Statistical Study on the Effect of Covid-19 on Patients with Chronic Diseases and Role of Radiological Diagnosis in Tobruk City

(Original Research Article)

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Abstract

COVID-19, a viral respiratory disease first identified in December 2019, rapidly emerged as a global public health threat. A deeper understanding of the epidemiology of SARS-CoV-2 and community risk perception is essential for developing effective, targeted interventions to reduce its spread and severity. This study aimed to examine the association between chronic diseases and severe outcomes among patients with COVID-19 infection, based on radiological diagnosis. A cross-sectional study was conducted among adult patients at Alhia Center, Tobruk, Libya, from 23 July to 30 August 2020. Logistic regression analyses (both univariable and multivariable) were performed to identify associations between chronic diseases and COVID-19 outcomes, with results presented as adjusted odds ratios (AOR) and 95% confidence intervals. A p-value of <0.05 was considered statistically significant. The study included 151 patients (82 females and 69 males). Diagnostic methods included clinical examination, radiographic imaging, swab tests, and rapid tests. A total of 23 deaths were recorded. This study contributes to the understanding of how pre-existing chronic conditions may influence the severity of COVID-19

Keywords: COVID-2019, Tobruk, chest X-ray, computed tomography

Introduction

December of 2019, a new severe acute respiratory syndrome,COVID-19, was reported in Wuhan, China. The virus causing this airborne disease was determined to be coronavirus-2 (SARS-CoV-2) [1]. Coronavirus is the biggest pandemic on the planet after H1N1 flu pestilence in 1918 [2].Based on the current studies the clinical course of the sickness shifts from gentle upper respiratory parcel disease discoveries to serious viral pneumonia joined by loss of taste and smell and respiratory disappointment [3]. Although the virus infects individuals of all ages; it is known that people at an older age and with concomitant chronic diseases have more severe symptoms. Studies show that among the expanding number of cases generally affected populations are people with previously known chronic diseases [4]. Hazard factors related with serious disease and mortality are old age, cardiovascular sickness (CVD), diabetes mellitus (DM), hypertension (HT), chronic lung illness, chronic kidney illness (CKD) [5]. Several studies have reported that chronic conditions, such as respiratory and cardiovascular diseases, are associated with worse outcomes following infection [6].These illnesses, which are hazard factors that increment the case casualty rates, have been the main source of death in totally developed or non-industrial countries around the world [7]. Severe viral infections causing systemic inflammatory syndrome increase the risk of plaque, rupture and thrombus formation, and thus result in cardiovascular events [8]. In the course of COVID-19, microangiopathic changes occurring in the respiratory tract of diabetic patients reduce gas exchange and lung compliance and cause a significant decrease in forced vital capacity (FVC) and forced expiratory volume in 1.second (FEV1) [9]. Hypertension is another important disease that should be set consideration in Covid patients. SARS-CoV-2 enters target cells by restricting to angiotensin converting enzyme2 (ACE2) expressed on epithelial cells of lung, kidney, veins. ACE2 articulation expansions in patients with HT and DM, who are treated with ACE inhibitors or receptor blockers [10]. Identification of additional risk factors associated with COVID-19 patients will also affect the survival of individuals with chronic disease. In this study, it aims to detect co-morbidities in hospitalized patients with a diagnosis of COVID-19[11]. Imaging techniques play an important role in diagnose the disease, determine its severity, guide treatment and assess treatment response. The current recommendation of the vast majority of scientific and radiological associations is that imaging tests should not be used as screening tools for detecting COVID-19. Rather, they should be reserved for evaluating complications [16]. Chest X-ray is generally the first-line imaging test in patients with suspected or confirmed COVID-19 due to its usefulness, availability and low cost, though it is less sensitive than computed tomography (CT).[17] The optimal chest X-ray includes posteroanterior (PA) and lateral projections with the patient standing.[18] .

Methodology

Study Design

Across –sectional study was conducted among adult patient from 23July to 30Augusts 2020 at Alhia Center ,Tobrouk city Libya .Both variable and multivariable logistic regression analysis with 95% confidence interval were fitted to identify chronic disease with covid -19 .The adjusted odds ratio (AOR) was used to determine the magnitude of the independent variables P-value <0.05 was considered statistically significant .Sample size (n=151) (F=82) (M=69) using logistic regression models diagnosis (Clinical examination , Radiographic , Swab ,Rapid test, Gene expert),deaths =23.

