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Research Article

The Prevalence of Frailty and its Associated Risk Factors Among the Saudi Elderly Population in Primary Health Care in Riyadh, Saudi Arabia

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Abstract

Background: Frailty is a geriatric clinical syndrome characterized by increased vulnerability to a wide range of negative outcomes such as falls, disability, institutionalization, and mortality. Frailty is becoming a major public health issue as the population of the elderly continues to grow for developing future planning, intervention, and treatment for the targeted groups. As a result, the purpose of this study was to determine the prevalence of frailty in older adults and to identify risk factors for frailty, in Riyadh, Saudi Arabia.

Methods: A cross-sectional observational study was carried out in 2021 convenient sample of 228 from the elderly patients aged 60-year-old or above who are attending Al-Wazart health center of Prince Sultan Military Medical City, Riyadh, Saudi Arabia. A data collection form that consists of two parts, the first part assessed the patient demographics, comorbidities, and medications, while the second part consisted of the FRAIL scale and the Mini-cog test.

Result: A total of 228 Saudi elderly patients participated in the current study, the male gender represented 51.8% of the studied sample, and 42.1% were in the age group of 60-65 years old. The largest percentage (43.4%) of the participants were in the BMI group of 25-29.9 kg/m^2, the vast majority (97.4%) of them were nonsmokers, and living with their families (99.1%). Almost one-third of the participants have a caregiver at 32.0%, and 46.1% were illiterate. It was found that the prevalence of frailty was 25.4% while 24.6% were prefrail. There was a statistically significant difference ($P < 0.05$) between the robust, frail, and prefrail subjects in terms of age, educational level, and presence of a caregiver.

Conclusion: The prevalence of frailty syndrome was 25.4%, while 24.6% were prefrail. Possible cognitive impairment was reported in 18.4%. Old age, dyslipidemia, heart failure, hypothyroidism, and polypharmacy, were the significant risk factors for frailty. As the older adults population size in Saudi Arabia is growing with greater longevity, the impact of frailty syndrome could not be ignored and neglected. Further study is needed to validate our findings in other large-scale population of older adults.

Keywords: Frailty; Elderly; Geriatric; Saudi Arabia

Introduction

Frailty is a geriatric clinical syndrome characterized by increased vulnerability to a wide range of negative outcomes such as falls, disability, institutionalization, and mortality as a result of decreased reserve and resistance to stressors caused by cumulative declines in multiple physiological systems [1]. Over the last few decades, research efforts have contributed to a better definition and description of frailty, but there is no gold standard for identi-

fying frailty [2,3]. Unintentional weight loss, weakness, slowness, low physical activity level, and weariness are all components of the frailty phenotype suggested by Fried., *et al*. [1], and individuals who have three or more components are considered frail, while those who have none to two components are considered non-frail. Frailty syndrome is becoming more widely recognized as a major concern for the elderly. It is a silent process in an adult's life that distinguishes normal aging from disability [4].

Frailty is becoming a major public health issue as the population of the elderly continues to grow [5]. According to the United Nation report in 2017 [6], In Saudi Arabia, the elderly population is expected to increase significantly by the year 2050 to reach 22.9%. Therefore, this would increase the prevalence of frailty as older adults are the most vulnerable group facing frailty.

Frailty was found in 4.0% to 59.1% of community-dwelling older adults [7]. Moreover, Frailty is quite common in elderly hospitalized patients, with prevalence rates ranging from 27 to 80% in [8-10]. Clinical frailty progression in older adults is complicated. It is not caused by a single factor but is commonly influenced by several factors that can be interrelated or independent of one another. Female gender, advanced age, living alone, low education level, low-income level, poor self-rated health, and having more chronic disease are among the associated factors commonly reported in the literature [11-14]. Frailty is usually the result of many problems that culminate in an overall functional decline [15].

The identification of factors contributing to frailty syndrome may have implications for health practitioners, educators, and policymakers as a guide in terms of assessments, investigating etiologies, and predicting factors for developing future planning, intervention, and treatment for the targeted groups. A comprehensive approach to frailty and limitation prevention is thus required, focusing on modifiable individual and environmental risk factors before the condition progresses to the severe stage and becomes a disability. As a result, the purpose of this study was to determine the prevalence of frailty in older adults and to identify risk factors for frailty, in Riyadh, Saudi Arabia.

Methods

This was a cross-sectional study that has been conducted from January- July 2021 among Saudi elderly attending Al-Wazart health center of Prince Sultan Military Medical City, Riyadh, Saudi Arabia. Al-Wazart health center is one of the biggest primary health care centers in Saudi Arabia with more than 50 clinics with different specialties, some of which are available 24/7. Every week, more than 8000 patients are checking in for a follow-up, screening, or management.

