DOI: https://doi.org/10.54393/pjhs.v4i01.500

PAKISTAN JOURNAL OF HEALTH SCIENCES
https://thejas.com.pk/index.php/pjhs
Volume 4, Issue 1 (January 2023)

Original Article

Clinical Frailty Score as a Predictor of Mortality among Patients with COVID-19 Presenting to a Tertiary Care Hospital

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ARTICLE INFO

Key Words:
Clinical Frailty Scale, CFS, COVID-19, Mortality

How to Cite:
Farooq, H. ., Salam, T. ., Salam, M. ., Iqbal, S. ., Zahid Jamil, M. ., & Ullah, I. . (2023). Clinical Frailty Score as a Predictor of Mortality among Patients with COVID-19 Presenting to a Tertiary Care Hospital: Clinical Frailty Score among COVID-19 Patients. Pakistan Journal of Health Sciences, 4(01). https://doi.org/10.54393/pjhs.v4i01.500

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Received Date: 12th January, 2023
Acceptance Date: 28th January, 2023
Published Date: 31st January, 2023

ABSTRACT

The association of Clinical Frailty Scale (CFS) with COVID-19 mortality has got prognostic value in some research work. National Institute for Heath and Care Excellence (NICE) guidelines suggest use of CFS in making important decisions regarding COVID-19 patients' management. **Objective:** To determine the prognostic validity of clinical frailty score with COVID 19 severity among patients presenting to a tertiary care hospital. **Methods:** It was a comparative cross sectional study carried out at COVID-19 dedicated ICU, HDU and ward, Jinnah Hospital Lahore from January 2021 to June 2021. Forty-eight patients, fulfilling the inclusion criteria, were recruited for the study after informed consent. Subjects were categorized as low and high frailty on basis of CFS score and outcome was evaluated. Data were entered and analyzed using SPSS version 24.0. **Results:** Among forty-eight subjects included in study, in subjects with age range of 40 - 60 years, 58.3% were having low CFS score and 50.0% were having high score. In low score group, 54.2% had ward stay with nasal or face mask oxygen as compare to 25.0% in high score group. Forty five percent had HDU/CPAP/ BiPAP in low CFS score group as compare to 41.7% and 33.3% required invasive ventilation with high score. (p=.005). **Conclusion:** COVID-19 patients with high frailty have with increase severity of disease requiring ICU invasive ventilation and increased mortality compared with non-frail patients with COVID-19.

INTRODUCTION

COVID-19 disease is so far the largest pandemic of 21st century affecting major parts of the globe after its origin in 2019 in China. It is highly contagious infection caused by a novel coronavirus [1]. Severe disease presentation is seen in around 20% of patients necessitating hospital admission [2]. Clinical Frailty Score has been suggested as a significant determinant of COVID-19 mortality and specifically addressed in NICE guidelines in risk stratification of Covid patients, although some studies have pointed out its overestimation of COVID-19 prognosis [3-5]. Frailty is directly linked to advancing age with upto 40% of old age patients had high CFS score are in middle to old age [6]. Limited number of studies tried to systematically establish the link between CFS score severity and mortality outcome of COVID-19 but their results were inconclusive results and hence, the concern of CFS score as a prognostic marker for COVID-19 patients remains unaddressed [5, 7]. Frailty is biological syndrome of reduced resistance and reserve to stressors resulting from physiological decline, which predisposes to adverse outcomes. A meta-analysis of multiple (n:34) studies including 18042 patients was carried out by Kastora *et al.*, regarding clinical frailty scale as a point of care prognostic indicator of mortality in COVID-19 patients. The mortality rates were significantly higher in CFS 4–5 patients group as compared to patients with CFS 1–3 (p = 0.0008). Similarly, mortality was even more pronounced in CFS 6–9 patient group when matched to CFS 1–3 category (p<0.0001). Other

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co morbidities like ischemic heart disease, chronic kidney disease and hypertension were independently associated with reduced survival of COVID-19 patients. The rationale of this study was to further define the role of CFS score in COVID-19 patients as a prognostic parameter. This study was also designed to review other patient and disease specific variables of prognostic interest like acute kidney injury, cardiac injury or delirium complicating covid-19 patients' management [8, 9].