Statistical Analysis

Statistical analysis was performed by using SPSS Windows (Graduate Pack, version 23). Logistic regression model was used to assessment the associated between the selected disease and death or intensive care unit (ICU) admission adjusted for age.

Results

The study sample amounted to 151 patients, (Females =82) and (Males=69). Table (1) shows distribution of the studied sample by age group among patients. It appears from the table that 7.3% of sample was less than 30 year or less, 11.9% were between 31-40 year, 21.2% were between 41-50 year, 14.6% were between 51-60 year,21.9% were between 61-70 year, 23.2%were older than 70 years.

Table (1): Distribution of the Studied Sample by Age Group among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30 years or less	11	7.3	7.3	7.3
	31 - 40 years	18	11.9	11.9	19.2
	41 - 50 years	32	21.2	21.2	40.4
	51-60 years	22	14.6	14.6	55.0
	61- 70 years	33	21.9	21.9	76.8
	older than 70 years	35	23.2	23.2	100.0
	Total	151	100.0	100.0	

There was statistically significant outcome with age pearson chi-square (value 20.869, sig = 0.001). Table (2) shows distribution of the studied sample by gender among patients, it apparent from table that 54.3% females and 45.7% males. There was no statistical significant (sig = 0.359). Studying the distribution of the studied sample by diagnosis method among patient, Table (3)shows that 91.4% diagnosis by Clinical

examination , 0.7% by Radiographic, 0.7% by Rapid test, 0.7% by Swap, 4.6%Radiology and clinical, 2.0% by gene expert. There was no statistical significant (sig = 0.76).

Table (2): Distribution of the Studied Sample by Gender among Patient at Alhia Center

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	69	45.7	45.7	45.7
	Female	82	54.3	54.3	100.0
	Total	151	100.0	100.0	

Table 3: Distribution of the Studied Sample by Diagnosis Method among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Clinical	138	91.4	91.4	91.4
	Radiology	1	0.7	0.7	92.1
	Rapid Test	1	0.7	0.7	92.7
	Swap	1	0.7	0.7	93.4
	Radiology+ Clinical	7	4.6	4.6	98.0
	Gene Expert	3	2.0	2.0	100.0
	Total	151	100.0	100.0	

Table (4) Shows distribution of the studied sample by diabetes mellitus among patient, it apparent from table that 80.8% had no diabetes,19.2% had diabetes, there was no statistical significant(0.201).

Table 4. : Distribution of the Studied Sample by Diabetes Mellitus among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	122	80.8	80.8	80.8
	Yes	29	19.2	19.2	100.0
	Total	151	100.0	100.0	

Table (5) Shows distribution of the studied sample by hypertension among patient ,it apparent from table that 72.8% had no hypertension ,27.2% had hypertension, there was no statistical significant(0.239).

Table 5: Distribution of the Studied Sample by Hypertension among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	110	72.8	72.8	72.8
	Yes	41	27.2	27.2	100.0
	Total	151	100.0	100.0	

Table (6) Shows distribution of the studied sample by cardiovascular among patient, it apparent from table that 95.4% had no cardiovascular, 4.6% had cardiovascular, there was no statistically significant (0.415).

Table 6: Distribution of the Studied Sample by Cardiovascular Disease among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	144	95.4	95.4	95.4
	Yes	7	4.6	4.6	100.0
	Total	151	100.0	100.0	

Table (7) Shows distribution of the studied sample by pregnancy among patient, it apparent from table that 98.7% had no pregnancy, 1.3% had pregnancy, there was no statistical significant (0.516).

Table 7: Distribution of the Studied Sample by Pregnancy among Patient at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	149	98.7	98.7	98.7
	Yes	2	1.3	1.3	100.0
	Total	151	100.0	100.0	

Table (8) Shows distribution of the studied sample by renal diseases among patient, it apparent from table that 98.7% had no renal diseases, 1.3% had renal diseases, there was no statistical significant (0.42).

Table 8: Distribution of the Studied Sample by Renal Disease among Patient at Alhia Center

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	148	98.0	98.0	98.0
	Yes	3	2.0	2.0	100.0
	Total	151	100.0	100.0	

Table 9 shows the distribution the samples of all chronic diseases tested in the Alhia Center as shown below.