The current study population were recruited through convenience sampling from elderly patients aged 60-year-old or above who are attending Al-Wazarat Primary Healthcare Center at Prince Sultan Military Medical City, Riyadh, Saudi Arabia. Patients who are bed-ridden/wheelchair-bound have a language barrier, or inability to understand the study information and to give written informed consent due to (e.g. severe aphasia, severe cognitive impairment/dementia, or severe visual or auditory impairment) and who has an acute illness were all excluded.

The data was collected by a data collection form that consists of two parts, the first part assessed the patient demographics, comorbidities, and medications, while the second part consisted of the FRAIL scale [16] and the Mini-cog test [17]. The FRAIL scale (short 5-question assessment of fatigue, resistance, aerobic capacity, illnesses, and loss of weight) classified the patients into 3 categories: robust (score = 0), prefrail (score = 1-2), and frail (score = 3-5), it was translated to Arabic and adapted to Saudi elderly culture by Alqahtani BA., *et al.* [18]. The Mini-Cog test a composite of three-item recall and clock drawing was developed as a brief test for discriminating demented from non-demented persons. It is a valid assessment tool that is widely used in clinical practice and research and was translated into Arabic by Albanna M., *et al.* [19]. The data collection process was carried out as Face-To-Face interviews and the interviewer filled the data collection form.

Statistical analysis

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Categorical variables were expressed as percentages. The Chi-square test was used for categorical variables. Univariate and multivariate logistic regression were used to assess the associated risk factors with frailty among the Saudi Elderly population. A p-value <0.05 was considered statistically significant.

Results

A total of 228 Saudi elderly patients participated in the current study, the male gender represented 51.8% of the studied sample,

and 42.1% were in the age group of 60-65 years old. The largest percentage (43.4%) of the participants were in the BMI group of 25-29.9 kg/m^2, the vast majority (97.4%) of them were nonsmokers, and living with their families (99.1%). Almost one-third of the participants have a caregiver at 32.0%, and 46.1% were illiterate. Data is shown in table 1.

		Number	%
Age group	60-65	96	42.1
	66-70	55	24.1
	71-75	42	18.4
	76-80	12	5.3
	> 80	23	10.1
BMI	15-19.9	1	.4
	20-24.9	25	11.0
	25-29.9	99	43.4
	30-34.9	90	39.5
	35-39.9	11	4.8
	>=40	2	.9
Gender	Male	118	51.8
	Female	110	48.2
Education level	illiterate	105	46.1
	Primary	55	24.1
	Elementary	41	18.0
	High-school	19	8.3
	Higher education	8	3.5
Living Status	Alone	2	.9
	Family	226	99.1
Having a Care giver	Yes	73	32.0
	No	155	68.0
Smoking	Yes	6	2.6
	No	222	97.4

Table 1: Characteristics of the participants.

The prevalence of frailty among the studied Saudi elderly population is shown in table 2. It was found that the prevalence of frailty was 25.4% while 24.6% were prefrail.

The results of the current study showed that 18.4% of the Saudi elderly population might have possible cognitive deteriorations, as shown in table 3.

		Number	%
DM	Yes	189	82.9
	No	39	17.1
HTN	Yes	166	72.8
	No	62	27.2
Dyslipidemia	Yes	170	74.6
	No	58	25.4
Heart failure	Yes	27	11.8
	No	201	88.2
stroke	Yes	13	5.7
	No	215	94.3
osteoprosis	Yes	35	15.4
	No	193	84.6
Hypothyroidism	Yes	33	14.5
	No	195	85.5
CKD	Yes	9	3.9
	No	219	96.1
Depression	Yes	6	2.6
	No	222	97.4
Polypharmacy	Yes	96	42.1
	No	132	57.9

Table 2: Prevalence of Comorbidities among the participants.

	Number	Prevalence (%)
Robust	114	50.0
Pre-frail	56	24.6
Frail	58	25.4

Table 3: Prevalence of frailty among the our study Elderly population.

Prevalence of frailty among the Saudi Elderly population by characteristics of the participants is shown in table 4. There was a statistically significant difference ($P < 0.05$) between the robust, frail, and prefrail subjects in terms of age, educational level, and presence of a caregiver.

The majority of the study participants were diabetic, hypertensive, and dyslipidemic at 82.9%, 72.8%, and 74.6%, respectively. Almost 15% of them were osteoporotic and have hypothyroidism, while 42.1% were polypharmacy, as shown in table 5.

	Number	Prevalence (%)
Possible deterioration	42	18.4
No deterioration	186	81.6

Table 4: Assessment of cognitive impairment.

