

# Frailty and malnutrition among Egyptian elderly: prevalence and risk factors in nursing home and community dwelling elderly

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## Abstract

**Background:** frailty and malnutrition are common problems among elders. Studying these two concepts is very important as both of them are amenable for preventive interventions and are reversible.

**Aim:** To measure the prevalence of frailty and malnutrition among two groups of Egyptian elderly; nursing homes and community dwellers and to identify risk factors of these two problems.

**Methods:** the study included 350 elderly males and females aged 60 and over, 175 participants from nursing homes and 175 community dwellers. An interview questionnaire collected data about: sociodemographic data, health status, functionality of family (family APGAR score), screening for depression (5 item Geriatric Depression Scale) and cognitive status (Mini-Mental state). Frailty was measured using SHARE frailty index whereas nutritional status was measured using the Mini Nutritional Assessment questionnaire (MNA).

**Results:** Prevalence of frailty was 77.1% among elderly in nursing homes compared to 66.3% among community dwellers with no significant difference between them. As regard Nutritional status, nursing home had significantly higher percentage of malnourished participants compared to community dwelling participants (43.4% Vs 30.9%). Using the 5 items GDS, 57.7% of elderly were at risk of depression while 42% had impaired cognitive function using the MMSE. Frailty and malnutrition were highly prevalent in older age, in females, in widowed elderly, in those living alone, in participants with dysfunctional family, with comorbidities, with more than three comorbidities, with ischemic heart disease, receiving more than 3 drugs, with depressive symptoms and in those with lower cognitive performances

**Conclusions:** Frailty and malnutrition are highly prevalent problems among elderly in both nursing homes and

## Background:

Frailty is an increased vulnerability to advanced and persistent loss of function that, at least initially, only becomes evident under stress. Frailty has been described as loss of ability to adapt to stress because of

diminished functional reserves<sup>[1]</sup>.

Malnutrition is defined as a chronic state in which a combination of varying degrees of over – and under nutrition and inflammatory activity change body

composition [2,3]. Underweight as well as obesity are both associated with higher risk of frailty [4,5].

Studying these two concepts is very important as both of them considered as an early stage of disability which means they are still amenable for preventive interventions and are reversible [6].

The prevalence of malnutrition in a recent review was 27 % among elders [7] and the prevalence of frailty was 17% and prefrailty was 42.3% in community dwelling elders in a multinational study that included 10 European Countries [8].

Another study has revealed that about one half of the nursing home patients were frail [9]. However; in a study done in Egypt the prevalence of malnutrition was 10.8 % among elders [10], and the prevalence of frailty in institutionalized elders was 58.7% [11] and 23.9% among community-dwelling elders [12]. Nearly 38% out of 350 randomly chosen rural community elderly population in Upper Egypt (Minia), had malnutrition or at risk of malnutrition using MNA score. Chronic diseases and presence of acute illness were significantly associated with malnutrition occurrence among older populations [13]. These correlates have been associated with frailty [14].

According to the current level of evidence, frailty and malnutrition has been little investigated in Egypt leaving a gap of knowledge in this area and by overcoming this gap, screening for frailty and malnutrition should be done to target older persons at an early stage of, before changes in the body composition and their consequences become clinically evident and irreversible.

Our aim was to measure the prevalence of frailty and malnutrition among elders in both nursing homes and community-dwellings and to identify risk factors of these two problems.

## Methods

This cross sectional study included 350 elderly participants aged 60 and older, 175 community dwellers and 175 from nursing homes. Data was collected along a period of 3 months from January till March 2017. All data and measurements were done through a single interview with participants.

## Measures

### *All participants were subjected to:*

3.2.1 A written informed consent to participate in the study.

3.2.2 An interview questionnaire used to collect data about:

a- Socio-demographic data included gender, age, marital status, educational level, economic status, employment status, living environment and living condition (living alone: yes/no).

b- Health status was reported through the number of chronic diseases present, and the daily drug intake.

3.2.3 Family Support was measured using the Family APGAR questionnaire which consists of five questions regarding the components of family function [15].

