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Cancer and COVID-19 in Gaza strip-Palestine: What do we know?

Amal F Jamee [1,*], Wallaa I Alnahhal [2], Norhan A Abughali [2], Mohammed K Abed [2], Sabrin M Zourob [2], Heba S redwan [2] and Shuruk A Ghunaim [2]

[1] *Palestinian Ministry of Heath; University of AL-Azhar; faculty of Medicine, Gaza, Palestine.*
[2] *University of Palestine, Faculty of Pharmacy, Gaza, Palestine.*

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Abstract

As we know cancer patients are considered very vulnerable in the current COVID-19 pandemic. Our study aimed to determine the association between the prognosis of COVID-19 patients with and without cancer.

Patients and methods: We retrospectively analyzed a total of 60 adult patients with and without a history of cancer and with confirmed COVID-19 infection recruited in Al Shifa hospital of Gaza strip as a case-control study from Mars 12, 2022 to Mai 20, 2022. Logistic regression models were performed to explore the risk factors of mortality.

Results: Thirty cancer patients (cancer group, mean age 57.9± 19.9; median age 60 years; 43.3% were female) and 30 non-cancer patients were identified (non-cancer group, mean age 42.17±14.8; median 40 years; 46.7% were female). Intensive care unit admission was higher in the non-cancer group (63.3%) than in the cancer group (26.7%). The mortality rate was higher in the cancer group (40.0%) than in the non-cancer group (33.3%) and the admission to Intensive care unit remains the strongest risk factor for mortality for cancerous patients (OR= 11.9;95%CI:2.26-62.59, p=0.003).

Conclusion: Cancer patients with COVID-19 infection reported a poor prognosis, a closed care, management, and monitoring can improve the outcome of the disease.

Keywords: COVID-19 Infection; Cancer; Gaza strip; Palestine

1. Introduction

The coronavirus disease (COVID -19) caused by a severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2), continues to cause widespread levels of mortality and morbidity around the world [1] notably in the elderly, in patients with chronic diseases and compromised immune systems and in cancer patients [2]. To date, up to 600 million cases and 6.5 million deaths related to COVID-19 have been reported in the world [3]. Several studies reported that age, male gender, and a large presence of comorbidities worsen the outcome of the COVID- 19 infection [4]. In Palestine, the Palestinian Ministry of Health (MOH) has reported 620,548 cases and 5,403 deaths up to 29 September 2022[5]. Cancer patients have an increased risk of acquiring severe infections due to compromised immunity, poor nutrition, and adverse effects associated with post-cancer treatment [6]. Globally it is recognized that cancer patients have a higher risk of serious complications, poor prognosis, and death from COVID-19 [2,7]. According to the report of MOH in Palestine, the cancer incidence rate was 117.8 per 100,000 population in 2019 [8]. Breast cancer was the most common cancer of all cancer cases (16.9% in the West Bank; 18.0% in the Gaza strip, respectively) followed by colorectal cancer (12.6% in the West Bank; 10.7% in the Gaza strip, respectively)[9]. Also, cancer was the second cause of death

* Corresponding author: Amal F Jamee
Palestinian Ministry of Heath; University of AL-Azhar; Faculty of Medical Sciences, Gaza, Palestine.

accounting for 16% of the total death in the West Bank and 10.3% of total deaths in the Gaza strip [9]. For this, we conducted a case-control study by analyzing the patient's medical records at Al Shifa hospital in the Gaza strip with the aim of describing the characteristics and the clinical features and determining whether cancer patients are at higher COVID-19 mortality r compared to non-cancerous patients.

2. Methods

This study was a case-control retrospective study where we compared the occurrence and the severity of the COVID-19 pandemic between cancer patients and non-cancerous patients, in a government hospital for adults. We included all patients (aged ≥18 years) who were positive for RT-PCR test during the period from Mars 12, 2022 to Mai 20, 2022. The control group were matched in terms of age, gender and underlying diseases such as hypertension, diabetes and ischemic heart disease. Transplants patients (kidney, bone marrow, and liver) were excluded from the study because of the higher mortality rate in this subgroup of patients.