Table 9: Distribution of Studied Sample for all Chronic Disease at Alhia Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No disease	98	64.9	64.9	64.9
	DM	9	6.0	6.0	70.9
	HTN	16	10.6	10.6	81.5
	CV	1	.7	.7	82.1
	Pregnancy	2	1.3	1.3	83.4
	DM+HTN	16	10.6	10.6	94.0
	DM+HTN+ CV	4	2.6	2.6	96.7
	HTN+CV	2	1.3	1.3	98.0
	RF	1	.7	.7	98.7
	RF+ HTN	2	1.3	1.3	100.0
	Total	151	100.0	100.0	

Table 10:Distribution of the Studied Sample by Death among Patient at Alhia **C**enter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	recovery	125	82.8	82.8	82.8
	Death	26	17.2	17.2	100.0
	Total	151	100.0	100.0	

The distribution of the age and outcome among the patients at Alhia Center is shown in the Table 11.

Table 11. Distribution of the Studied Sample by Age and Outcome among Patient at Alhia Center (Age Group and Outcome).

		Outcome		Total
		Recovery	Death	
Age group	30 years or less	11	0	11
	31 - 40 years	18	0	18
	41 - 50 years	30	2	32
	51-60 years	20	2	22
	61- 70 years	23	10	33
	older than 70 years	23	12	35
Total		125	26	151
Pearson Chi-Square Test: Value: 20.869* Asymp Sig. (2-sided): 0.01				

Table 12: Distribution of the Studied Sample DM and Outcome among Patient at Alhia Center. (DM and Outcome).

		Outcome		Total
		Recovery	Death	
DM	No	103	19	122
	Yes	22	7	29
Total		125	26	151
Pearson Chi-Square Test: Value: 1.206* Sig: 0.201				

Table13: Distribution of the studied sample by HIN and outcome among patient at Alhia center **(HTN and outcome)**

		Outcome		Total
		Recovery	Death	
HTN	No	93	17	110
	Yes	32	9	41
	Total	125	26	151
Pearson Chi-Square Tests: Value:0.88 Sig: 0.239				

Table14: Distribution of the studied sample by CV and outcome among patient at Alhia center> (CV and outcome)

		Outcome		Total
		Recovery	Death	
CV	No	120	24	144
	Yes	5	2	7
Total		125	26	151
Pearson Chi-Square Tests: Value : 0.66 Sig: 0.415				

Table 15: Distribution of the studied sample by pregnancy and outcome among patient at Alhia center

Pregnancy * Outcome Crosstabulation

		Outcome		Total
		Recovery	Death	
Pregnancy	No	123	26	149
	Yes	2	0	2
Total		125	26	151
Chi-Square Tests: Value: 0.42 Sig: 0.516				

Table 16: Distribution of the studied sample by renal and outcome among patient at Alhia center -Renal * outcome Crosstabulation

		Outcome		Total
		Recovery	Death	
Renal	No	122	26	148
	Yes	3	0	3
Total		125	26	151
Pearson Chi-Square Test:				
Value: 0.63				
Sig: 0.42				

Table 17: Distribution of the Studied Sample by Gender and Outcome among Patient at Alhia Center. -Gender * outcome Crosstabulation

		Outcome		Total
		Recovery	Death	
Gender	Male	55	14	69
	Female	70	12	82
Total		125	26	151
Chi-Square Tests:				
Value: 0.84				
Sig: 0.359				

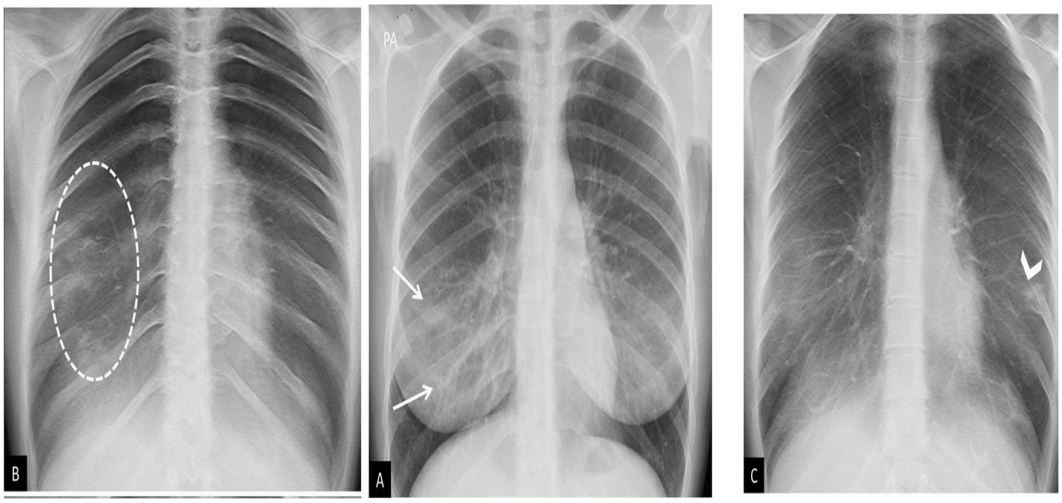
Table 18: Distribution of the Studied Sample by Over all Chronic Disease and Out among Patient at Alhia Center. Over all Chronic Disease * Outcome.