3.2.4 Screening for depression using the 5-item Geriatric depression scale [16].

3.2.5 Assessment of Cognitive status using the Mini Mental State Examination after adjustment of age and education [17].

3.2.6 Assessment of nutritional status using the Mini Nutritional Assessment questionnaire (MNA) in its Arabic version Which includes 18 questions with score between 24 to 30 points considered normal nutritional status, between 17 to 23.5 points considered at risk of malnutrition and score less than 17 considered malnourished [18].

2.2.7 Assessment of Frailty using the frailty instrument for primary care of the survey of health, Aging and Retirement in Europe (SHARE FI) which approximate Fried's frailty definition which include 5 criteria; exhaustion, weight loss, weakness, slowness and low physical activity.

Frailty is defined in terms of three categories each of which is defined by the sum of the number of individual criteria present (0: *non-frail*, 1 or 2: *pre-frail*, and 3, 4 or 5: *frail*) [19].

## Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences, version 20 (SPSS Inc, Chicago, IL, USA). Continuous variables are expressed as mean and Standard Deviation. Categorical variables are expressed as frequencies and percents. Student t test was used to assess the statistical significance of the difference between two study group means. ANOVA Test was used to assess the statistical significance of the difference between more than two study group mean, with bonferroni Post Hoc Test for comparisons of all possible pairs of group means. Chi square and Fisher's exact test were used to examine the relationship between Categorical variables. Logistic regression was used to test and estimate the dependence of qualitative variable (frailty) based on its relationship with a set of independent variables. A significance level of  $P < 0.05$  was used in all tests.

## Ethical considerations

Approval of the research ethical committee at faculty of medicine Ain Shams University was obtained as well as an informed consent from participants. Confidentiality of participants was maintained.

## Results

The study sample included 350 elderly participants, males and females were equally distributed by chance among the two study groups, nursing homes and community dwellers with a mean age of 66.3 years (SD=6.5). Based on SHARE FI, Frailty was present in 251 (71.7%) of the 350 participants, whereas 79 (22.6%) were considered as prefrail and 20 (5.7%) as robust. Frailty was more frequent among nursing home group compared to community dwellers (77.1% Vs 66.3%). Weakness and exhaustion were the most

frequent reported symptoms (86.6%) and (68.3%) respectively (figure 1).

Figure 1: Categorization of participants according to SHARE FI

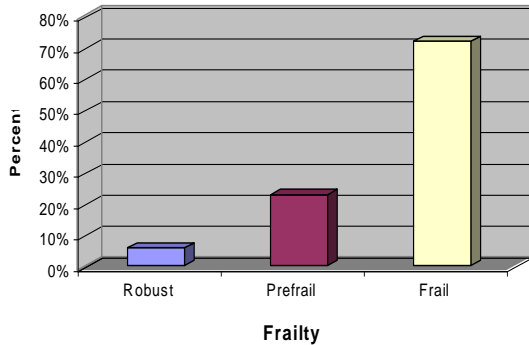
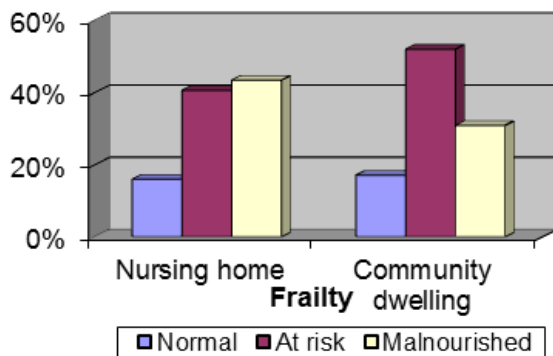


Figure 2: Categorization of participants according to MNA



The final conclusion of the 18 MNA items revealed the presence of malnutrition among 130 (37.1%) of the 350 participants, while 162 (46.3%) were classified as at risk of malnutrition, and only 58 participants (5.7%) were normal. nursing home had significantly higher percentage of malnourished participants compared to community dwellers (43.4% Vs 30.9%) (figure 2).

Frailty and malnutrition shared common determinants as regard the sociodemographic and health related characteristics as both of them were highly prevalent in older age, in females, in widowed elderly, in those living alone, in participants with dysfunctional family, with comorbidities, with more than three comorbidities, with ischemic heart disease, receiving more than 3 drugs, with depressive symptoms and in those with lower cognitive performances as shown in (Table 1).