2.1. Data collection

All demographic information, clinical characteristics, pathological data, associated comorbidities, symptoms, vital signs, and laboratory findings were extracted from the patient's medical files. In addition, we collected treatment given during the COVID-19 infection period for the two groups.

2.2. Statistical analysis

Data management and statistical analysis were performed with SPSS software version 26.0(IBM, New York, NY). Categorical variables were expressed using frequency and percentages. Continuous data were presented as mean with standard deviation (SD). To compare categorical variables, Pearson's chi-square test was used. Risk factors associated with mortality and their Odds ratio (ORs) were analyzed by the logistic regression models. The difference between groups was considered significative when the p.value was less than 0.05.

3. Results

3.1. Demographic and clinical characteristics of patients with and without cancer

Demographic, baseline characteristics, symptoms, and comorbidities are summarized in table 1. Of the total of 60 patients, 33 (55%) were males, and more than thirty of the study population were older than ≥ 60 years. All patients were from the five governments of the Gaza strip and most patients (60%) were from the central region of the Gaza strip (Gaza city and North Gaza). Hypertension and diabetes were more pronounced comorbidities in the cancer group (20%; 16.7% respectively). The most common symptoms on admission were fever associated with respiratory symptoms such as dyspnea, cough, and sore throat (55%).

Table 1 Clinical characteristics and comorbidities of patients with COVID19 in non-cancer group and cancer group

Characteristics	**Total n=60**		**Non-cancer group**		**Cancer group**		**p.value**
	N	**%**	**N**	**%**	**N**	**%**	
Age (mean)	50.0±19.1		42.2±14.8		57.9±19.9		0.001
Age group							
18-30 years	13	21.7	9	30.0	4	13.3	0.002
31-45 years	12	20.0	10	33.3	2	6.7	
46-59 years	14	23.3	7	23.3	7	23.3	
≥ 60 years	21	35.0	4	13.3	17	56.7	
Gender							
Male	33	55.0	16	53.3	17	56.7	0.795
Female	27	45.0	14	46.7	13	43.3	

Locality of residence							
Central region (Gaza city +central region)	36	60	19	63.3	16	56.7	0.598
Southern region (South Gaza)	24	40	11	36.7	13	43.3	
Comorbidities							
Hypertension	9	15.0	3	10.0	6	20.0	0.331
Diabetes	7	11.7	2	6.7	5	16.7	
≥2 comorbidities	21	35.0	11	36.7	10	33.3	
No comorbidities	23	38.3	14	46.7	9	30.0	
Symptoms							
Fever+ respiratory symptoms	33	55.0	17	56.7	16	53.3	0.948
Fever+ respiratory+ GI* symptoms	14	23.3	7	23.3	7	23.3	
Respiratory symptoms without fever	13	21.7	6	20.0	7	23.3	
Underlying cancer disease							
Solid tumor	------	------	------	------	16	53.3	-----
Hematological	------	------	------	------	6	20.0	
Metastatic	------	------	------	------	8	26.7	

*GI: Gastrointestinal

Among the cancer patients, lung cancer was the most frequent type of cancer (23.3%) followed by leukaemia (20%), brain tumour (13.3%), and breast cancer (10%) (Figure1). All cancerous patients had a history of anti-cancer therapy, twenty-four (80%) were on chemotherapy, and six of them received treatment combining chemotherapy and radiotherapy (Figure 2).

