

RESEARCH ARTICLE

# Correlation Of Initial Chest CT Finding of Covid -19 Patients with Their Death Risk.

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## ABSTRACT

**Introduction:** Initial chest CT scan, as a practical and accessible tool, is one of the best diagnosing tools due to easy to perform and it will be able to make fast diagnosis for patients this study aimed to investigate if the initial chest CT finding of Covid -19 patients is a risk factor of their death?

**Method & Material:** This descriptive cross-sectional study performed on 589 patients referred to Imam Hossein hospital (Tehran, Iran). Inclusions criteria were conformed diagnose of SARS CoV- 2 and exclusion criteria were death of the patient for any cause other than SARS CoV- 2. Data were extracted from electronic information hospital system. Sampling was done by easy and accessible method. Data were analyzed by SPSS 26 and statistical methods such as Chi-square, independent t-test, Fisher's exact test and Logistic regression.

**Result:** out of 589 patients participating in the study, 128 patients died and 481 patients survived. In survived group 57.9% were man with mean age of  $57.19 \pm 17.02$  years and in death group 62.5% were man with mean age of  $71.79 \pm 15.45$  years. Out of 538 patients who had initial chest CT finding, 127 patients, and out of 51 patients who had not, 1 patient died. Logistic regression showed that initial chest CT finding was associated with death of Covid-19 patients.

**Conclusion:** Initial chest CT finding of Covid -19 patients will be able to predict their mortality and manage their treatment process.

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## KEYWORDS:

Covid-19; infection; CT scan

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## INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was found for the first time from Wuhan, China, in December 2019 [1]. For this reason called Coronavirus Disease 2019 (COVID-19) by World Health Organization (WHO) on March 11, 2020 [2]. CT scan is practical and accessible tool for diagnosis of pneumonia disease and management of patients who have an infected chest [3]. Initial chest CT scan, as a practical and accessible tool, is one of the best diagnosing tools for diagnosing of patients infected by COVID-19 virus. This tool is very easy to perform and it be able to

make fast diagnosis for patients [4]. Also chest CT is a sensitive method for diagnose and screening of COVID-19 patients [5]. COVID-19 has various CT findings, some chest CT findings of COVID-19 may closely resemble the imaging findings of some other pathologies presenting with airspace disease [2]. Previous studies showed a typical time course of CT demonstrations of COVID-19 aggravation, including sub pleural ground glass opacity (GGO) in the early stage, enlarged GGO with a crazy-paving pattern and partial consolidation in the progressive stage, and subsequent extensive consolidation in the bilateral lungs [6-9]. The lungs of patients are the most common organ infected by Covid -19

viruses [10], which has been confirmed in previous studies [1. 11]. Some studies have reported that pulmonary alveolar damage from Covid-19 [10. 12]. In present study, we want to investigate if the initial chest CT finding can be considered as death risk for patients who infected by Covid 19 viruses.

## METHOD & MATERIAL

### Study design

This descriptive cross-sectional study was performed on patients with definite diagnose of SARS CoV- 2 referred to Imam Hossein hospital (Tehran, Iran). All patients who were diagnosed with definite infection of Covid-19 base of RT-PCR diagnostic test or chest CT scan findings were entered in the present study. Chest CT scan performed for all patients on admission and follows them to hospitalized and then evaluate the outcome including death or recovery. Five hundred eighty nine patients had initial chest CT on admission.

### Participations

Five hundred eighty nine patients with definite infection of Covid-19 base of RT-PCR diagnostic test or chest CT scan findings who referred to Imam Hossein hospital were entered in present study.

### Inclusion and exclusion criteria

Inclusions criteria were conformed diagnose of SARS CoV- 2

and exclusion criteria were death of the patient for any cause other than SARS CoV- 2.

### Data collection

Data were gathered by using a questionnaire, by observational and interview methods and initial chest CT findings, and outcome (death/survive) were extracted from electronic information hospital system and checked by one infectious and tropical residency & three emergency medicine specialist.

### Clinical Management

Medical radiographic findings, including the chest CT scan, were done on admission for each patient by protocol reported in previous study [13. 14]. All medical radiographic finding was performed by the clinical radiographic of Imam Hossein Hospital, and reviewed by two radiologists. Patients followed to death or recovery by an educated nurse.

### Statistical analysis

Sampling was done by easy and accessible method. Data were analyzed by SPSS 26 and statistical methods such as Chi-square, independent t-test, and Fisher's exact test. Regression Logistic test was used to investigate the association of CT scan findings and patients' death and recovery [15-17].

