Clinical Symptoms and Haematological Characteristics among Male and Female COVID-19 Patients in Rivers State: A Single-center Case Reviews

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Authors' contributions

This work was carried out in collaboration among all authors. Authors ADJ and TCU designed the study, wrote the protocol, managed the literature searches and wrote the first draft of the manuscript. Authors TCU and MOO performed the statistical analysis, managed the analysis of the study and correction of the draft. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Objectives: The study seeks to assess the sex differences in reported clinical symptoms and haematological parameters of hospitalized COVID-19 cases.
Study Design: A retrospective descriptive cross-sectional study.
Place and Duration of Study: Covid-19 Treatment Centre, Rivers State, between May 2020 and July 2020.
Methodology: Descriptive data collection for patients diagnosed of COVID-19 was employed within the months of May to July 2020. A comparison of demographic profile, presenting symptoms, comorbidities and laboratory findings between males and females was analyzed using SPSS version 25. Ethical approval was obtained prior to commencing data collection.

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Results: In this study, data of 56 patients were analyzed of which 31 (55.4%) were males and 25 (44.6%) were females. The mean age for all patients was 36 years and males had a higher mean age (40 ± 12.6) compared to females (31 ± 8.8). Twelve patients (21.4%) reported pre-existing co-morbidities and Hypertension 11 (19.6%) was the prevalent co-morbidity followed by peptic ulcer 2 (3.6%) and Diabetes 2 (3.6%) and these were more common among males. Triglyceride level was significantly higher among females (p= 0.028) and low-density lipoprotein (LDL) level was significantly lower among females (p= 0.044) while systolic blood pressure level was significantly higher among males (p= 0.011).
Conclusion: Though similar symptoms and haematological findings occur in males and females, specific disparities in some parameters were observed. We recommend healthcare personnel to consider these differences when caring for patients hospitalized for COVID-19.

1. INTRODUCTION

The new strain of Corona virus which was implicated as the cause of an unusual pneumonia-like symptoms observed in December 2019 in Wuhan, China spread quickly around the world and was declared a pandemic within the first few months of 2020. The virus initially known as 2019-nCOV was renamed by the World Health Organization (WHO) as Coronavirus Disease 2019 (COVID-19) [1]. The disease is extremely infectious with an incubation period of 2 to 14 days [2]. Transmission can occur from person to person through respiratory droplets, aerosols, fomites and direct contact with contaminated fluids (i.e. sputum, serum, blood, feces, etc.) of COVID-19 patients. Enclosed spaces such as airplanes, passenger cars and aerosol generating procedures (i.e. intubating the tracheal airway, bronchoscopy, nebulizing patients etc.) in the hospital settings can further speed up transmission of the virus [3,4].

As a result of the characteristically highly infectious nature of the virus, COVID-19 rapidly spread with a global occurrence of more than ten million confirmed cases and over 500 000 deaths as at 1st July 2020, according to the given case definitions and testing protocols. Around the same time, Africa recorded over 400 000 cases with five countries having higher counts including; South Africa (168 061), Egypt (71 299), Nigeria (27 110), Ghana (18 134) and Algeria (14 657) [5,6]. Furthermore, as of 1st December 2020, the WHO reported a global occurrence of 62, 844, 837 confirmed cases of COVID-19 with 1, 465,144 deaths [7]. While Nigeria was reported to have 67 557 confirmed cases of COVID-19 with 1 173 deaths as of 1st December 2020 [8].

Initially, patients infected with the disease reportedly presented commonly with mild to moderate symptoms such as; fever, cough and tiredness whereas symptoms such as nasal congestion, rhinorrhea, sore throat and diarrhea was reported but not common [9-11]. The elderly and patients with comorbidities have reportedly presented with severe respiratory illness and poor prognosis [12]. As the disease evolved, loss of taste and smell were symptoms observed by researchers to be predictors of COVID-19 infection, while other emerging symptoms such as; deadly inflammatory syndrome, COVID toes, confusion and hallucinations have been reported [13,14].

Laboratory tests are needed to confirm diagnosis and monitor the health status of suspected COVID-19 patients, and this can be done by detecting the nucleic acid of the virus with real-time reverse-transcription polymerase chain reaction (rRT-PCR). Though the rRT-PCR is the benchmark used to identify and monitor patients, it has a disadvantage of yielding false-negative results and its process is prolonged laborious process [15]. Additionally, haematological and biochemical tests are conducted to confirm suspicion of COVID-19 infection and alterations from the normal have been observed in these parameters among suspected cases [16-18]. The importance of laboratory tests goes beyond confirming diagnosis and helps to guide management and monitoring of the confirmed cases until recovery and discharge.