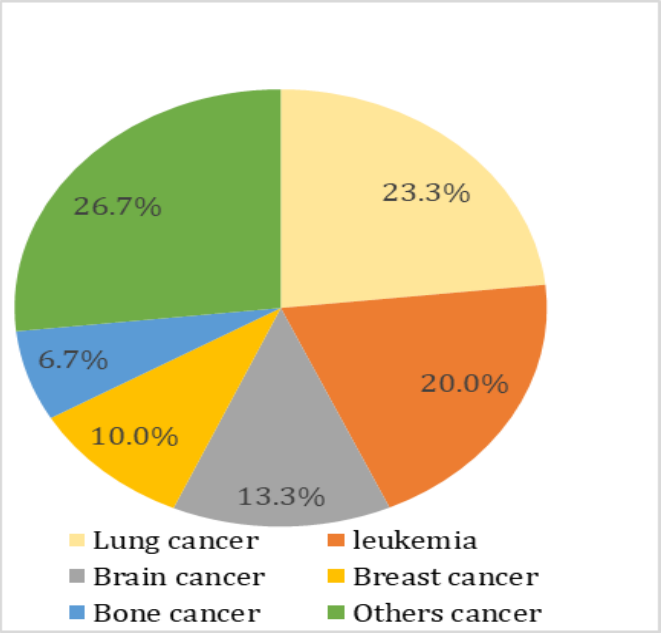

Figure 1 Different types of cancer

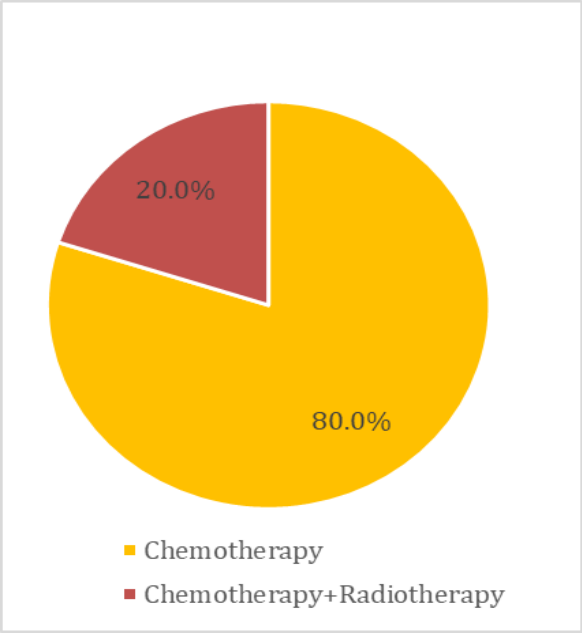

Figure 2 Cancer therapy

Also, we found that there is no difference between the two groups concerning blood pressure, body temperature, heart rate, and oxygen saturation level (supplementary table1). Laboratory investigation on admission indicates an increase in lymphocytes (14.5±17.0 *vs* 4.6±18.3, p=0.004), and a low level of haemoglobin (9.9±2.3 *vs* 11.2±1.9, p=0.0019) in the cancer group compared to the noncancer group (Table2).

Table 1s (supplement) Vital signs of patients with COVID19 infection in non-cancer group and cancer group

Vital signs	Total n=60	Non-cancer group	Cancer group	p.value
Systolic blood pressure (mmHg)	122.8±24.8	122.5±25.0	123.0±25.0	0.939
Diastolic blood pressure (mmHg)	74.2±17.1	72.7±16.1	75.7±18.1	0.501
Body temperature (^{0}C)	38.2±1.1	38.3±1.2	38.0±1.0	0.281
Pulse rate (beats per minute)	95.3±22.5	93.6±21,6	97.1±24.0	0.556
Oxygen saturation	86.4±11.4	84.3±11.7	88.4±10.9	0.168

Table 2 Laboratory findings of patients with COVID19 in non-cancer group and cancer group

Laboratory findings	Total n=60	Non-cancer group	Cancer group	p.value
Glucose level mg/dl	178.1±115.7	201.2±131.3	155±94.4	0.123
Hemoglobin level g/dl	10.5±2.2	11.2±1.9	9.9±2.3	0.019
White blood cells x10^9cells/L	9.9±5.6	9.2±3.8	10.5±7.0	0.373
Lymphocytes, x10^9cells/L	9.5±13.4	4.6±5.2	14.5±17.0	0.004
Creatinine mg/dl	2.6±12.9	4.3±18.3	1.1±0.5	0.323
Liver enzymes AST*	48.9±36.6	50.0±35.7	47.1±38.1	0.715
Liver enzymes ALT**	44.7±33.0	49.2±42.1	40.2±20.0	0.295
Potassium level mEq/L	4.1±0.63	4.2±0.69	4.0±0.55	0.239
Sodium level mEq/L	137.8±9.8	139±12.7	136±5.3	0.248

