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Prevalence of frailty among elderly patients attending primary health care centers in sixth of October city

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Abstract

Objectives: To determine the prevalence of frailty, reported in attendant elderly patients in primary health care centers in Sixth of October City in Greater Cairo.

Design: A Cross sectional study.

Setting and Participants: The study included 230 elder adults (both men and women), from 5 primary health care centers (PHCs) in 6th October city; 46 elders from each PHC.

Methods: All participants were questioned about their socio-demographic data by structured interview questionnaire and had physical examination. They were assessed using Comprehensive geriatric assessment; Daily and instrumental activities of daily living, Timed Up and Go test, Single leg stance test, hand-grip strength measurement, Mini-Mental Status Examination and mini-nutritional test

Results: Frailty was defined in the study according to modified *Linda P Fried* using 5 Frieds' criteria (unintentional weight loss more than 4.5kg within in prior year , self -reported exhaustion, decreased grip strength, slow walking speed, low physical activity) The study participants were classified into non-frail, pre-frail and frail as 20.8%, 45.7% and 33.5% respectively. The mean age of frail participants was significantly higher than pre-frail and non-frail. Frailty was significantly more frequent among females (74.03%). There was statistical positive correlation between frailty status and single leg balancing test, time up and go test and hand grip strength test.

Conclusion: The prevalence of frailty among our studied population was considerably high. Risk factors of frailty included female gender, weight loss, limited physical activity as per IADL assessment, and poor performance of Time Up and Go test and Single Leg Balance test. Additional predisposing factors to frailty are older age, illiteracy, low income, obesity, and depression.

Keywords: community-dwelling, Egypt, elderly, frailty, prevalence.

Background

Population ageing is accelerating rapidly worldwide, from 461 million people older than 65 years in 2004 to an estimated 2 billion people by 2050. Frail older adults are a major, identifiable subset as they are vulnerable with appropriate subsequent evaluation and intervention constitutes a cornerstone of geriatric medicine and quality care for the ever-growing elderly population. Frailty is a disorder of several inter-related physiological systems. A gradual decrease in physiological reserve occurs with ageing, in frailty, this decrease is accelerated and homoeostatic mechanisms start to fail [1].

Frailty has been defined by Fried et al. (2001). A condition meeting 3 of the 5 phenotypic criteria indicating compromised energetics namely, unintentional weight loss, exhaustion, low grip strength, slowed waking speed and low physical activity. A pre-frail stage, in which 1 or 2 criteria are present, identifies a subset at high risk of progressing to frailty.[2]

In Egypt, according to a study done on 83 Egyptian rural elderly in Dakahlia, it was found that nearly 24% of them were frail based on Study of Osteoporotic Fracture (SOF) frailty index [3].

Frailty was 58.7% in study done for 312 elderlies in geriatric homes in Alexandria, Egypt according to Fried criteria [4].

In Africa the prevalence of frailty above 60 years old range from (5.4% to 13.2%)[5].

In the United States the prevalence of frailty among adults aged 65 years and older (excluding nursing home residents) was estimated at 15.3%, with 45.5% pre-frail according to a nationally representative profile done by Bandeen-Roche et al. (2015)[6].

Risk factors for frailty include; Female gender as women have been more likely than men to be characterized as frail in several studies [3, 4], lower socio-economic status (SES) as measured by low education and/or low annual income, has been associated with frailty in several cross-sectional studies [6, 7], poverty, living alone, area deprivation also considered as risk factor for frailty[8]. Physiologic Factors also considered as risk factor as the more physiological systems that are in a diminished state, the greater the likelihood of frailty[8, 9] .Depressive symptoms have been shown to be associated with the syndrome in cross-sectional analyses[10].

Frailty has been associated with many diseases; cardiovascular disease, in particular[11]. Stroke, Diabetes, Hypertension, Arthritis, Cancer, and Chronic Obstructive Pulmonary Disease were predictive of incident frailty [12].

