



Research

Treatment Outcomes in COVID-19 patients with comorbidities in Kaduna state, Northwestern Nigeria

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Abstract

Background: Severe COVID-19 disease has been reported among people with underlying conditions such as diabetes, chronic respiratory diseases, cancer, obesity, and cardiovascular disease. This study determined the outcomes of COVID-19 among patients with comorbidities in Kaduna state, where we have the highest incidence in northern Nigeria.

Methods: This study was a retrospective, descriptive cross-sectional review of the clinical records involving all age groups of 902 COVID-19 patients admitted at the four isolation centers of the Kaduna State Infectious Disease Control Centre (IDCC) between March 27th 2020 to December 31st 2021. Data was analyzed with SPSS version 25 and STATA SE 12 with $p \leq 0.05$.

Results: Out of the 902 cases, 245 (27.2%) had comorbidities, hypertension 206(22.8%) was the most recorded comorbidity, others were diabetes 77(8.5%), asthma 7 (0.78%), HIV 7(0.78%), sickle cell anemia 7 (0.78%) and PTB 3 (0.33%). Patients with comorbidities had prolonged mean duration of symptoms 8.36 ± 3.5 days, compared to 7.2 ± 2.7 days in those without comorbidities ($p=0.001$). Multivariate logistic regression analysis further shows that the odds for clinical recovery from the COVID-19 disease was significantly lower for patient with hypertension (AOR=0.13, 95%CI=0.06-0.27, $p < 0.01$), diabetic (AOR=0.20, 95% CI=0.10-0.40, $p < 0.01$) and HIV comorbidities (AOR=0.1, 95%CI=0.01-0.98, $p=0.05$) compared to those without comorbidities

Conclusion: Hypertension and diabetes were the major comorbidities in this study. Most patients with comorbidities had severe presentations and fatal poorer outcome. There is a need for sustained public health education targeted at patients with chronic diseases to be screened and treated early for COVID 19 Disease.

Keywords: COVID 19; -Comorbidities, Outcome, Retrospective, Hypertension; Diabetes

Introduction

Corona Virus Disease 2019 (COVID-19) is an infectious disease caused by a new corona virus strain.¹ It is caused by SARS-COV2 and represents the causative agent of a potentially fatal disease that is of great global public health concern.² It was identified in Wuhan China in December, 2019 and had since then spread throughout the world affecting both developed and developing countries, resulting in significant morbidity and deaths.^{3,4} It was declared a pandemic by the World Health Organization in 2020.⁵ The transmission of COVID-19 is potent and the infectious rate is rapid, and since there is no specific drug for COVID-19, the treatment is mainly by symptomatic and supportive therapy. In

addition, it should be pointed out that patients with severe illness need more aggressive treatment with laboratory support and meticulous care.⁶⁻⁷

The disease affect mostly older people and those with underlying diseases such as diabetes, chronic respiratory diseases, cancer, obesity, and cardiovascular disease, and it could even lead to death.⁸ A study conducted in Paris on the characteristics and outcomes of Asthmatic patients with COVID-19 pneumonia, and other comorbidities revealed worst clinical outcome in patients with hypertension and diabetes.⁹ Another study conducted in Dubai among 193 patients with severe COVID-19 and diabetes revealed higher mortality rate, intensive care unit admissions and requirement of



ventilator support among those with diabetes as comorbidity.^{10,11} A similar study conducted in Wuhan, China on the risk factors for severity and death among adult hospitalized COVID-19 patients revealed that older age group, hypertension, diabetes, obesity, chronic kidney disease and stroke contributed more to mortality among COVID-19 patients.¹² Another survey among patients hospitalized for COVID-19 and cardiac disease in Northern Italy revealed higher mortality and complications like thromboembolic phenomenon, Acute Respiratory Distress Syndrome (ARDS) and Septic Shock among COVID-19 patients.¹³ A COVID-19 survey among patients with chronic diseases in Saudi Arabia¹⁴ and Egypt¹⁵ also revealed that patients with more than one chronic conditions were at higher risk of yielding poor clinical outcomes, increased disease complications, critical disease progression and worsening survival rate.