*AST: Aspartate aminotransferase; **ALT: Alanine aminotransferase

3.2. Treatment and outcome

Treatment options of patients are presented in Table 3. A total of 39 patients (65%) received oxygen therapy. All-cause mortality was greater in the cancer group compared to the non-cancer group (40% *vs* 33.3%) but the difference did not reach a statistical significance. The percentage of COVID- 19 patients with non-cancer who required intensive care unit (ICU) hospitalization and ventilator use was more than three times higher than in patients with cancer (63.7%;26.7% respectively p=0.004). In addition, there was a statistically significant difference between the 2 groups in terms of the use of antibiotic treatments such as meropenem and vancomycin and the use of both was higher in the non-cancer group (76.7%; 20% p<0.001 respectively). Also, one-third of the COVID-19 population received the antiviral treatment (Ribavirin) and fifty per cent of non-cancer patients receive monoclonal antibody interleukin 6 receptor antagonist compared to the cancer group (53.3% *vs* 20% p=0.007) and the combination of these two medicines was only given in the non-cancerous group (20%).

The association of clinical factors with the risk of mortality is displayed in table 4, which was evaluated using multivariate logistic regression analysis. In the first model adjusted for age, ICU admission, the value of WBC, and creatinine level, the risk of death increased in patients in age ≥ 60 years (OR=11.8; 95% CI:1.46-96.16,p=0.021); and in patients admitted to ICU (OR=10.4; 95% CI:2.01-54.24, p=0.005). In the second model adjusted for age, ICU admission, and cancer group vs non-cancer group, the risk of mortality remained still high in patients admitted to ICU (OR= 11.9; 95% CI:2.26-62.59, p=0.003).

Table 3 Treatment and COVID -19 outcome of patients with and without cancer

Outcome	Total n=60		Non-cancer group		Cancer group		p.value
	N	%	N	%	N	%	
Oxygen therapy	39	65.0	23	76.7	16	53.3	0.058
ICU admission	27	45	19	63.3	8	26.7	0.004
Medical treatment							
Dexamethasone	57	95.0	30	100.0	27	90.0	0.076
Antibiotic treatment							
Meropenem	41	68.3	26	86.7	15	50.0	0.002
Vancomycin	32	53.3	24	80.0	8	26.7	<0.001
Meropenem+ Vancomycin	29	48.3	23	76.7	6	20.0	<0.001
Antiviral treatment							
Ribavirin	18	30.0	11	36.7	7	23.3	0.260
Tocilizumab: Actemra	22	36.7	16	53.3	6	20.0	0.007
Ribavirin+ Tocilizumab	6	10.0	6	20.0	0	0	0.006
COVID-19 outcome							
Discharge	38	63.3	20	66.7	18	60.0	0.592
Mortality	22	36.7	10	33.3	12	40.0	

Table 4 logistic regression analysis on Risk factors predicting the risk of mortality among patients diagnosed with the COVID-19 infection

Variables	Univariate OR (95% CI)	p.value	Multivariate analysis			
			Mode l† OR (95%CI)	p.value	Model 2†† OR (95%CI)	p.value
Gender						
Male	1.3 (0.45-3.76)	0.628	----------		----------	
Female	Ref					
Age group						
18-30 years	Ref					
31-45 years	2.4 (0.42-13.39	0.325	----------		----------	
46-59 years	0.6 (0.08-4.01	0.560	----------		----------	
≥ 60 years	4.4 (0.94-21.00)	0.060	11.8 (1.46-96.16)	0.021	4.7 (0.68-31.99)	0.118
Patient group						
Non-cancer group	Ref					
Cancer group	1.3 (0.47-3.82)	0.592			2.5 (0.4-14.77)	0.297
Comorbidities						
Hypertension	0.23 (0.03-2.22)	0.206	----------		----------	
Diabetes	0.3 (0.03-3.07)	0.318	----------		----------	
≥2 comorbidities	2.5 (0.74-8.45)	0.140	----------		----------	
No comorbidities	Ref					