**Discussion:**

This study aimed to compare the prevalence of frailty and malnutrition among two groups; nursing homes and community dwellers. This study also aim to identify the risk factors of them among this elderly population. When studying the prevalence of frailty we found that according to the SHARE frailty index, about 71.7% of the 350 elderly participants were considered as frail, whereas 22.6% were considered as Prefrail and only 5.7% as robust ( non frail). This high prevalence of frailty in our study may not be surprising but rather expected for many reasons; first, the fact that our study was carried out in two settings, nursing homes and community dwellings may partly explain this high prevalence. In deed this elderly population in our study may be more vulnerable because of limited access to health care services and lower socioeconomic status which has been associated with frailty. Finally, most of the geriatric syndromes and factors attributing to the development of frailty are very common in this population. Regarding rural Lebanese elderly population living in community, according to the SOF index, about two thirds of these elderly community dwellers were considered as either frail (36.4%) or Prefrail (30.4%) which is lower than the current study<sup>[20]</sup>. This difference may be attributed to examining only community dwellers and not including elderly in nursing homes as the current study. When we compared the prevalence of frailty among the two study groups, no significant difference was found between nursing home and community dwelling participants although frailty was more frequent among nursing home participants compared to community dwellers (77.1% Vs 66.2%) and this percentage is in agreement with a study made on 312 institutionalized elders at Alexandria which revealed that 58.7% were considered as frail <sup>[11]</sup>. Another study done on 88 Egyptian rural elderly revealed that 23.9% were frail <sup>[12]</sup>. This high percentage in nursing homes related to that most of nursing home admissions are due to cognitive and functional impairments and multiple comorbidities among elderly which play an important role in developing frailty.

As regard the two study groups, nursing homes had significantly higher percentage of malnourished participants compared to community dwelling participants (43.4% Vs 30.9%). This high percentage of malnutrition in nursing homes due to unsuitable care from a nursing home's staff. As among the nursing homes we visited the task of choosing the proper meal options and providing them to the elderly is left to a single staff member only and this goes in agreement with the study that reported approximately 20% of nursing home residents had some form of malnutrition<sup>[21]</sup>.

The present study revealed that frailty and malnutrition shared common determinants as regard the sociodemographic and health related characteristics. Both of them were highly prevalent in older age, in

Table 1: Health-related characteristics:

