Role of frailty in prediction of hospitalized older adult patient's outcomes: a prospective study

Background/aim: Frailty is associated with an increased risk of negative short-term and long-term hospital outcomes. This study aimed to evaluate the role of frailty in predicting readmission, length of stay, and quality of life in the hospitalized older adults.

Materials and methods: This observational study was conducted at Ziaiyan Hospital, Tehran, Iran. 304 participants (65-85 years), were enrolled through the inclusion criteria from August to December 2019. The Frailty Index (FI) was assessed by the Minimum Data Set-Home Care. Readmission was obtained through telephone interviews. The length of stay was gathered by the patient's hospital records, and the EuroQol questionnaire was used for assessing the quality of life. Data were collected by a researcher nurse at the admission time, 30, 60, and 90 days after discharge. The logistic regression model and repeated measures ANOVA were employed to analyze the association between frailty and outcomes.

Results: According to FI, 102 (33.55%) participants were pre-frail, whereas 35 (11.51%) were frail. In the fully-adjusted model for readmission, the pre-frail participants had a higher risk of readmission at the hospital in comparison with the non-frail and frail groups (OR=1.88, 95% CI =1.90–3.26), and also for GP visits, frail patients showed nearly significant differences (OR =2.45, 95% CI =0.99–6.06) but there were no differences between frail and pre-frail patients in readmissions in the emergency ward. In a fully-adjusted prolonged stay model, pre-frail patients had a higher probability to stay longer in hospital (OR =2.28, 95% CI: 1.24 - 4.18). The fully-adjusted model for QoL showed, frail patients were more prone to the declined levels of QoL in comparison with pre-frail patients (OR =10.77, 95% CI: 3.97 - 29.18).

Conclusions: The findings indicated that frailty worsened negative outcomes and declined QoL. Early diagnosis in hospital settings could be beneficial for designing optimal care plans for the frail and pre-frail patients.

Key Words: Frailty, hospitalization, quality of life

1. Introduction

With the aging population worldwide, the frailty of older adults is a concern for health systems because older patients, especially the frail older adults needing further care and services, are more likely to be hospitalized [1]. Frailty, in the hospitalized older adults, is associated with an increased risk of negative outcomes in the short term (increased length of stay and readmission) and the long term (disability and death) [2]. It could also predict loss of independence, disability, falls, delirium, re-hospitalization, and declined quality of life among the elderly [3]. Although frailty is a common problem in the hospitalized older adult patients, its diagnosis usually faces a few challenges [2]. Currently, there is no consensus for frailty assessment in clinical settings [4]. Clinicians pay close attention to the impact of frailty on health aspects of life among the older adult patients. The right assessment should be applied in proper settings to diagnose frailty accurately [5]. Frailty assessment is performed based on two approaches, i.e. the phenotype model and the cumulative deficit approach. The phenotype approach measures weight loss, fatigue, exhaustion, weakness, physical activity, and mobility dysfunction [6]. Evaluation through the phenotype model can be useful for measuring the functions of the senior citizens such as gait speed and grip strength. However, it is difficult to apply this approach to the older adult patients in hospital settings that may not accurately show the baseline frailty status [4].

The other approach is the accumulation of health deficits, known as the Frailty Index (FI), including 30 or more deficits from different domains related to health [7]. The Minimum Data Set (MDS) assessment form and the Comprehensive Geriatric Assessment (CGA) allow for the measurement of the MDS-specific frailty index and CGA-FI [8]. It is hard to implement the cumulative deficit approach due to a large number of variables; however, some studies indicate that the FI is a more sensitive predictor of adverse outcomes in the older adults because of its

multidimensionality [9]. In addition, the FI is a strong predictor of hospital outcomes, mortality, and disability [10]. Hence, the FI might serve as a useful approach to ascertain the effectiveness of health status in clinical settings [11].

Since the MDS-HC form is used as a standard assessment instrument in hospital settings to discharge older patients, the MDS-specific frailty index can be extracted from it [12]. Therefore, the MDS-HC form can be employed to evaluate frailty and detect short-term and long-term outcomes among the hospitalized older adult patients [4]. This study aims to appraise the role of frailty in the prediction of Patients outcomes (readmission, length of stay, and quality of life) among the hospitalized older adults based on the MDS-specific frailty index.