Hemoglobin level g/dl						
Anemia	1.7 (0.40-7.17)		----------		----------	
Not anaemic	Ref					
WBC* x10^{9}cells/L						
WBC 4-10	Ref					
WBC <4	1.8 (0.14-22.7)	0.655	----------		----------	
WBC >10	4.5 (1.44-14.38)	0.010	4.6 (0.98-21.72)	0.052	----------	
Lymphocytes x10^{9}cells/L						
Lymphocytes ≥1	Ref					
Lymphocytes <1	2.0(0.56-7.20)	0.289	----------	-----------	----------	
Creatinine, mg/dL						
<1.5mg/dL	Ref					
≥1.5mg/dl	10.9 (1.18-100.45)	0.035	9.4 (0.70-125.70)	0.092	----------	
ICU Hospitalization**						
Yes	4.6 (1.5-14.35)	0.008	10.4 (2.01-54.24)	0.005	11.89 (2.26-62.59)	0.003
No	Ref					
ICU Treatments						
Tocilizumab***			----------	----------	----------	
Yes	2.46 (0.83-7.31)	0.107				
No	Ref					
Antiviral therapy						
Yes	0.6 (017-1.88)	0.353	----------	---------	----------	
No	Ref					
Oxygen therapy						
Yes	2.4 (0.76-8.10)	0.135	----------	----------	----------	
No	Ref					

*WBC: White blood cells x10^{9}cells/L; **ICU: Intensive care unit; ***Tocilizumab: Actemra; †Modele1: Multivariate analysis was adjusted to age group, the value of WBC; creatinine level, and ICU hospitalization. ††Modele2: Multivariate analysis was adjusted to age group, ICU hospitalization, and cancer group vs non-cancer group.

4. Discussion

Findings from this study reveal that COVID- 19 infection in our cancer patients are older; the mean age was 57.9±19.9 and had a higher rate of mortality (40%) without a significant difference between the cancer and non-cancer group. This may be explained by the old age of cancerous patients, the presence of comorbidities two times higher such as Hypertension (20%) and diabetes (16.7%) and the weakened immune status of cancer patients. The mortality rate described in our study is close to the data conducted in a study in Iran [10]. A systematic review of risk for mortality among a large population with hematologic malignancy affected with COVID- 19 revealed that age>60 years is a risk factor for mortality in these patients [11,12]. Also, the LEOSS (Lean European Open Survey on SARS-Cov-2 infected patients) registry reported a mortality rate of 22.5% in patients with cancer versus 15% in patients without cancer [13]. The regression analysis showed that the risk of death increased more than tenfold in COVID-19 infected cancer patients admitted to ICU, compared to non-cancer patients. This higher mortality is probably related to the vulnerability of the immune system of cancerous patients, who were all on anticancer therapy (chemotherapy or combining chemotherapy and radiotherapy). However, studies in China and the United States have suggested a predisposing role of malignancy

in the increased mortality rate of COVID-19, with higher rates for patients with active cancer receiving anti-cancer treatments [14,15].

Limitations

Our study has some limitations, first, it is a retrospective study, based on patients with symptomatic COVID-19 infection admitted to the hospital (COVID-19 unit). Also, the limitation of sample size restricted a more stratified analysis to reduce the effect of selection bias. Secondly, certain important confounders were not able to be included in the multivariate analysis such as the tumour stage.

5. Conclusion

The comparison between cancer and non-cancer patients infected with COVID-19 may reveal more information. Therefore, larger sample sizes with more information are needed in the future to further explore risk and serious events in cancer patients infected with COVID-19.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare any financial interest or any conflict of interest.

Statement of ethical approval

The ethical approval was obtained from the Palestinian ethical committee.

Statement of informed consent

We abandoned the requirement for informed consent for this retrospective study subject to the anonymity of patients.

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