Variable		Robust		Prefrail		Frail		P	Sig
		20	5.7%	79	22.6%	251	71.7%		
Three Frailty Groups									
Co morbidity (n %)	No	8	42.1%	10	52.6%	1	5.3%	0.001*	HS
	Yes	12	3.6%	69	20.8%	250	75.5%		
Number of co morbidities (n %)	less than or equal 3	20	6.0%	79	23.7%	235	70.4%	0.037**	S
	More than 3	0	.0%	0	.0%	16	100.0%		
HTN (n %)	No	9	8.7%	32	31.1%	62	60.2%	0.007*	HS
	Yes	11	4.5%	47	19.0%	189	76.5%		
DM (n %)	No	16	9.0%	45	25.4%	116	65.5%	0.006*	HS
	Yes	4	2.3%	34	19.7%	135	78.0%		
IHD (n %)	No	20	8.1%	70	28.3%	157	63.6%	0.001*	HS
	Yes	0	.0%	9	8.7%	94	91.3%		
Renal (n %)	No	20	5.9%	79	23.2%	242	71.0%	0.226**	NS
	Yes	0	.0%	0	.0%	9	100.0%		
Respiratory (n %)	No	20	5.9%	77	22.6%	243	71.5%	1**	NS
	Yes	0	.0%	2	20.0%	8	80.0%		
Hepatic (n %)	No	19	5.8%	74	22.6%	235	71.6%	1**	NS
	Yes	1	4.5%	5	22.7%	16	72.7%		
Others (n %)	No	17	8.3%	53	25.7%	136	66.0%	0.006*	HS
	Yes	3	2.1%	26	18.1%	115	79.9%		
Drug (n %)	less than or equal 3	14	16.3%	34	39.5%	38	44.2%	0.001*	HS
	More than 3	6	2.3%	45	17.0%	213	80.7%		
Risk of depression(%)	Normal	16	10.8%	44	29.7%	88	59.5%	0.001*	HS
	At risk of depression	4	2.0%	35	17.3%	163	80.7%		
Cognitive Impairment (n %)	Normal	18	8.9%	61	30.0%	124	61.1%	0.001*	HS
	Impaired	2	1.4%	18	12.2%	127	86.4%		
Nutritional status									
Variable		Normal		At risk		Malnourished		P	Sig
		58	16.6%	162	46.3%	130	37.1%		
Co morbidity (n %)	No	12	63.2%	6	31.6%	1	5.3%	0.0001**	HS
	Yes	46	13.9%	156	47.1%	129	39.0%		
Number of co morbidities (n %)	less than or equal 3	58	17.4%	157	47.0%	119	35.6%	0.017**	S
	More than 3	0	.0%	5	31.3%	11	68.8%		
HTN (n %)	No	22	21.4%	46	44.7%	35	34.0%	0.287*	NS
	Yes	36	14.6%	116	47.0%	95	38.5%		
DM (n %)	No	32	18.1%	85	48.0%	60	33.9%	0.419*	NS
	Yes	26	15.0%	77	44.5%	70	40.5%		
IHD (n %)	No	52	21.1%	118	47.8%	77	31.2%	0.0001*	HS
	Yes	6	5.8%	44	42.7%	53	51.5%		
Renal (n %)	No	58	17.0%	158	46.3%	125	36.7%	0.329**	NS
	Yes	0	.0%	4	44.4%	5	55.6%		
Respiratory (n %)	No	57	16.8%	160	47.1%	123	36.2%	0.307**	NS
	Yes	1	10.0%	2	20.0%	7	70.0%		
Hepatic (n %)	No	53	16.2%	153	46.6%	122	37.2%	0.709**	NS
	Yes	5	22.7%	9	40.9%	8	36.4%		
Others (n %)	No	44	21.4%	94	45.6%	68	33.0%	0.01*	HS
	Yes	14	9.7%	68	47.2%	62	43.1%		
Drug (n %)	less than or equal 3	25	29.1%	39	45.3%	22	25.6%	0.001*	HS
	More than 3	33	12.5%	123	46.6%	108	40.9%		
Risk of depression (%)	Normal	44	29.7%	72	48.6%	32	21.6%	0.0001*	HS
	At risk of depression	14	6.9%	90	44.6%	98	48.5%		
Cognitive Impairment (n %)	Normal	51	25.1%	104	51.2%	48	23.6%	0.0001*	HS
	Impaired	7	4.8%	58	39.5%	82	55.8%		

females, in widowed elderly, in those living alone, in participants with dysfunctional family, with comorbidities, with more than three comorbidities, with ischemic heart disease, receiving more than 3 drugs, with depressive symptoms and in those with lower cognitive performances. Similar findings were reported in previous studies; as in a study including 1030 elderly patients who attended internal medicine and geriatric outpatient clinics at Turkey, age, depression, body mass index and the educational level were independently associated with malnutrition in elderly population<sup>[22]</sup>. Another study revealed that polypharmacy lead to malnutrition by impairing food absorption or enhancing excretion or by causing nausea, vomiting, diarrhea, constipation or early satiety<sup>[23]</sup>. As regard frailty, this goes in agreement with the study that revealed, an increasing age, female gender, widowed elderly, low educational level and poor socioeconomic class were strongly related to frailty<sup>[20]</sup>.

The difference between our study and other studies may be due to different tools in assessment of frailty and different cultures.

This study has several strengths including; the large representative sample with a high response rate if we compare it with other studies in Egypt. Moreover, data collection for frailty and malnutrition were based on widely used and well validated instruments.

There are some limitations. It may be argued that high prevalence of frailty is due to difference between mean ages of the participants included in this study between 60 to 90 years old and in our study we don't compare the prevalence of frailty in each age group and this is a clear limitation of the study. Part of our questionnaire is based on self reported information which may be affected by memory and information bias due to educational disparities. Finally, Cognitive impairment may affect the accuracy of the SHARE frailty index and under estimate frailty.

In conclusion, our study revealed the high prevalence of Frailty and malnutrition among the elderly population in both nursing home and community dwellers although they are more prevalent among nursing home elders, which may be important for future screening of these problems among elderly.

#### Conflict of interest

All authors declare no conflict of interest.

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