In Nigeria despite double epidemic of high prevalence COVID-19 and high prevalence of chronic non communicable diseases,¹⁶ very few researches have been conducted on the clinical outcome of the COVID -19 disease among patients with comorbid conditions in the country. Osibogun et al reported in Lagos, Nigeria, that hypertension and diabetes were the commonest comorbidities in COVID-19 patients, with associated increased complications and death among those with these comorbidities.¹⁷ This study therefore was conducted in Kaduna, a state with the highest number of COVID-19 cases in the North Western region of Nigeria²¹ to determine the clinical outcome following management of COVID-19 patients with comorbidities in Kaduna State.

Methods

The study was conducted at the Infectious Disease Control Centre (IDCC) in Kaduna, the capital of Kaduna State, in North Western Nigeria. The Kaduna State Infectious Disease Control Centre had two isolation centers within Kaduna metropolis as at the time of this survey; the Kakuri IDCC and the Hamdala Alternative Isolation center (HAIC). Other isolation centers were located in General Hospital Kafanchan and Zaria Hotel outside the state capital city. The State had a total of 262 beds in the four Isolation centers and had managed more than 10,000 COVID 19 cases as at the time of the survey. Kaduna State responds to the COVID-19 pandemic via nine pillars setup by the state Emergency Operation Centre (EOC). These pillars include Case Management, Risk communication, Logistics and Supplies, Epidemiology and Surveillance,

Laboratory Services, Point of Entry (POE), Infection Prevention and Control, Coordination and Research.

The study was a review of clinical records of COVID-19 patients from 27/03/2020 to 31/12/2021 in the four isolation centres. A structured questionnaire was used as a proforma to retrieve data on patients' socio demographics, complications, period of symptoms, severity of condition upon presentation at the facilities and self-reported comorbidities. The questionnaire also contained classification of the COVID 19 cases as mild, moderate and severe. A patient who was asymptomatic at presentation was classified as mild, while a patient was classified as moderate if they presented with fever, cough, respiratory rate <30 breaths per minute, SPO₂ >90% for adults and >92% for children. Patients with grunting respiration, respiratory rate >30 breaths per minute, spO₂ <90% for adults and <92% for children requiring oxygenation was classified as severe.¹⁷

The outcomes were recovery and death defined as follows:

- Recovery: These are patients who were admitted by the case management team with evidence of discharge from the hospital following remission of presenting symptoms or a repeat COVID 19 polymerase chain reaction (PCR) negative test.
- Death: This is death of person admitted for COVID-19 with clinical records of being certified dead by a COVID-19 case manager.

Data analysis was done using IBM SPSS version 25 and Stata SE 12. Categorical variables were presented in frequencies and percentages, normally distributed continuous variables were presented as mean and standard deviation (SD) while non-normal continuous variables were presented as median and interquartile range (IQR). Chi-square tests were used to determine differences in patient characteristics between those with comorbidities and those without. Multivariate logistic regression analysis was done for the determinants of clinical recovery from COVID 19. The level of statistical significance was set at $p \leq 0.05$.

Ethical Permission (MOH/ADM/744/VOL.1 / 930) was obtained from the Kaduna state Ministry of Health Research Ethic Committee (HREC).

Results

A total of 902 COVID-19 patients participated in the study. The mean age of the respondent was 40.1 ± 16 years. Majority of the respondents were male 524 (58.1), mostly Hausa 357(39.6%) and Southern Kaduna tribes 707 (78.4), Married 550 (61.0) and were Christians 494 (54.8). Majority 612(67.8) had tertiary level of education, 415(46) were admitted at HAIC and 245(27.2) had

comorbidities. (Table 1) Hypertension 206(22.8%) was the most recorded comorbidity, others were Diabetes 77(8.5), Asthma 7 (0.78%), HIV 7(0.78%), Sickle Cell Anemia 7 (0.78%), PTB 3 (0.33%) and other diseases such as psychiatric conditions, acute viral hepatitis, chronic liver disease and chronic lymphocytic leukemia. (Table 2).