Univariate logistic regression for the associated risk factors with frailty in the Saudi elderly population is shown in table 6. The results of the current study revealed that, compared to subjects aged 60-65 years old, those aged >80 years old have more than 10 folds increased risk of frailty, with OR=10.63(95%CI 2.95-38.28), and a significant P value of <0.001. For the BMI, more than two folds risk of frailty was found for subjects with a BMI of ≥30 kg/m^2, where the OR (95% CI) was 2.64 (1.07-6.47), and a P-value of 0.034. In addition, hypertension, dyslipidemia, heart failure, osteoporosis, and hypothyroidism were significant (all P values were <0.05) risk factors for frailty with OR of 1.87, 2.60, 6.95, 2.15, and 2.63, respectively. Moreover, polypharmacy was found to be a significant (P < 0.001) risk factor for frailty(OR=3.03, 95%CI(1.75-5.24).

When multivariate logistic regression analysis was done, the risk factors that remained significantly associated with frailty among the elderly Saudi population were age >80 years, dyslipidemia, heart failure, hypothyroidism, and polypharmacy, as shown in table 7.

		Robust		Pre-frail		Frail		P value
		Number	%	Number	%	Number	%	
Age	60-65	59	61.46	24	25.00	13	13.54	0.001*
	66-70	28	50.91	13	23.64	14	25.45	
	71-75	20	47.62	9	21.43	13	30.95	
	76-80	4	33.33	3	25.00	5	41.67	
	> 80	3	13.04	7	30.43	13	56.52	
BMI	<25	17	65.38	6	23.08	3	11.54	0.135
	25-29.9	54	54.55	22	22.22	23	23.23	
	35-39.9	43	41.75	28	27.18	32	31.07	
Gender	Male	61	51.69	29	24.58	28	23.73	0.810
	Female	53	48.18	27	24.55	30	27.27	
Education level	illiterate	50	47.62	26	24.76	29	27.62	0.039*
	Primary	19	34.55	17	30.91	19	34.55	
	Elementary	25	60.98	10	24.39	6	14.63	
	High-school	13	68.42	2	10.53	4	21.05	
	Higher education	7	87.50	1	12.50	0	0.00	
Living Status	Alone	0	0.00	1	50.00	1	50.00	0.364
	Family	114	50.44	55	24.34	57	25.22	
Care giver	Yes	22	30.14	14	19.18	37	50.68	<0.001*
	No	92	59.35	42	27.10	21	13.55	
Smoking	Yes	5	83.33	1	16.67	0	0.00	0.213
	No	109	49.10	55	24.77	58	26.13	

Table 5: Prevalence of frailty among the Saudi Elderly population by characteristics of the participants.

* Significant p value.

		Odds Ratio	95% C.I.		P value
			Lower	Upper	
Age	60-65**	1.00			
	66-70	1.54	0.79	3.00	0.208
	71-75	1.75	0.84	3.65	0.132
	76-80	3.19	0.90	11.34	0.073
	> 80	10.63	2.95	38.28	<0.001*
BMI	< 25**	1.00			
	25-29.9	1.57	0.64	3.87	0.323
	≥30	2.64	1.07	6.47	0.034*
Gender	Male	0.87	0.52	1.46	0.596
	Female**	1.00			
Care giver	Yes	3.39	1.87	6.13	<0.001*
	No**	1.00			
Smoking	Yes	5.18	0.60	45.09	0.136
	No**	1.00			
Comorbidities					
DM	Yes	2.01	0.98	4.10	0.056
HTN	Yes	1.87	1.03	3.40	0.038*
Dyslipidemia	Yes	2.60	1.39	4.86	0.003*
Heart failure	Yes	6.95	2.32	20.83	0.001*
Osteoprosis	Yes	2.15	1.01	4.56	0.047*
Hypothyroidism	Yes	2.63	1.19	5.81	0.017*
Depression	Yes	5.18	0.60	45.09	0.136
Polypharmacy	Yes	3.03	1.75	5.24	<0.001*

Table 6: Univariate logistic regression for the associated risk factors with frailty in the Saudi elderly population.

*Significant P value.

** Used as a references.

		Odds Ratio	95% C.I.		P value
			Lower	Upper	
Age	60-65**	1.00			
	66-70	1.615	.732	3.561	0.235
	71-75	1.530	.641	3.648	0.338
	76-80	5.190	1.180	22.819	0.029*
	> 80	10.856	2.574	45.791	0.001*
BMI	< 25**	1.00			
	25-29.9	1.224	.442	3.391	0.697
	≥30	1.065	.372	3.049	0.907
Care giver	Yes	6.378	2.920	13.931	<0.001
	No**	1.00			

Comorbidities					
HTN	Yes	.788	.346	1.792	0.570
Dyslipidemia	Yes	2.670	1.088	6.553	0.032*
Heart failure	Yes	6.689	1.931	23.174	0.002*
osteoprosis	Yes	2.304	.918	5.785	0.076
Hypothyroidism	Yes	2.946	1.132	7.668	0.027*
Polypharmacy	Yes	2.061	1.019	4.166	0.044*

Table 7: Multivariate logistic regression for the associated risk factors with frailty in the Saudi elderly population.