METHODS

A Comparative Cross sectional study was conducted from January to June 2021 in COVID – 19 dedicated ICU, HDU and ward of Jinnah hospital Lahore. Subject with age 40 and over of either gender symptomatic patients with PCR positive for COVID-19 with severe infection as Patients with COVID-19 are considered to have severe illness if they have SpO2 <94% on room air at sea level, PaO2/FiO2 <300 mm Hg, a respiratory rate >30 breaths/min, or lung infiltrates >50% were included through a non-probability / consecutive sampling. Patients having recent myocardial infection, those undergone recent surgery and with cytokine syndrome were excluded for the study. A sample size of 48 was calculated from win-pepi ver: 11.14 for estimating an odds ratio with 95% Confidence interval, 90% precision and expected prevalence of the outcome in absence group i.e. low CFS (score 1-3) of 10% and expected odds ratio of 3.09 with high CFS score (6-9) and ratio of 1 in both group using following formula.

na = [Zα/22 / log2(1-RP)]*[1/X+1/Y]

After informed consent and approval from ethical committee, a detailed clinical and demographic history was taken and subjects were categorized as low and high frailty on basis of score and outcome was evaluated. Data were entered and analyzed using SPSS version 24.0. Quantitative data was presented by mean and SD. Categorical variables were presented as frequency and percent. Survivors and non-survivors were also compared for age, gender, CFS and presence of comorbidities and a p value of .05 was taken as statistically significant.

RESULTS

Forty-eight patients were included in study, with 24 in low Clinical Frailty Score (CFS 1-3) (n=24) and 24 in high score (CFS 7-9). With respect to age, among patients of less than 40 years, 29.2% were having low CFS score and 8.3% were having high CFS score. In the age group of 40 - 60 years, 58.3% were having low score and 50% was having high score. Among 60 - 80 years, 12.5% had low score and 41.7% had high score. (p < .035). A major component of male patients (62.5%) was particularly having high CFS score. (p=.383). Smoking was more common in high CFS score groups (41.7%) as compared to 33.3% in low score groups (p=.551). most of the diabetic patients (62.5%) were 37.5% were diabetes in high score. (p=.083). Ischemic heart disease was low (12.5%) in 12.5% in low score group as compare to 50.0% in high score. (p=.005). Similarly, other comorbidities like malignancy (4.2%) and chronic respiratory illness (25%) (p=.009) were more prevalent in high score group. Among low CFS score group, 25.0% were having non-severe disease, 70.8% were having severe disease and 4.2% were critically ill as compared to high score group where 58.3% had severe disease and 41.7% had critical illness. Regarding hospital stay in low CFS score group, 54.2% had ward stay with nasal or face mask oxygen as compared and 45.8% had HDU/CPAP/ BiPAP. A large number of patients (33.3%) needed invasive ventilation within high score category. (p=.005). Seventy five percent of the patients with low CFS score survived as compared to fifty percent in high CFS scores (p=.074) (Table 1).

Variables n=48		Clinical Frailty Scale		
		Low Score (CFS 1-3) (n=24)	High Score (CFS 7-9) (n=24)	p-value
		F (%)	F (%)	
Age of patients	< 40 years	7(29.2)	2(8.3)	.035
	40 - 60 years	14(58.3)	12(50)	
	60 - 80 years	3(12.5)	10(41.7)	
Gender of patients	Male	12(50)	15(62.5)	.383
	Female	12(50)	9(37.7)	
Smoking status	Yes	8(33.3)	10(41.7)	.551
	No	16(66.7)	14(58.3)	
Diabetes	Yes	9(37.5)	15(62.5)	.083
	No	15(62.5)	9(37.5)	
Ischemic heart disease	Yes	3(12.5)	12(50)	.005
	No	21(87.5)	12(50)	
Malignancy	Yes	0(0)	1(4.2)	.312
	No	24(100)	23(95.8)	
Chronic respiratory illness	Yes	0(0)	6(25)	.009
	No	24(100)	18(75)	
COVID severity	Non severe	6(25)	0(0)	.001
	Severe disease	17(70.8)	14(58.3)	
	critical illness	1(4.2)	10(41.7)	
Hospital stays	ICU invasive ventilation	0(0)	8(33.3)	.005
	HDU CPAP or BIPAP	11(45.8)	10(41.7)	
	Ward stay Nasal Cannula or Face mask	13(54.2)	6(25)	
Outcome	Survived	18(75)	12(50)	.074
	Non-Survived	6(25)	12(50)	

Table: 1 Demographics and clinical characteristics of the cohort

Survived and non-survived subjects were also compared for socio-demographic and clinical variables. Among subjects with < 40 years 26.7% were survived while 5.6% were deceased. Mortality was increased to 44.4% in 40 - 60 years age group and peaked to 50% among 60-80 years age group (p < .013). Most of the male patients (77.8%) carried grave prognosis. Survival was also decreased in patients who were smoker as 55.6% of smokers could not survive (p=.045). Most of the diabetic and ischemic heart disease patients were having high mortality rates (72.2% and 50%