A number of studies have reported that sex differences exists in the clinical symptoms and laboratory parameters of COVID-19 patients and obvious abnormalities have been seen among males compared to females [19-21]. Researchers have also observed a higher mortality from corona virus disease among males

compared to females [22]. This study therefore aims to provide a description of the demographic characteristics of COVID-19 patients and compare sex differences in clinical symptoms and laboratory findings in this single-center study. The findings will add to the body of knowledge on coronavirus disease about the sex differences in clinical symptoms and laboratory parameters in Nigeria. The study will support observations about emerging symptoms of COVID-19 and sex bias that has been reported from other studies on COVID-19 patients through evidence-based epidemiological analysis.

2. METHODOLOGY

2.1 Study Area

The research was conducted in the General hospital at Eleme as a single-center study, which is one of the three COVID-19 treatment centers located in Port Harcourt Rivers state. The treatment center is fully supported by the state government and has a well-equipped side laboratory and teams of qualified medical personnel with skills for management of patients infected with COVID-19.

2.2 Study Design and Population

A retrospective descriptive cross-sectional study was conducted following ethical approval and permission from the treatment center. Data was collected from patients' records as they were consecutively admitted into the treatment center based on the guidelines for confirmed cases of

COVID-19 by the Nigeria Center for Disease Control (NCDC) [23].

2.3 Data Collection and Analysis

Electronic records of patients admitted into the treatment center at the General hospital, Eleme, Rivers State in the months of May-July 2020 was collected. A period of two extra weeks was added to capture management profile of patients admitted towards the end of July. Data collected included; demographic profile, presenting symptoms and signs, comorbidities, and laboratory findings.

Data was analyzed using Statistical Package for Social Sciences Software (SPSS) version 25.0. Categorical variables are presented in tables as frequencies and percentages and continuous variables are presented as mean and standard deviation. The mean values of continuous variables were compared using independent t-test for normally distributed data and Chi square test was used to compare categorical variables while Fisher's exact test was used for limited data.

3. RESULTS

Table 1: In this study, records of 56 patients were collected. There were 31(55.4%) males and 25 (44.6%) females. More than twenty percent of the participants were over 40 years of age 17(20.4%) and 11 (19.6%) of them were within the 31-35 years' age group. The mean age of males was 40 ± 12.6 years and higher than the mean age of females 31 ± 8.8 years.

Table 1. Basic characteristics of the patients

Variable	Frequency n=56	Percentage (%)
Sex		
Male	31	55.4
Female	25	44.6
Age group		
≤20 years	3	5.4
21-25 years	6	10.7
26-30 years	9	16.1
31-35 years	11	19.6
36-40 years	10	17.9
Over 40 years	17	20.4
Age (Mean ± S.D)	**36 ± 11.7**	
Age of Male patients (Mean ± S.D)	**40 ± 12.6**	
Age of Female patients (Mean ± S.D)	**31 ± 8.8**	

Table 2. shows that more than twenty percent of the participants had pre-existing co-morbidities and males had a higher prevalence of co-morbidities 9 (75.0%) compared to females 3 (25.0%). The prevalent co-morbidity observed was Hypertension among 11 participants, and males had a higher prevalence of Hypertension 9 (81.8%) compared to the females 2 (18.2%). There was equal prevalence of peptic ulcer among males and females 1 (50.0%) and the other co-morbidities identified; Diabetes 2 (100%), Chronic Obstructive Pulmonary Disease (COPD) 1 (100%), Malignancy 1 (100%) and Hypothyroidism1 (100%) were observed only among males.

The prevalent presenting symptom was Fever (16) among all participants and this was followed by anosmia (14), loss of taste (11), dry cough (10), body pain (10), sore/itchy throat (8), headache (7), fatigue (5) and breathing difficulty (4). There was equal prevalence of fever 8 (50.0%), dry cough 5 (50.0%), body pains 5 (50.0%), and itchy sore/throat 4 (50.0%) among both sexes. The prevalent symptoms among males compare to females were; anosmia {males 8 (57.2%), females 6 (42.8%)}, Loss of taste {males 6 (54.5%), females 5 (45.5%)}, chills {males 2 (100.0%), females 0 (0.0%)}, diarrhea {males 1 (100.0%), females 0 (0.0%)} and catarrh {males 1 (100.0%), females 0 (0.0%)}. The prevalent symptoms among females were; headache {males 3 (42.9%), females 4 (57.1%)}, fatigue {males 1 (20.0%), females 4 (80.0%)}, loss of consciousness {males 0 (0.0%), females 1 (100.0%)} and breathing difficulty {males 0 (0.0%), females 4 (100.0%)}. The difference in proportion between males and females was statistically significant with difficult breathing only, p=0.034.