Prevention of frailty encompasses three overlapping approaches across the lifespan: Primary prevention; increasing intrinsic capacity reserves in early aging. Secondary prevention; preserving function in late aging and tertiary prevention; restoring function in frail older adults. Care needs span across physical, environmental, and psychosocial domains, with the more frail patients having more unmet needs.[13, 14]

In Egypt, studies on frailty prevalence and its assessment are scarce, our study, aimed to estimate the prevalence of frailty reported in attendant elderly patients in primary health care centers in Sixth of October City in Greater Cairo Governorate.

Methods

Design:

Cross-sectional study

Study setting:

Five primary health care centers in 6th October city; (Al Hosary, Al Shabab, Al Mostakbal, Al Reaya and Haram city primary health care).

Study duration:

Data was collected along a period of 6 months from October 2018 till March 2019. Two days were selected every week to fulfill the needed sample.

Study population:

230 older adults (both men and women) recruited 46 elders from 5 primary health care

Sample size:

Using PASS program, setting alpha error at 5% and confidence interval width 0.08. Based on result from previous study Collard et al. (2012)[15], the prevalence of physical frailty was 9.9%, taking in consideration 10% dropout note, the required sample was **230** elders.

Inclusion criteria:

Elders aged 60 years & over both males and females.

Exclusion criteria:

1. Elders who suffered from any disability as handicapping or paralysis.
2. Elders who suffered from cognitive impairment diagnosed by mini mental state.
3. Elders who suffered from depression diagnosed by geriatric depression scale test 15-questions.

Study tools:

All participants were subjected to:

1. Socio-demographic data collection including age, gender, marital status, education, occupation, living condition, monthly income and history of special habits.
2. History of falls including any fall in the past, location of falling, injuries resulted from fall and fear of falling.
3. Comprehensive geriatric assessment [16]by the following assessments:

- **Assessment of depression[17]** using An Arabic version of (GDS)[18] 15 items. It is effective for screening of depression in elders; in which participants were asked to respond by answering yes or no in reference to how they felt over the past week.
- **Cognitive function was assessed**[19] using The Arabic version of Mini Mental Status Examination (MMSE) [20] . The MMSE takes 5-10 minutes. It's an 11 questions tool to measure five areas of cognitive function: orientation to time, orientation to place, three words registration, attention and calculation, three words recall, language and visual construction (pentagon copying). The score for MMS ranges from 0- 30 according to age & level of education with lower score reflecting worse cognitive function according to age & educational level.
- **Assessment of physical activity** by instrumental activity of daily living (IADL)[21, 22] and activity of daily living (ADL)[23, 24]. Participants' functional level was then categorized as independent, assisted or dependent accordingly.
- **Assessment of walking speed** by time up and go test (TUG) [25]evaluate the gait and risk of fall. It measured the time of every participant taking to rise from a chair, walk 3 meters distance, turn, walking back to the chair and

sit-down. The time in seconds started with the word (START) and ended when the participant sits-down. A score of more than 14 seconds indicates high risk of falls.

- **Assessment of strength** by hand grip test[26]Using Camry digital hand dynamometer. The participant can squeezes with maximum isometric effort for at least 5 second, the screen will display the maximum grip value and a grip value status bar showing the status of weak, strong or normal according to age & gender.
- **Assessment of exhaustion** by multidimensional assessment of fatigue (MAF) [27]. It is 16 items scale that measures fatigue according to degree & severity over the past week & its impact on various activity of daily living (household chores, cooking, bathing, dressing, working, socializing, sexual activity, leisure, shopping, walking & exercising) and the last two questions are about the timing & distress that cause the fatigue.
- **Assessment of balance** by Single Leg Balance test ***[28].*** The participant stands erect on firm surface and look forward with arms folded, using chair for initial support. The timer starts once the foot is lifted off the floor and stops when the participant raises foot or touches the floor or with arm movements. Score of more than 10 seconds or equal is normal.
- **Assessment of nutrition** by mini-nutritional test (short form) (MNA)[29]. Using an Arabic version [30]which is composed of six questions about (loss of food in-take, weight loss, mobility assessment, neuropsychological problems, acute disease & body mass index). Score Less than 8 indicates malnutrition.