2. Material and Methods

2.1. Study design and participants

This prospective observational study was conducted on geriatric patients (n= 304) who were admitted to Ziaiyan Hospital (an educational hospital affiliated with Tehran University of Medical Sciences) from August 2019 to December 2019.

Since the Minimum Data Set- Home Care (MDS-HC) requires accurate responses of the older adults and their caregivers, they were selected through the following criteria 1) The patients were aged between 65 and 85 years old. 2) They were admitted to geriatric, internal, and Coronary Care Unit wards. 3). They were not admitted to ICU. 4). They were not terminal ill or in high need of care. 5). They did not reside in a nursing home. 6). The presence of a caregiver was mandatory for the consent of patients with a lack of mental capacity.

Severe disease cases or the older adult who were transferred from hospitals to nursing homes were excluded, for they were unable to fill out the questionnaires or complete functional

assessments. The health-related and functional variables were collected through face-to-face interviews conducted by a trained nurse at admission time based on the MDS-HC.

Informed consent was obtained from patients or their legally acceptable representatives. The study was approved by the Ethics Committee of the University of Social Welfare and Rehabilitation (IR.USWR.REC.1396.296).

The frailty index and other outcomes base on the following information were extracted.

2.2. Frailty assessment

The MDS-HC is a standard geriatric assessment tool that contains more than 200 items regarding attention, cognition, orientation, mood and affection, function, nutrition, medication, pain, incontinence, and environment. In this study, the Frailty Index (FI) was constructed by using 42 health-related deficits/variables based on an FI derived from the MDS-HC. More information about the calculation of the FI was written in Burn et al study [13]. To calculate the FI, it was necessary to answer all 42 health-related deficits/variables, so the incomplete information of the older adults was not considered in the calculation of the FI, and they were excluded from the study. Each variable was recorded on a binary scale of 0 or 1 (1 represents the presence of a deficit, whereas 0 represents the absence of a deficit). The FI was calculated by adding up the number of deficits recorded for a patient. The summation was then divided by the total number of possible deficits representing an FI with a potential range from 0 to 1 [13]. In this analysis, like the study by McKenzie et al., three frailty categories were obtained: non-frail (≤ 0.21), pre-frail (>0.21 to ≤ 0.30), and frail (>0.30) [14].

2.3. Readmission information

Readmission is defined as at least another admission to a hospital or an emergency ward or a visit to a General Practitioner (GP) for any reason within 3 months after discharge [15].

Readmission information was obtained from all patients through telephone interviews conducted by a trained nurse within 30, 60, and 90 days from the baseline.

2.4. Length of stay information

The length of stay was defined as the number of days between admission and discharge (or death). The prolonged hospitalization period was also calculated for further analysis based on the following definition: "A prolonged length of stay is equal to or greater than 75% of the total length of stay in the entire cohort study" [16].

2.5. Quality of life assessment

The EuroQol five-dimensional questionnaire (EQ-5D-3L) was used for assessing the quality of life. This tool consists of two parts, i.e. the EQ-5D descriptive system and the EQ-5D visual analog scale (EQ-5D VAS). The EQ-5D descriptive system includes mobility, self-care, usual activities, pain/discomfort, and anxiety/ depression. The total score ranges from -0.594 to 1 based on the UK weighted index [17]. Validation of an Iranian version of "EQ-5D-3L" questionnaire has been done by Dastourani et al study [18].

In consistency with the study of Parkin et al., the results were classified as two categories in this study to define the QoL score as low quality of life (≤ 0.50) and high quality of life (>0.50) [19]. In the EQ-5D VAS, respondents registered the self-rated health on a vertical visual analog scale, ranging from 0 (the worst health status) to 100 (the best health condition) [17,19].

2.6. Co-variables

The information of age, sex, educational attainment, marital status, co-morbidity, polypharmacy, cognition, and depression was collected to evaluate the impacts of variables that were not encoded directly in the FI. Co-morbidity is defined as the co-existence of at least 3 separate chronic illnesses [20].

Poly-pharmacy is defined as the concurrent use of more than 5 medications [21]. The patients' cognitive states were evaluated by conducting the six-item Cognitive Impairment Test (6-CIT) consisting of orientation, attention, and memory domains. The score ranges from 0 to 28, and scores higher than 11 indicate cognitive impairment [22].