Patients with comorbidities had prolonged duration of symptoms 8.36 ± 3.5 days, compared to 7.2 ± 2.7 days in those without comorbidities. Bivariate analysis revealed that more patients with comorbidities were found to have propensity to develop symptoms ($X^2 = 114.1, P = < 0.001$): ranging from fever ($X^2 = 131.6, P = < 0.001$), Cough ($X^2 = 142.8, P = < 0.001$), Anosmia ($X^2 = 61.0, P = < 0.001$) and loss of taste ($X^2 = 63.5, P = < 0.001$), shortness of breath ($X^2 = 173.6, P = < 0.001$), had severe presentations ($X^2 = 272.6, P = < 0.001$), developed of complications ($X^2 = 38.6, P = < 0.001$): ranging from Acute Respiratory Distress Syndrome ($X^2 = 26.7, P = < 0.001$) and Acute Kidney Injury ($X^2 = 12.3, P = 0.002$), Required oxygen therapy ($X^2 = 155.9, P = < 0.001$) and Died ($X^2 = 101.2, P = < 0.001$) compared to those without comorbidities (Table 3 &4).

Multivariate logistic regression analysis shows that the odds for recovery from the COVID-19 disease was significantly lower for patient with hypertension (AOR=0.33, 95%CI=0.06-0.27), diabetes (AOR=0.20, 95% CI=0.10-0.40) and HIV comorbidities (AOR=0.1, 95%CI=0.01-0.98) compared to those without comorbidities (Table 5).

Table 1: Socio-Demographic Characteristics of COVID-19 Patients admitted in Kaduna State Isolation Centers. N=902

Sociodemographic	Freq	Percent
Age (Years) - Median age (40.1±16.0)		
<18	44	4.9
18-30	281	31.2
31-40	171	19.0
41-50	169	18.7
51-60	130	14.4
61-70	67	7.4
>70	40	4.4

Sociodemographic	Freq	Percent
Sex		
Male	524	58.1
Female	378	41.9
Religion		
Islam	408	45.2
Christianity	494	54.8
Tribe		
Hausa	357	39.6
Southern Kaduna	350	38.8
Igbo	83	9.2
Yoruba	67	7.4
Others	45	5.0
Marital Status		
Married	550	61.0
Single	317	35.1
Widow	35	3.9
Level of Education		
No formal education	17	1.9
Primary	93	10.3
Secondary	180	20.0
Tertiary	612	67.8
Treatment center		
HAIC	415	46
IDCC Kakuri	325	36
Zaria	153	17
Kafanchan	09	1

*Other tribes include Nupe, Igala, Itseki

Table 2: The Distribution of the different comorbidities among patients admitted in Kaduna State Isolation Centers n=902

Comorbidity	Freq	Percent
Present	245	27.20
Absent	657	72.80
Hypertension	206	22.84
Diabetes	77	8.54
Asthma	7	0.78
Sickle Cell Anemia	7	0.78
HIV	7	0.78
Heart Disease	7	0.78
Pulmonary Tuberculosis	3	0.33
*Others	9	3.70

*Others include psychiatric condition, Acute Viral Hepatitis, Chronic Liver Disease and Chronic Lymphocytic Leukemia.



Table 3: Relationship between symptoms and comorbidities of COVID 19 among patients admitted in Kaduna State Isolation centers n=902

Symptoms	With comorbidities (%) n=245	Without comorbidities (%) n=657	X ²	P-value
Symptoms - (Mean duration)	8.36±3.5 days	7.2±2.7 days		
Symptoms present				
Symptoms absent	171 (46.1) 74 (13.9)	200 (53.9) 457 (86.1)	114.1	<0.001
Fever				
Yes	156 (50.8)	151 (49.2)	131.6	<0.001
No	89 (15.0)	506 (85.0)		
Headache				
Yes	140 (50.0)	140 (50.0)	107.0	<0.001
No	105 (16.9)	517 (83.1)		
Cough				
Yes	154 (52.7)	138 (47.3)	142.8	<0.001
No	88 (14.5)	519 (85.5)		
Sore throat				
Yes	107 (59.8)	72 (40.2)	120.1	<0.001
No	138 (19.1)	585 (80.9)		
Shortness of Breath				
Yes	99 (74.0)	35 (26.0)	173.6	<0.001
No	146 (19.0)	622 (81.0)		
Loss of taste				
Yes	61 (60.4)	40 (39.6)	63.5	<0.001
No	184 (23.0)	617 (77.0)		
Loss of Smell				
Yes	70 (56.0)	55 (44.0)	61.0	<0.001
No	175 (22.4)	607 (77.6)		
Fatigue				
Yes	150 (55.4)	121 (44.6)	155.6	<0.001
No	95 (15.1)	536 (84.9)		