		Outcome		Total
		Recovery	Death	
Over all Chronic Disease	No disease	83	15	98
	DM	7	2	9
	HTN	12	4	16
	CV	1	0	1
	Pregnancy	2	0	2
	DM+HTN	13	3	16
	DM+HTN +CV	2	2	4
	HTN+CV	2	0	2
	RF	1	0	1
	RF+ HTN	2	0	2
Total		125	26	151
Pearson Chi-Square Test: Value: 5.795 Sig: 0.76				

Discussion

Coronavirus is a new severe acute respiratory syndrome, COVID-19, was reported in Wuhan, China. The virus causing this airborne disease was determined to be coronavirus-2 (SARS-CoV-2) .COVID-19 is the largest pandemic in the world after H1N1 flu pestilence in 1918 [2]. Based on the current studies the clinical course of the disease varies from mild upper respiratory tract infection findings to severe viral pneumonia accompanied by loss of taste and smell and respiratory failure [3]. In the Our study it was found that out of the 151 patient at Alhyia center, in Tobruk city ,26(17.2%) death , the results shows deaths in this study increased with age chi- square tests (0.001) ,(see table 11). Another study in U.K in patients admitted to hospital with COVID-19, mutually exclusive categories of obesity and chronic disease are consistently associated with in-hospital mortality in younger adults but not in those 70 years of age or over for men or 80 years and over for women [12]. Another study to systematically evaluate the impact of age on the clinical characteristics and important outcomes for COVID-19 patients, thus helping clinicians to establish risk stratification of COVID-19 patients as early as possible. Sporadic studies have

mentioned that elderly people may tend to die after infection [13].older patients presented significantly lower levels of lymphocytes than younger patients. Lymphocytes are generally elevated in response to common viral infections, but are abnormally decreased in severe acute respiratory syndrome (SARS) and COVID-19 [14]. In our study shows that patients 80.8% had no diabetes,19.2% had diabetes, 72.8% had no hypertension ,27.2% had hypertension, 95.4% had no cardiovascular, 4.6% had cardiovascular, 98.7% had no pregnancy, 1.3% had pregnancy, .7% had no renal, 1.3% had renal disease. Another study common chronic disease among patients was hypertension with 47.2%. This was followed by diabetes mellitus (32.8%) and heart disease (27.5%), Respectively [15]. Although there are significant differences in sensitivity between PCR, CT and portable X-ray, it is accepted that the latter can be used as a triage method in certain scenarios [19] Digital chest tomosynthesis is a technique that uses X-rays in projections with different angles to gather information from different lung sections. This avoids overlapping structures and enables more precise detection of small pulmonary lesions that cannot be visualised on conventional chest X-ray (Fig 1) [20] . Our study shows the use of radiological diagnostics with a clinical diagnosis (4.6 %) see table 3.



(**Fig 1**) Tomosynthesis**. A 30-year-old woman with COVID-19.** (A) Conventional posteroanterior chest projection. Bilateral opacities in lower fields (arrows) that could correspond to dense breast tissue. Owing to uncertainties around the right hemithorax (arrows), a decision was made to perform a digital tomosynthesis (DT) study. (B and C) DT images. These show extensive consolidation in the right lower lung field (white circle in B), as well as small contralateral consolidations only visualised on DT (arrow tip in C) corresponding to foci of pneumonia.

Conclusion

It would be appropriate to evaluate carefully to COVID-19 patients, particularly for the chronic diseases. Specific attention should be paid to people at an older age COVID-19 patients with chronic diseases, especially DM, HTN.

In conclusion, the clinical features and prognosis of the disease vary among patients of different ages and a thorough assessment of age may help clinicians worldwide to establish risk stratification for all COVID-19 patients. Patients aged ≥60 years showed heavier clinical manifestations, greater severity and longer disease courses compared with those aged <60 years. Closer monitoring and more medical interventions may be needed for the elderly. The choice of radiological diagnostics in the initial diagnosis of the patient.

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