Depression was measured by the MDS-Depression Rating Scale (MDS-DRS) with a maximum score of 14. The patient's MDS-DRS score was interpreted based on the following category, i.e. non-depression (0), mild/moderate depression (<1 to >3), and severe depression (<3) [23]. A binary classification was used for the logistic regression. It included two categories (depression≥3 and without depression <3) [24].

2.7. Statistical analyses

Statistical analysis was performed in SPSS 16.0 (SPSS Inc., Chicago, IL, USA) and Stata 11 (Stata Corp., College Station, TX) at P-values<0.05 (two-tailed). The normal distribution of continuous variables was assessed by conducting the Kolmogorov-Smirnov test. The continuous and categorical variables were presented as a mean (± standard deviations) and numbers or proportions, respectively. The discrimination of frail, pre-frail, and non-frail groups was tested through analysis of variance (ANOVA). The categorical variables were compared by using Chi-squared tests. Furthermore, the unadjusted and fully-adjusted logistic regression models were employed to estimate the Odds Ratio (OR) and its 95% Confidence Interval (CI) in frailty status as an independent variable. A repeated measure ANOVA was conducted to check the trends in quality of life over time.

3. Results

A total of 304 geriatric patients agreed to participate in this study; however, 16 participants were excluded due to incomplete assessment resulting from follow-up inability or death.

The mean age of the older adult patients was about 75.72 ± 6.30 years. The FI maximum score was reported at 0.540, and the mean ± SD of FI scores was reported 0.21± 0.08. Based on FI cutoff points, 102 (33.55%) patients were identified as pre-frail, whereas 35 (11.51%) were diagnosed as frail.

The frail patients were older than the pre-frail and non-frail (78.2 ± 6.41 vs. 76.43 ± 5.93 and 74.76 ± 6.32; P = 0.004) patients. There were significant differences between variables (age, co-morbidity, depression, cognition, quality of life, readmission, and prolonged stay) in frailty status [Table 1].

3.1. The Relationship between Frailty Status and Readmission

Unadjusted logistic regression analysis showed significant differences between non-frail and pre-frail patients in readmission rates at the hospital (unadjusted OR =2.12, 95% CI =1.27–3.54) and emergency ward (unadjusted OR =1.72, 95% CI =1.04–2.83). Based on results regarding frail patients compared with non-frail and pre-frail patients, the GP visits were highly significant (unadjusted OR =4.31, 95% CI =1.90–9.77).

After age, sex, depression, and cognition variables were adjusted, the pre-frail participants had a higher risk of readmission at the hospital in comparison with the non-frail and frail groups (fully-adjusted OR=1.88, 95% CI =1.90–3.26). In the fully-adjusted model for the emergency ward variables, there were no significant differences between frail and pre-frail patients in readmissions. In the fully-adjusted model for GP visits, frail patients showed nearly significant differences (fully-adjusted OR =2.45, 95% CI =0.99–6.06). In fully-adjusted logistic regression,

gender (male) and cognitive impairment variables increased the emergency ward readmissions frequency of the elderly patients. Moreover, the pre-frail and depressed patients were more prone to GP visits in this study [Table 2].

3.2. The Relationship between Frailty Status and Length of Stay

There were no significant differences between non-frail, pre-frail, and frail geriatric patients in the length of stay. In the unadjusted logistic regression model, pre-frail (unadjusted OR =2.82, 95% CI =1.61–4.95) and frail patients (unadjusted OR =2.38, 95% CI =1.06–5.31) were more prone to prolonged stay at the hospital. In a fully-adjusted prolonged stay model, pre-frail geriatric patients had a higher probability to stay longer in hospital (fully-adjusted OR =2.28, 95% CI: 1.24 - 4.18); however, pre-frail and frail elderly women experienced higher levels of the length of stay in hospital [Table 2].

3.3. The Relationship between Frailty Status and Quality of Life

The unadjusted logistic regression model showed significant differences between non-frail, frail (unadjusted OR =16.44, 95% CI =6.63–40.70), and pre-frail elderly patients in the scores of QoL (unadjusted OR =5.71, 95% CI =3.17–10.29). In the fully-adjusted model, frail patients (fully-adjusted OR =10.77, 95% CI: 3.97 - 29.18) were more prone to the declined levels of QoL in comparison with pre-frail patients. Furthermore, QoL can decline more in older frail or pre-frail patients [Table 2].