Ethical consideration:

- Approval from faculty of medicine Ain Shams University ethical committee was obtained.
- Administrative approvals from the directors of each primary health care centers were obtained.
- Verbal informed consent was taken from every participant after explaining the purpose of the study.

Data Management and Analysis:

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science **(SPSS 25).** Data was presented and suitable analysis was done according to the type of data obtained for each parameter.

i. Descriptive statistics:

1. Mean and Standard deviation (± SD) for parametric numerical data, while Median and Interquartile range (IQR) for non-parametric numerical data.
2. Frequency and percentage of non-numerical data.

ii. Analytical statistics:

1. ***Student T*** test was used to assess the statistical significance of the difference between two study group means.
2. ***ANOVA test*** was used to assess the statistical significance of the difference between more than two study group means.
3. ***Post Hoc test*** is used for comparisons of all possible pairs of group means.
4. ***The Kruskal-Wallis*** test is was used to assess the statistical significance of the difference between more than two study group ordinal variables.
5. ***Chi-Square test*** was used to examine the relationship between two qualitative variables
6. ***Fisher's exact test*** was used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells.
7. ***Logistic regression:*** used to adjust the prediction of the presence or absence of an outcome based on a set of independent variables. It is similar to a linear regression model but is suited when the dependent variable is qualitative (categorical)

P- value: level of significance

- P< 0.05: Significant (S).
- P<0.01: Highly significant (HS).

Results:

The study sample consisted of 230 elderly participants. Approximately half of the participants were females (55.7%). About 35% experienced more than 9 years of education, while 27.4% were illiterate. 57% of the study participants were married and 95.2% lived in the apartment. About 60% of the participants had a monthly income less than 1000 L.E, 73.5% were non-smokers and only 18.3% were currently working.

Frailty according to modified Fried using 5 Fried's criteria; reported as non-frail, pre-frail and frail in percent; (20.8%, 45.7% and 33.5%) respectively. Exhaustion, balance impairment and low physical activity by IADL were the most frequent symptoms of frailty among all participants (72.6%, 63.5% and 66.57%) respectively.

The mean age of frail participants was significantly higher than pre-frail and non-frail. Frailty was significantly more frequent among females (74.03%) than males. It was significantly higher among widows (70.13%), among those who are living with others (66.23%) and those who are living in apartment (100%). Frailty was more prevalent among illiterate (57.14%), unemployed (70.13%) and who had income of 1000 L.E or less (79.22%). Smoking frequency was 28.57% among pre-frail and 10.39% among frail participants. **(Table 1)** and(**Table 2)**

There was statistical correlation between frailty status and single leg balancing test, time up and go test, hand grip strength and function level using IADL an ADL tools with (P <0.001) for all tests.

Table (1): Association between socio-demographic data and the three frailty groups

