0.01
Age	<0.01
Pluripathology	<0.01
Cardiovascular disease	0.001
Gastrointestinal disease	0.004
Osteoarticular disease	0.04

Table 3: *P*-values for association between frailty (dependent variable) and variables previously associated in the bivariate analysis within a multivariate model

	p-value
Disability	<0.01
Age	0.03
Gastrointestinal disease	0.004
Cardiovascular disease	0.06

further research will help us to compare the differences with the general population. It is important to attend primary care to detect frailty properly as certain studies have demonstrated differences in the way family physicians and geriatricians detect this entity.[13]

In a descriptive analysis, frailty has been more frequent in relative terms in men than in women although they have presented greater relative frequency of prefrailty. No objective statistical association between the presence of frailty and sex was found.[14] Our findings are in agreement with those studies that indicate that frailty is more common in women and that they persist in this condition longer than men. This may be due to the attendance of frail women at a different health-care center from the rest of population, delegating some activities to other family members.

As already shown in the literature, the presence of frailty increases with age.[15] The ideal time for screening frailty can be set between 75 and 81 although the sample size limits the interpretation of results, and other studies have shown that there may be younger frail individuals.[16]

The transition from a normal situation to prefrailty status entails deterioration in instrumental activities of daily living. This relationship has been described in other articles, but the temporal association between the onset of prefrailty and the start of the loss of functional capacities has not been recounted in the consulted literature. For example, Woo *et al.* indicate that frailty can be used as a method that allows targeted interventions to retard disability.[17] Mijnarends *et al.* reflected on the relationship between frailty and sarcopenia, recognizing the similarities between the

Frail scale and Fried's frailty phenotype, and encouraged the study of the relationship of these entities with a disability.[18]

Frailty syndrome is related to dependence, age, and digestive illnesses. Malnutrition may be behind this latest relationship, influencing pathophysiological changes associated with frailty. Cardiovascular diseases showed no significant relationship with frailty, but this result may change with further research, in accordance with previous literature and remove the limitations of this investigation.

Detection of frailty syndrome, especially its intermediate stage or prefrailty status, identifies individuals with greater risk of disease and negative prognosis. This condition can assist in making clinical decisions based on the timing of benefits of the different diagnostic and therapeutic procedures. Establishment of the relationship between frailty and functional dependency as well as the identification of those individuals more likely to require the use of social resources later[19] are vital so that social and health policies[9] can be determined.

It is necessary to establish the temporal relationship of the events associated with the onset of frailty, such as the time of evolution from the prefrail status to frailty, or the prognosis of frail and prefrail patients. Studying the relationship between frailty and different pathology groups can strengthen the understanding of the pathophysiology of the syndrome in order to find the possible ways of prevention and treatment. It is possible that intervention in the gastrointestinal or cardiovascular field can delay the development of the syndrome, relying in each case on their pathophysiology.

This study has some limitations. It obtained the association between variables but not a cause-effect relationship. However, the results may be used to develop scenarios and proposals for improvement. Patients included in the study did not cover the entire population spectrum because of the sampling. Using charts and data collection in a medical environment can produce biases that have to be borne in mind when the results are interpreted.

CONCLUSION

Detecting frailty in the early stage called prefrailty may be useful to identify patients at risk of losing their functional capacities. This relationship is important not only to maintain the best health level in the population, but also for the organizational implications that can be developed from it. The identification of prefrail individuals may be useful in the implementation of health and social programs that prevent the development of frailty and disability, and its economic and social costs. Further research might be

done to describe the effects of different interventions on prefrail patients.

Acknowledgments

Conflicts of interest
There are no conflicts of interest.

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