The results of repeated measures ANOVA showed significant differences in QoL scores among non-frail, pre-frail, and frail older adult patients at the baseline 30, 60, and 90 days after discharge from the hospital ($P < 0.001$) [Table 3].

Figure shows the descending slope of QoL (EQ5D and EQ.VAS) scores at baseline, 30, 60, and 90 days after geriatric patients were discharged from the hospital.

4. Discussion

This study described that the significant differences in specific variables (age, co-morbidity, depression, cognition, quality of life, readmission, and prolonged stay) concerning the frailty status of geriatric inpatients. Furthermore, a significant association was observed between frailty and prolonged stay, readmission, and QoL among the hospitalized older adult patients. The prolonged stay was prominent in pre-frail geriatric patients in the hospital. In frail geriatric patients, the probability of a GP visit was approximately significant. The QoL was declined in frail, pre-frail, and non-frail patients during the 3-month follow-up; it decreased more in frail patients.

Based on results in the present study, there were more readmissions in frail and pre-frail geriatric patients. Similarly, Vidan et al. reported that frailty was an independent predictor in the hospitalized Spanish older adults within 12 months of readmission [25].

In hospitalized Chinese patients, frailty increased the risk of readmission [26]. Additionally, in Aortic Valve Implant older adult patients in a Japanese study, frailty was correlated with unplanned readmission [27]. The major reason for an association between frailty and readmission might be the assumption that patients admitted to hospitals were more sensitive to frailty syndrome and experienced a higher risk of readmission or poor outcomes [28]. At the same time, the discharge process might not consider the health-related concerns and needs of the older adult patients in some hospitals [29]; therefore, it may increase the chance of re-hospitalization among frail and pre-frail older patients.

Results showed that cognitive impairment and gender [30] affected readmissions in frail patients. The present study also indicated higher emergency ward readmissions in men as well as

cognitive impairment in frail and pre-frail patients. Existing gender differences in the findings might be attributed to health-seeking behavior and perceived health status. The majority of the older adult men were less interested in using follow-up care and preventive programs. They were also more prone to unintentional acute illnesses because of unwillingness to comply with preventive programs. This could explain the more ED readmissions in older males after discharge [31].

Possible mechanisms for increasing the probability of re-admission in cognitive impairment patients might be due to disorientation in the time or place as well as problems in complying with simple commands in the hospital as a result of attention/memory deficits [32]. Moreover, patients and caregivers are usually agitated for the issues that will emerge after discharge. Patients commonly fail to pay attention to the necessary instructions after discharge [33]; therefore, they are re-admitted quickly after discharge.

The findings of this study showed that the probability of prolonged stay was higher in the pre-frail hospitalized older adults. This finding is consistent with the results of other studies [30, 34]. Apparently, the Iranian pre-frail older adult patients were more prone to lengthy hospital stay [35]. This might be because the frail patients were mostly bed-ridden in their homes [35] due to being mistreated by their family caregivers or facing ageism taboo, which might have been neglected by their family caregivers [36]. The readmission rate was lower in the elderly frail patients than in the pre-frail patients.

According to the findings, the older adult women were more likely to stay in hospital. This was consistent with the findings reported by De Buyser et al. [37]. However, Alnajashia et al. [38] found no significant association between length of stay and gender. It might be due to higher levels of life expectancy in the older adult women, compared with older men, as well as the high

probability to live alone and the high rate of co-morbidity in the Iranian older female than the male older adults [39]. Besides, there is no social security system in Iran to support the elderly (in terms of financial and career services), especially for older women. As a result, the older women may stay longer in hospital.

Based on the research findings, the older adult frail patients had a lower QoL score. In a similar study, Cavrini et al. reported that the QoL score was correlated with the number of hospitalization and institutionalization in the Italian older adults within two years of follow-up [40]. Kahlon et al. observed that frail patients had lower QoL scores than non-frail older adult patients in Canada [41]. In contrast, Kojima et al. noted that the British pre-frail older adult patients not only had a better QoL score at baseline but also showed improvements in QoL over time [42]. However, the research settings of our study are not similar to those of the reviewed studies.