		Frailty			Monte Carlo Fisher's Exact test of sig. P-Value
		Non Frail N=48 Mean ± SD N (%) Median (IQR)	Pre Frail N=105 Mean ± SD N (%) Median (IQR)	Frail N=77 Mean ± SD N (%) Median (IQR)	
Marital status	Single (Single, widow and divorced)	10 (20.83%)	34 (32.38%)	55 (71.43%)	<0.001
	Married	38 (79.17%)	71 (67.62%)	22 (28.57%)	
Location	Al hosary	8 (16.67%)	26 (24.76%)	12 (15.58%)	0.551(C)
	Al reaya	14 (29.17%)	19 (18.1%)	13 (16.88%)	
	Al shabab	8 (16.67%)	19 (18.1%)	19 (24.68%)	
	Al mostakbal	10 (20.83%)	21 (20%)	15 (19.48%)	
	Haram city	8 (16.67%)	20 (19.05%)	18 (23.38%)	
Home	Alone	4 (8.33%)	8 (7.62%)	4 (5.19%)	<0.001(C)
	With spouse	38 (79.17%)	70 (66.67%)	22 (28.57%)	
	With other	6 (12.5%)	27 (25.71%)	51 (66.23%)	
Educational level	Illiterate	3 (6.25%)	16 (15.24%)	44 (57.14%)	<0.001
	Read and write	8 (16.67%)	19 (18.1%)	19 (24.68%)	
	5-8 years of education	13 (27.08%)	25 (23.81%)	4 (5.19%)	
	≥9 years of education	24 (50%)	45 (42.86%)	10 (12.99%)	
Smoking N=61		23 (47.92%)	30 (28.57%)	8 (10.39%)	<0.001
Smoking type	Cigarettes	16 (69.57%)	25 (83.33%)	7 (87.5%)	0.359(F)
	Shisha	4 (17.39%)	1 (3.33%)	1 (12.5%)	
	Both	3 (13.04%)	4 (13.33%)	0 (0%)	
	Other	0 (0%)	0 (0%)	0 (0%)	
Former smoker		7 (28%)	14 (18.67%)	11 (15.94%)	0.418
Duration of smoking cassation		9 (3-26)	9.5 (6-13)	20 (11-30)	0.067(K)

Table (2): Prevalence of frailty elements among the participants.

Six modified fried elements		N		%	
Unintentional weight loss > 3kg	**Positive**	2		0.9%	
Exhaustion	**Positive**	167		72.6%	
Weakness	**Positive**	52		22,6%	
Slow gait	**Positive**	72		31.3%	
Balance impairment	**Positive**	146		63.5%	
		IADL	**ADL**	**IADL**	**ADL**
Low physical activity by IADL and ADL	**Positive**	153	43	66.57%	18.77%

Table (3): Comparison between the three frailty groups as regard comprehensive geriatric assessment tools.

Geriatric assessment tools		Frailty			P-Value
		Non Frail N=48	Pre Frail N=105	Frail N=77	
Single Leg Balance test value		12 (10.5 - 13)	9 (6 - 12)	1 (0 - 2)	<0.001 (K1)
Single Leg Balance test evaluation	Normal ≥10 sec.	38 (79.17%)	45 (42.86%)	1 (1.3%)	<0.001(C)
	Balance impairment <10sec.	9 (18.75%)	37 (35.24%)	8 (10.39%)	
	Impairment & high risk of fall ≤5 sec.	1 (2.08%)	23 (21.9%)	68 (88.31%)	
TUG test value		8.21 ± 0.92	9.31 ± 1.53	13.96 ± 3.97	<0.001(A)
TUG test evaluation	Normal <14sec.	48 (100%)	99 (94.29%)	11 (14.29%)	<0.001
	Risk of fall ≥14 sec.	0 (0%)	6 (5.71%)	66 (85.71%)	
Hand Grip Strength test evaluation	Normal	45 (93.75%)	103 (98.1%)	26 (33.77%)	<0.001
	Strong	3 (6.25%)	1 (0.95%)	0 (0%)	
	Weak	0 (0%)	1 (0.95%)	51 (66.23%)	
IADL Value		5.9 ± 1.31	5.63 ± 1.33	3.42 ± 1.5	<0.001(A1)
IADL Evaluation	Independent	43 (89.58%)	34 (32.38%)	0 (0%)	<0.001(F)
	Assisted	5 (10.42%)	71 (67.62%)	76 (98.7%)	
	Dependent	0 (0%)	0 (0%)	1 (1.3%)	
ADL Value		6 ± 0	5.9 ± 0.31	5.19 ± 1.1	<0.001(A1)
ADL Evaluation	Independent	48 (100%)	94 (89.52%)	45 (58.44%)	<0.001(C)
	Assisted	0 (0%)	11 (10.48%)	32 (41.56%)	
	Dependent	0 (0%)	0 (0%)	0 (0%)	

(A) One Way ANOVA test of significance, post hoc Bonferroni test was significant at: (A1) Frail group Vs. (Non frail and Pre frail groups.) (F) Monte Carlo Fisher's Exact test of significance. (C) Chi-Square test of significance. (K) Kruskal-Wallis test of significance, post hoc was significant at: (K1) Between all groups.