Table 4: Relationship between severity of illness and comorbidities of COVID 19 among patients admitted in Kaduna State Isolation centers n=902

Clinical Characteristics	With comorbidities (%) n=245	Without comorbidities (%) n=657	X ²	P-value
Severity				
Mild	77 (12.4)	543 (87.6)		
Moderate	92 (46.7)	105 (53.3)	272.6	<0.001
Severe	76 (89.4)	9 (10.6)		
Oxygen requirement				
Yes	82 (78.1)	23 (21.9)	155.9	<0.001
No	163 (20.5)	634 (79.5)		
Complications				
Yes	22 (78.6)	6 (21.4)	38.6	<0.001
No	223 (25.5)	651 (74.5)		
Complication type				
ARDS				
Yes	14 (82.4)	3 (17.6)	26.7	<0.001

No	231 (26.1)	654 (73.9)		
AKI				
Yes	6 (85.7)	1 (14.3)	12.3	0.002
No	238 (26.6)	657 (73.4)		
Outcome				
Recovered	199 (23.4)	650 (76.6)		
Died	46 (86.8)	7 (13.2)	101.2	<0.001

AKI – Acute Kidney Disease; ARDS – Acute Respiratory Distress Syndrome

Table 5: Multivariate logistic regression of ‘recovery outcome’ of treatment and comorbidities among the COVID -19 patients. (n=902)

Variable	Freq (%)	*AOR	95% CI	p
Hypertension				
Yes	206(22.84)	0.13	0.06-	<0.01
No	696(77.16)		0.27	
Diabetic				
Yes	77(8.54)	0.20	0.10-	<0.01
no	825(91.46)		0.41	
PTB				
Yes	3	0.18	0.01-	0.30
no	899		4.68	
HIV				
Yes	7	0.10	0.01-	0.05
No	895		0.98	
Others				
Yes	40	1.21	0.24-	0.81
No	8		5.93	

*AOR= Adjusted Odd Ratio

Discussion

This survey was conducted to determine the outcome of managing COVID-19 patients with comorbidities in IDCC, Kaduna. The finding shows that hypertension and diabetes were the major comorbidities in our setting and that patients with comorbidities had severe presentations and poorer outcome compared to those without comorbidities.

This survey also showed that majority of the patients managed were mild cases similar to the previous study conducted by Oyefabi et al which revealed that most of the COVID-19 cases managed in Kaduna state were mild in presentation.¹⁸ However, our findings also showed that the presentations in patients with comorbidities in this study were mostly severe to critical. The findings corroborate with that of Osibogun et al in Lagos¹⁷ and Richardson in New York city Area¹⁹ that COVID-19 patients with comorbidities had severe form of clinical presentation compared to those without comorbidities.

Our findings also revealed that hypertension and diabetes were the most common comorbid conditions among COVID-19 patients similar to the findings in Lagos.¹⁷

This current survey also showed that the duration of symptoms recovery was prolonged in patients with comorbidities compared to those without comorbidities. This finding agrees with that of Mohan et al, in North India,²⁰ and an African study conducted by Akande et al¹⁶ in Ilorin, North Western Nigeria which showed that COVID-19 patients with comorbidities had increased length of hospital stay and would require prolonged duration of treatment. Our findings also showed that patients with comorbidities had increased chance of developing complications, required oxygen and had increased risk of dying compared to those without comorbidities. The findings corroborate with previous findings which revealed that chronic comorbid conditions like hypertension and diabetes present with severe COVID 19 complications and fatal outcomes.¹⁵

There is a need for early diagnosis and treatment of comorbid conditions in patients with COVID-19 in order to guarantee better treatment outcomes. There is also a need for aggressive sensitization campaigns on the importance of vaccine uptakes in COVID-19 patients for primary prevention of the disease especially in patients with chronic medical conditions.

Limitations of the study: The limitations of this study are that of using secondary hospital data in a developing country like Nigeria where most of the patients’ records are still paper based with the possibility of missing hospital data and selection bias.

Conclusion

The study found that COVID-19 patients with comorbidities tend to have significant poorer outcome with respect to their clinical characteristics, including symptomatology, severity, complications, oxygen need, and increased mortality rate. Thereby, the need to critically investigate the management of



COVID-19 patients with comorbidities to reduce the negative consequences.

Conflict of interest: Nil

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