In this study, the reason for a lower score of QoL in frail older adult patients might be interpreted as the fact that hospitalization reduced the mobility and functional capacity of the older adults and increased dependency [43]. Meanwhile, independence and self-care are important measures in the lives of the older adults which are disrupted during hospitalization; thus, it appears that hospitalization decreased QoL in frail patients.

There were a few research limitations. This is a single-center study, the findings of which might not be generalizable. Only one frailty assessment tool (MDS-HC frailty index) was employed due to its practicality, ease of administration, and complete assessment of multiple important geriatric domains. The cause and duration of each readmission were not discussed in the study evaluation intervals.

In the present study, the frailty assessment was performed using MDS-HC in the hospital setting, since adopting frailty measures depends greatly on clinical settings and the purpose of frailty assessment [26]. The results obtained revealed that the MDS-specified frailty index was able to predict the adverse outcomes in the hospitalized older adult patients. Based on the MDS-specified frailty index, the pre-frail status was more prevalent among geriatric inpatients. This is a valuable finding for policymakers so that they can be aware of the vulnerable older adult population in Iran and prepare appropriate care plans for major inpatient vulnerable groups.

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Table 1: Sociodemographic and disease characteristics of older adult patients according to the frailty level (N= 304)				
Variables	**Non frail (N=167)**	**Pre-frail (N=102)**	**Frail (N=35)**	**P-value**
Age	74.76 ± 6.32	76.43 ± 5.93	78.2 ± 6.41	0.004
Sex				
Male	44 (26.35)	28 (27.45)	7 (20.00)	0.678
Female	123 (73.65)	74 (72.55)	28 (80.00)	
Education level				
Illiterate	0 (0)	1 (0.98)	1 (2.86)	0.275
Primary school	102 (61.08)	71 (69.61)	28 (80.00)	
Secondary school or advanced	65 (38.92)	30 (29.41)	6 (17.14)	
Marital status				
Single	2 (1.20)	0 (0)	0 (0)	
Married	77 (46.11)	48 (47.06)	12 (34.29)	0.656
Widow/ Divorce	88 (52.70)	54 (52.94)	23 (65.71)	
Polypharmacy [20]				
5< Drug	27 (16.17)	10 (9.80)	2 (5.71)	0.130
5> Drug	140 (83.83)	92 (90.20)	33 (94.29)	

Co-morbidity [19]				
3< Disease **Z-score value**	93 (55.69) 2.57	39 (38.24) -2.67	17 (48.57) -0.05	0.021
3> Disease **Z-score value**	74 (44.31) -2.57	63 (61.76) 2.67	18 (51.43) 0.05	
Depression (MDS- DRS[1]-)				
Normal **Z-score value**	88 (52.69) 5.16	24 (23.53) -4.07	8 (23.53) -2.03	< 0.001
Mild/moderate **Z-score value**	57 (34.13) 1.15	32 (31.37) 0.00	6 (17.65) -1.82	
Severe **Z-score value**	22 (13.17) -6.74	46 (45.10) 4.38	20 (58.82) 4.05	
Cognition (6 CIT)[2]	5.05 ± 3.81	6.78 ± 3.83	9.62 ± 3.88	< 0.001
Frailty Index	.16 ± .03	.25 ± .02	.38 ± .06	-
Length of stay	6.03 ± 2.65	7.62 ± 3.91	7.74 ± 3.72	0.064
Prolonged stay [16]				
> 8days **Z-score value**	137 (82.04) 3.77	63 (61.76) -3.24	23 (65.71) -1.08	0.001
<8 days **Z-score value**	30 (17.96) -3.77	39 (38.24) 3.24	12 (34.29) 1.08	
Quality of life				
EQ5D[3]	.68 ± .25	.49 ± .31	.26 ± .34	< 0.001
EQ.VAS[4]	55.14 ± 15.68	44.21 ± 15.86	38.42 ± 12.58	< 0.001
Readmission				

Hospital **Z-score value**	No Yes	23 (14.37) 2.61 137 (85.63) -2.61	2 (2.17) -3.10 90 (97.83) 3.10	4 (12.90) 0.51 27 (87.10) -.051	0.008
Emergency department **Z-score value**	No Yes	101 (60.48) 1.51 66 (39.52) -1.51	48 (47.06) -2.37 54 (52.94) 2.37	23 (65.71) 1.15 12 (34.29) -1.15	0.050
GPs .visit **Z-score value**	No Yes	100 (59.88) -0.25 67 (40.12) 0.25	75 (73.53) 3.29 27 (26.47) -3.29	9 (25.71) -.4.47 26 (74.29) 4.47	< 0.001