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respectively). Preexisting malignancy and chronic respiratory illness accounted for 5.6% and 16.7% of deaths respectively. Among survived group, 16.7% were having non severe disease, 76.7% were having severe disease and 6.7% were critically ill as compare to non-survived group where 5.6% had severe disease and 44.4% had critical illness. (p=.002). Regarding hospital stay, in survived group 53.3% had ward stay with nasal or face mask oxygen as compared to 16.7% with non-survived patients. Forty percent of patients in survived group had HDU/CPAP/BiPAP as compared to 50.0% in non-survived group 33.3% patient were given invasive ventilation among non-survivors. (p=.012). Sixty percent of patients who survived had low CFS score (p=.074)(Table 2).

Variables n=48		Outcome		
		Survived F (%)	Survived F (%)	p-value
Age of patients	< 40 years	8(26.7)	1(5.6)	.013
	40 - 60 years	18(60)	8(44.4)	
	60 - 80 years	4(13.3)	9(50)	
Gender of patients	Male	13(43.3)	14(77.8)	.020
	Female	17(56.7)	4(22.2)	
Smoking status	Yes	8(26.7)	10(55.6)	.045
	No	22(73.3)	8(44.4)	
Diabetes	Yes	11(36.7)	13(72.2)	.014
	No	19(63.3)	5(27.8)	
Ischemic heart disease	Yes	6(20)	9(50)	.030
	No	24(80)	9(50)	
Malignancy	Yes	0(0)	1(5.6)	.192
	No	30(100)	17(94.4)	
Chronic respiratory illness	Yes	3(10)	3(16.7)	.499
	No	27(90)	15(83.3)	
COVID severity	Non severe	5(16.7)	1(5.6)	.002
	Severe disease	23(76.7)	8(44.4)	
	critical illness	2(6.7)	9(50)	
Hospital stays	ICU invasive ventilation	2(6.7)	6(33.3)	.012
	HDU CPAP or BIPAP	12(40)	9(50)	
	Ward stay Nasal Cannula or Face mask	16(53.3)	3(16.7)	
Outcome	Low Score (CFS 1-3)	18(60)	6(33.3)	.074
	High Score (CFS 7 -9)	12(40)	12(66.7)	

Table 2: Patients Characteristics and Their Outcome

DISCUSSION

The coronavirus disease 19 (COVID-19) pandemic has jolted the whole world with its rapid infectivity waves and morbidity, with 312,000 confirmed cases and 44,819 fatalities were recorded in first wave in UK by Yang *et al.* Clinical presentation of COVID-19 varies widely with most of the patients being minimally symptomatic on one end to critically ill patients needing invasive ventilation at the other end. COVID-19 pathogenesis is influenced by multiple risk factors like age, diabetes, obesity and presence of ischemic heart disease [10–12]. In our study, critical illness was much higher (41.7%) in patients with higher clinical frailty scores. Consequently, use of invasive ventilation (33.3%) was much more pronounced in this group. The mortality rate of COVID-19 is different in various parts of the world variable depending on available health resources and demographic circumstances [13]. A high mortality rate was observed in Belgium by Ortiz-Prado *et al.*, population (16.34%) while mortality rates were similar in USA and China population (5.95% and 5.6% respectively) [14]. A higher mortality rate (50%) was observed in critical illness patients included in our study. Mortality rates were high (33.3%) in patients requiring invasive ventilation. Excess mortality rate was similar worldwide in old age group and further rose in the presence of multiple comorbidities [15, 16]. Diabetes and smoking were strongly linked to mortality (72.2% and 55.6% respectively) in our study as well. Frailty is a well-known contributor of disease burden by affecting patient survival and increased expenditure of health resources. Natural aging and preexisting medical conditions aggravate frailty scores thus leading to poorer outcomes [17, 18]. Our study also showed a very high mortality (66.7%) associated with high clinical frailty scores of 7 and above. Thus, high mortality from COVID-19 among older people reported in multiple studies was primarily governed by high CFS scores [19-21]. Limitations of our study were small sample size and single center experience.

CONCLUSIONS

COVID-19 patients with high frailty have increased severity of disease requiring invasive ventilation more frequently and have increased mortality compared with non-frail patients with COVID-19.

Conflicts of Interest

The authors declare no conflict of interest

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article

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