*Significant P value.

** Used as a references.

Discussion

We set out this cross-sectional survey study to assess the prevalence of frailty, and its risk factors in older adults in Riyadh, Saudi Arabia. The results revealed a frailty prevalence of 25.4%, and age >80 years, dyslipidemia, heart failure, hypothyroidism, and polypharmacy, were the significant risk factors for frailty after multivariate regression analysis.

The prevalence of frailty reported in this study was 25.4%, and such prevalence rate is noticeably higher compared to systemic review observed in 21 studies with an overall weighted average prevalence of 10.7% [20]. The prevalence of frailty among older adults in the population studied was much higher than in other studies from Malaysia at 18.3% [21], Japan and the United States at 16.0% for each [22,23], and Taiwan at 4.9% [24]. Also, other studies showed a lower frailty prevalence of frailty compared to this study including studies carried out in Canada (22.7%) [25], Turkey (27.8%) [26], and Italy (23.0%) [27]. On the other hand, greatly higher frailty prevalence was reported in Chile (42.6%) [28]. Such difference in frailty prevalence estimates between different studies might be due to differences in geographical, study design, age, gender, respondent characteristics, and heterogeneous frailty phenotype implementation. Follow-ups on frailty status are required, and the prevalence of frailty must be updated. If the prevalence of frailty rises, it will be a threat to the elderly as well as a warning to health care professionals, researchers, and policymakers [29].

The multivariate logistic regression analyses identified five predictors of frailty syndrome among older adults in Riyadh, Saudi Arabia. The associated factors related to frailty syndrome were age >80 years, dyslipidemia, heart failure, hypothyroidism, and polypharmacy. In a previous similar study from Malaysia, old age, unmarried, hospitalization in the previous year, poor self-rated health, and lower BMI were reported associated factors [21]. In line with our findings, previous studies consistently demonstrated that old age is positively associated with frailty [21,30].

A large body of evidence shows that most disorders, such as diabetes, hypertension, arthritis, and heart disease, increase the risk of frailty [31,32]. In the current study hypertension and arthritis were insignificantly correlated with frailty, while diabetes was a significant risk fak in the univariate but not the multivariate logistic regression analysis. Heart diseases in the current study showed a significant association with frailty in both univariate and multivariate analyses.

In the current study, obesity (BMI≥30 kg/m^2) was found to be a significant risk for frailty in the univariate analysis. According to the theory of frailty syndrome, frailty is a wasting disorder [33,34]. Previous studies showed that BMI has a U-shaped curve on the risk of frailty and mortality, implying that both wasting disorder and obesity are strongly linked to frailty and mortality [35,36].

In regards to the educational level as a risk factor for frailty, previous studies showed low educational level is a significant factor for frailty, and this was also the finding in our case, but after multivariate adjustment, the association became non-significant [37,38].

The health-care system must be prepared to care for frail elderly people [39]. Although frailty can be reversed, the emphasis

should be on the prevention, detection, and management of the risk factors associated with frailty. This is because the annual mean healthcare cost of the frail elderly is more than twice as high as the estimated cost for the robust elderly [39].

Limitations

There are some limitations in the current study. First, there is no established "gold standard" measurement of frailty in elderly patients, and we used only one tool, therefore the probability of bias is there. Second, the study was cross-sectional in design, so we cannot assess the causality. Third, the sample was taken from only one healthcare institution in Riyadh, Saudi Arabia, therefore, the results cannot be generalized to the whole kingdom. Multicenter studies with a larger sample size are warranted in the future.

Conclusion

In conclusion, the prevalence of frailty syndrome was 25.4%, while 24.6% were prefrail. Possible cognitive impairment was reported in 18.4%. Old age, dyslipidemia, heart failure, hypothyroidism, and polypharmacy, were the significant risk factors for frailty after multivariate adjustment. As the older adults population size in Saudi Arabia is growing with greater longevity, the impact of frailty syndrome could not be ignored and neglected. Further study is needed to validate our findings in other large-scale population of older adults.

Statistical analysis

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Descriptive statistics for Categorical variables were expressed as percentages and for continuous variables we used mean and Standard deviation. We used analytic statistics such as Chi square test was used for categorical variables. Univariate and multivariate logistic regression were used to assess the associated risk factors with frailty among the Saudi Elderly population. A p-value <0.05 was considered statistically significant.

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