1. MDS-DRS: Minimum Data Set Depression Rating Scale

2. 6 CIT: Six-item Cognitive Impairment Test

3. EQ5D: European Quality of Life-5 Dimensions

4. EQ.VAS: EuroQol-Visual Analogue Scales

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Table 2: Unadjusted and full adjusted logistic regression analysis of frailty status and related factors

Variables		Odds	CI (95%)	P-Value
Prolonged Stay	**Un adjusted**			
	Non frail	Reference		
	Pre- frail	**2.826**	**1.611 - 4.957**	**< 0.001**
	Frail	**2.382**	**1.068 - 5.313**	**0.034**
	Fully adjusted			
	Non frail	Reference		
	Pre- frail	**2.280**	**1.241 - 4.185**	**0.008**
	Frail	1.457	.584 - 3.633	0.419
	Age	1.023	.977 - 1.070	0.320
	Sex (Male/Female)	**2.084**	**1.068 - 4.067**	**0.031**
	Depression (Non-depressed/Depressed)	1.755	.958 - 3.214	0.068
	Cognition (Not impaired/ Impaired)	1.274	.718 - 2.261	0.408
Readmission	**Unadjusted**			
	Non frail	Reference		

	Pre- frail	**.537**	**.313 - .920**	**0.024**
	Frail	**4.311**	**1.901 - 9.777**	**< 0.001**
	Fully adjusted			
	Non frail	Reference		
	Pre- frail	**.359**	**.194 - .666**	**0.001**
	Frail	2.458	.996 - 6.068	0.051
	Age	1.002	.962 - 1.044	0.894
	Sex (Male/Female)	1.097	.625 - 1.924	0.745
	Depression (Non-depressed/Depressed)	**2.540**	**1.387 - 4.650**	**0.003**
	Cognition (Not impaired/ Impaired)	1.404	.822 - 2.396	0.213
Readmission (Emergency department)	**Unadjusted**			
	Non frail	Reference		
	Pre- frail	**1.721**	**1.046 - 2.831**	**0.032**
	Frail	.798	.371 - 1.713	0.563
	Fully adjusted			
	Non frail	Reference		
	Pre- frail	1.618	.939 - 2.787	0.083
	Frail	.652	.277 - 1.534	0.328
	Age	.992	.954 - 1.032	0.719

	Sex (Male/Female)	**.568**	**.335 - .963**	**0.036**
	Depression (Non-depressed/Depressed)	1.014	.577 - 1.781	0.961
	Cognition (Not impaired/ Impaired)	**1.670**	**1.005 - 2.776**	**0.048**
Readmission (Hospital)	**Unadjusted**			
	Non frail	Reference		
	Pre- frail	**2.123**	**1.273 - 3.541**	**0.004**
	Frail	1.260	.606 - 2.618	0.534
	Fully adjusted			
	Non frail	Reference		
	Pre- frail	**1.887**	**1.090 - 3.267**	**0.023**
	Frail	.964	.423 - 2.196	0.932
	Age	.998	.960 - 1.038	0.945
	Sex (Male/Female)	1.044	.616 - 1.770	0.870
	Depression (Non-depressed/Depressed)	1.289	.731 - 2.271	0.379

	Cognition (Not impaired/ Impaired)	1.354	.815 - 2.250	0.241
Quality of life (EQ5D)	**Unadjusted**			
	Non frail	Reference		
	Pre- frail	**5.718**	**3.177 - 10.29**	**< 0.001**
	Frail	**16.44**	**6.639 - 40.70**	**< 0.001**
	Fully adjusted			
	Non frail	Reference		
	Pre- frail	**4.941**	**2.630 - 9.280**	**< 0.001**
	Frail	**10.77**	**3.976 - 29.183**	**< 0.001**
	Age	**1.054**	**1.004 - 1.106**	**0.031**
	Sex (Male/Female)	1.408	.736 - 2.696	0.301
	Depression (Non-depressed/Depressed)	1.241	.643 - 2.393	0.519
	Cognition (Not impaired/ Impaired)	1.684	.935 - 3.032	0.082