## RESULT

**Table 1:** Demographic characteristics of death & recovery patients.

Variables	Recovery case Frequency (Percent) N = 461	Death cases Frequency (Percent) N = 128	Total cases Frequency (Percent) N = 589	Test Type P-value
		Gender		
Male	267 (57.9)	80 (62.5)	347 (58.9)	Chi-square
Female	194 (42.1)	48 (37.5)	242 (41.1)	P = 0.351
		Age		
< 60 years	270 (58.6)	22 (17.2)	292 (49.6)	Chi-square
> 60 years	191 (41.4)	106 (82.8)	279 (50.4)	P < 0.001
		Age Mean		
Year	57.19 ± 17.02	71.79 ± 15.45	60.41 ± 17.81	Independent T test
				P < 0.001
		Marital		
Single	31 (6.7)	5 (3.9)	36 (6.1)	Chi-square
Married	430 (93.3)	123 (96.1)	553 (93.9)	P = 0.239
		Past medical History		
Cancer	8 (1.7)	7 (5.5)	15 (2.5)	
Heart disease	30 (6.5)	25 (19.5)	55 (9.3)	
Alzheimer	7 (1.5)	4 (3.1)	11 (1.9)	Fisher's Exact Test
CVA	13 (2.8)	2 (1.6)	15 (2.5)	P = 0.061
Diabetes	94 (20.4)	32 (25)	126 (21.4)	
HTN	30 (6.5)	12 (9.4)	42 (7.1)	
No PMH	206 (44.7)	26 (20.3)	232 (39.4)	

Results demonstrated that out of 589 patients participating in the study, 128 patients died and 461 patients survived. In survived group 57.9% were man, 93.3% married with mean

age of 57.19 ± 17.02 years and most patient have no past medical history and in death group 62.5% were man, 96.1% married with mean age of 71.79 ± 15.45 years and most

patient have past medical history. Data analysis showed that gender, marital status and past medical history had no significant difference between the two groups of death and survival.

**Table 2:** Logistic regression between initial chest CT finding and mortality risk.

Variables	Total cases Frequency N=589	Death cases Frequency (Percent) N=128	B	S.E	Logistic Wald	regression 95%CI	P-value
<b>Initial chest CT</b>							
	chest	CT	finding				
Yes	538	127 (23.6)					
			2.738	1.015	7.27	0.00-0.47	P= 0.007
No	51	1 (1.96)					

Result showed that out of 589 patients who participated in this study 538 patients had initial chest CT finding and 51 patients didn't have. Out of 538 patients who had initial chest CT finding, 127 patients, and out of 51 patients who had not, 1 patient died. Logistic regression showed that initial chest CT finding was correlated with mortality.

## DISCUSSION

At the moment there is no available prognostic biomarker to identify patients requiring immediate medical attention and their definite death risk factor [7]. Chest CT, especially initial chest CT, will be able to play a key role in diagnosis and prognosis of COVID-19 patients. there is remarkable knowledge gaps about the chest CT imaging finding of patient who infected by Covid-19 virus [4]. In this study we found that out of 538 patients who had initial chest CT finding, 127 patients, and out of 51 patients who had not, 1 patient died. Logistic regression showed that initial chest CT finding was associated with death of Covid-19 patients. In consistent with the present study, Homayounieh and her colleague in their study reported that High RALE score on initial chest CT, and pleural effusions, and worsening lung severity score on follow-up CT Chest were two of death risk factor for patient infected by Covid-19 [18]. Other previous study approved this finding and reported that initial chest CT can serve as a good tool for the initial assessment of COVID-19 [19. 20]. Marco Francone & et.al reported that chest CT finding is associated with severity and death of covid-19 patients and it will be useful to speed-up diagnostic workflow [21]. Yan Li & et al in their study founded that severe manifestation on CT at an early stage may indicate poor prognosis for patients with COVID-19 and Initial CT may be useful to speculate prognosis and stratify patients [14]. Lingli Li et al in their study demonstrated that Chest CT finding is a predictor of covid-19 patient's death, and it can be a prognostic indicator for them [22]. Previous study reported that initial chest CT finding on admission may result in death due to big alveolar damage and progressive respiratory failure [1. 13].

Chest CT scan is an available diagnostic tool and it is easy to perform. Initial pathological chest CT findings of patients indicate the severity and the progression of infection by the virus. The use of CT scan findings on admission can help

physicians choose the appropriate treatment protocol and better manage the planning treatment strategies and evaluating prognosis of patients with Covid-19. We recommend considering Initial pathological chest CT findings on admission as a death risk for patients who infected by SARS CoV- 2 virus.

## CONCLUSION

Pathologic chest CT finding of Covid -19 patients on admission is a predictor of their death and pay attention to this factor will be able to manage the treatment process of COVID-19 patients.

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## CONFLICT OF INTEREST

There is no conflict of interest.

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