98.7% of frail participants stand on one leg less than 10 seconds, 85.71% of them had the worst results of time up and go test and 66.23% were weak using hand grip strength test.

98.7% of frail participants were assisted using an IADL tool, while 41.56% of them were assisted using ADL tool. (Table 3)

Binary logistic regression analysis for risk factors of frailty shows that the strongest predictors were increasing age, female gender, malnutrition, low physical activity assessed by IADL and ADL, balance impairment and slow gait. (Table 4)

Table (4): Regression analysis of frailty predictors.

	p value	Odds Ratio (95% CI)
Increase Age	0.199	1.09 (0.96 - 1.23)
Gender (REF. male)	0.032	7.4 (1.19 - 45.91)
Nutrition assessment	0.020	0.24 (0.07 - 0.8)
GDS	0.677	1.08 (0.74 - 1.58)
IADL	0.001	0.32 (0.16 - 0.64)
ADL	0.342	2.02 (0.47 - 8.57)
Single Leg Balance test	0.008	0.76 (0.62 - 0.93)
Time Up and Go test	0.003	1.63 (1.18 - 2.25)

DISCUSSION

Frailty is one of the most challenging health problems that affect the elderly. It affects the quality of life, and physical wellbeing. Moreover, it threatens one's independence. Unfortunately, the prevalence of frailty among the elderly in Egypt is barely known.

In our study, the prevalence of frailty was 33.5%, with approximately half of the participants falling in the pre-frailty group. Many studies were published supporting this finding with a similar incidence among larger sample sizes and huge variability among the studied populations. This agrees with ***Thompson et al.*** found that the incidence of frailty is 34% among community dwellers older adults [31].

Whilst many other studies reported a much lower incidence rate reaching less than 10%. For instance, ***Wang et al., Swiecicka et al., Lorenzo-lopez et al., and Doi et al.,*** claimed an incidence rate of 4.2%, 5.2%, and 6%, and 8%, respectively[32-35] .In contrast, a higher prevalence was reported by ***Tayel and Elkady*** where they found that 58.7% of the elderly residents in geriatric homes in Alexandria, Egypt were frail[36] and ***Sabbour et al*** study depicted a much higher prevalence. During their investigations about the prevalence of frailty and malnutrition among two groups; nursing homes and community dwellers. They found that prevalence of frailty according to the SHARE frailty index was about 71.7% of the elderly participants, whereas 22.6% were considered as prefrail[37]. This huge discrepancy in incidence rates / prevalence rates among different studies is attributed to many factors including study settings "eg:our participants were collected from PHC units and other studies collected participants from geriatric homes", study population, sample size, and assessment tools. There is an association between all these factors and the different risk of frailty and pre-frailty among the elderly[38].

In the current study, exhaustion, low physical activity, and balance impairment were the most frequent symptoms of frailty criteria (72.6%, 66.5%, and 63.5%, respectively). This relatively disagrees with ***Sabbour et al.*** who found that weakness un measurable and exhaustion were the most frequent reported symptoms [39]. Findings from ***Tayel and Elkady*** study also contradicted ours. They claimed that the most prevalent lty criteria were slow walking speed, low physical vity, and muscle weakness (90.2%, 81.9%, and 3%, respectively) [36].

s is in line with other studies, which showed that lty was most commonly associated with lower scle strength, poor physical performances, and sequent feeling of exhaustion and therefore reduced sical activity[40] .