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Table 3: Comparison of the average scores of EQ5D and EQ.VAS at the baseline and three times assessments, based on repeated measures ANOVA

Variable		Baseline	30 days	60 days	90 days	P-value[1]	P-value[2]
EQ5D	Non frail	.68 ± .24	.66 ± .24	.65 ± .24	.65 ± .24	< 0.001	< 0.001
	Pre frail	.49 ± .31	.42 ± .31	.40 ± .30	.38 ± .31		
	Frail	.27 ± .35	.17 ± .32	.13 ± .31	.12 ± .31		
EQ.VAS	Non frail	55.19 ± 15.70	54.54 ± 15.44	54.17 ± 15.45	54.10 ±15.48	< 0.001	< 0.001
	Pre frail	44.20 ± 15.86	40.80 ± 15.21	39.95 ± 14.92	39.73 ± 14.87		
	Frail	38.28 ± 12.92	33.59 ± 12.394	32.19 ± 11.70	31.09 ± 11.69		

P-value[1]: Unadjusted

P-value[2]: Fully adjusted with age, sex, depression, and cognition

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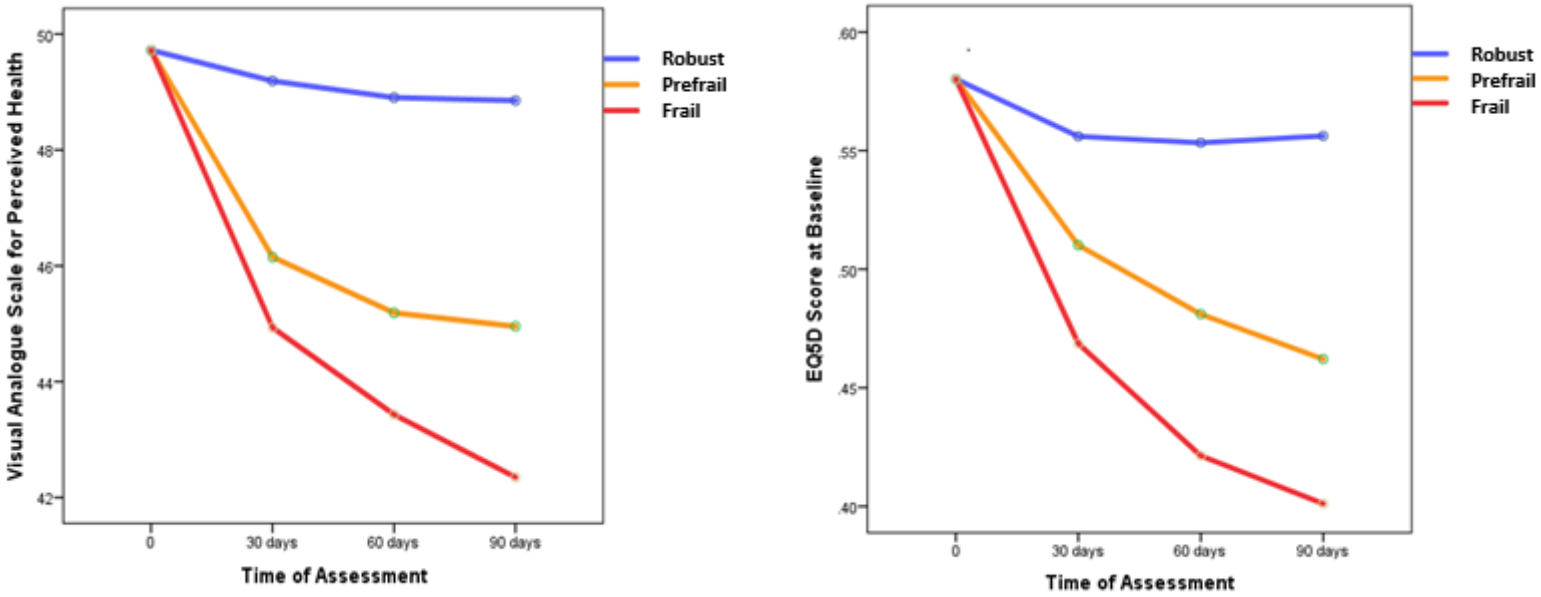

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٤١٣ **Figure: Trend of EQ5D and EQ.VAS score at the base line and three-time assessment**

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