e present study group age (ranges; 60 - 90 years) h mean age of (66.84 ± 5.86), this age near to that of ***stell et al.*** who had sample of up 1,327 individuals n the Madrid neighborhoods of Peñagrande and Cuatro Caminos. The mean age was 75.4 ± 7.4 (range: 65–104).[41] and with A cross sectional study was conducted on 312 elders of both sexes, aged between 60-80 years, of mean age 70.79±7.7 years elderly homes in Alexandria, Egypt [36] .On other hand in Northern Italy study population done by ***Perna et al.*** of 366 participants had a mean age of (81.46 ± 6.55) who had higher range of age than current study as they had high life span [42]

In spite the fact that few of our participants were dependent, almost all of frail participants needed assistance in daily life activities (98.7%), while more than half (67.6%) of those pre-frail need it too. These figures are higher in comparison to other studies. For instance, ***Yadav et al.,*** found that approximately half of their studied participants needed assistance in daily living activities[43].

Findings from ***Akın et al study*** augmented this finding as 47.1% of elderly and frail primary health care users were ADL dependent [44].Further analysis proved that there was a statistically significant relationship between frailty status and function level using IADL an ADL tools.

In our study, several factors were considered predictors or risk factors for frailty. This includes female gender, poor nutrition status, restricted daily life activities, poor performance during Time Up and Go test and Single Leg Balance test.

We found that nearly three fourths of our frail participants were females. This is on agreement with many studies[45, 46] .Female gender is associated with more health comorbidities, including osteoarthritis, anxiety, depression, imbalance disorders, and many other health conditions. This gender specific affection

is explained by multiple causes; on the top of them is overrepresentation and reporting since females tend to seek health care more often than males. Others would blame the low physiological reserve due to menstruation, and pregnancy, in addition to the chronic health conditions [47].

It was noticed that frailty was more prevalent among subjects with low income <500 L.E. It is already established that income status determines some health conditions, frailty is one of them. ***Yadav et al*** reported a 65% incidence of frailty among those with low income. Old people with low income can barely have access to good health care facilities. Poor medical care seeking leads to buildup of multiple health conditions contributing to the overall risk of frailty[43]

We found that 23% of our frail subjects had restricted movement and could not leave home. Assessment of the physical activity in using IADL showed that 33.5%, 66.1% and 0.4% of the participants were independent, assisted, and dependent respectively**.** People with poor performance on IADL assessment are 0.32 times riskier to have frailty.

This disagrees with ***Ebeid. et al*** study who found that 73.9%, 13.6 % and 1.1% were independent, assisted, and dependent respectively. Regarding ADL, none of our frail subjects proved to be dependent; yet, approximately half of them were assisted. Similarly, in ***Ebeid. et al*** study, none of their participants were dependent; but assisted individuals were fewer than ours 18.7% [48]. In contrast, in ***Setiati et al study,*** reported a higher percentage of dependent individuals reaching 26% [49]**.**

This variability in ADL scores is attributed to the variability of the mean age of the included patients. It was noticed that the older the individuals, the higher their susceptibility to dependency.

When gait speed was assessed, we found abnormal result in 88% of frail people, while slowness itself was proved in 22% of them. Individuals with slow gat are 1.6 times liable to frailty. This proves that frailty is associated with poor performance in Timed Up and Go test. This is low in comparison to ***Lourenço et al*** study who found that slow gait speed was evident among 95.5% of frail individuals [50] .Slowness is one of the indicators of frailty, which impedes the individual's physical activity, mobility, and quality of life. Moreover, it affects the psychological status of the elderly.

CONCLUSION

The prevalence of frailty among our studied population was considerably high. Risk factors of frailty included female gender, malnutrition, limited physical activity as per IADL assessment, and poor performance of Time Up and Go test and Single Leg Balance test. Additional predisposing factors to frailty are older age, illiteracy, low income, obesity, and depression.

LIMITATION

Part of questionnaire of the current study is based on self-reported information which may be affected by memory and information bias due to educational disparities. We collected our participants from PHC units and this make less Varity in our participants and results

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