Table 3 shows that there was a significant difference in mean TG (p=0.028) and this was higher among female patients compared to the males while the mean LDL and systolic blood pressure were significantly higher among males (p=0.044 and P=0.011 respectively) compared to females.

Table 2. Clinical characteristics of the patients

Variable	Frequency n=56	Males n (%)	Females n (%)	X^2 (p-value)
Co-morbidities				
Present	12	9 (75.0)	3 (25.0)	2.385 (0.123)
Type of Co-morbidity**				
Hypertension	11	9 (81.8)	2 (18.2)	0.088[a]
Peptic Ulcer	2	1 (50.0)	1 (50.0)	1.000[a]
Diabetes	2	2 (100.0)	0 (0.0)	0.497[a]
COPD	1	1 (100.0)	0 (0.0)	1.000[a]
Malignancy	1	1 (100.0)	0 (0.0)	1.000[a]
Hypothyroidism	1	1 (100.0)	0 (0.0)	1.000[a]
Type of symptoms**				
Fever	16	8 (50.0)	8 (50.0)	0.260 (0.610)
Anosmia	14	8 (57.2)	6 (42.8)	0.024 (0.877)
Loss of taste	11	6 (54.5)	5 (45.5)	1.000[a]
Dry cough	10	5 (50.0)	5 (50.0)	0.738[a]
Body pain	10	5 (50.0)	5 (50.0)	0.738[a]
Sore/Itchy throat	8	4 (50.0)	4 (50.0)	1.000[a]
Head ache	7	3 (42.9)	4 (57.1)	0.688[a]
Fatigue	5	1 (20.0)	4 (80.0)	0.161[a]
Breathing difficulty	4	0 (0.0)	4 (100.0)	0.034[a]*
Chills	2	2 (100.0)	0 (0.0)	0.497[a]
Diarrhoea	1	1 (100.0)	0 (0.0)	1.000[a]
Catarrh	1	1 (100.0)	0 (0.0)	1.000[a]
Loss of consciousness	1	0 (0.0)	1 (100.0)	0.446[a]

** Multiple responses apply, *Significant, [a] Fisher's exact test

Table 3. Haematological and clinical investigations in males and female patients

Variable	Male	Female	Student's t test (P-Value)
	Mean ± SD	Mean ± SD	
Sodium (Na$^+$)(mmol/l)	153.8±22.5	151.1±20.5	0.365 (0.722)
Chloride (Cl$^-$)(mmol/l)	98.9±12.9	100.43±13.5	-0.405 (0.697)
Alkaline Phosphatase (ALP)(IU/L)	244.0±328.5	143.8±48.0	1.315 (0.161)
High-density Lipoprotein (HDL)(mmol/l)	0.7±0.2	0.8±0.2	-1.253 (0.536)
Albumin (ALB)(g/l)	46.6±12.0	47.5±12.7	-0.271 (0.996)
Triglycerides (TG)(mmol/l)	1.6±1.1	1.9±2.3	-0.765 (0.028)*
Low-density Lipoprotein (LDL)(mmol/l)	3.7±1.9	3.4±1.0	0.477 (0.044)*
Creatinine (CR)(nmol/l)	83.0±16.8	73.5±13.7	2.074 (0.311)
Bicarbonate (CHO)(mmol/l)	4.4±1.5	8.8±19.5	-1.128 (0.069)
Alanine amino transferase (ALT)(ukat/L)	2.1±1.0	1.8±1.5	0.569 (0.086)
Aspartate amino transferase (AST)(ukat/L)	2.5±0.8	2.6±0.5	-0.45 (0.108)
Blood urea nitrogen (mmol/l)	11.1±15.4	7.6±2.9	1.102 (0.115)
Total protein (TP)(g/l)	8.2±1.3	7.7±1.4	1.256 (0.93 6)
Potassium (K)(mmol/l)	5.6±1.3	7.1±4.6	-1.282 (0.117)
Granulocytes (Gran)(mL)	2.6±1.4	2.7±1.0	-0.068 (0.35)
Temperature (°c)	36.5±0.3	36.5±0.4	0.184 (0.241)
Fasting Blood Sugar (mmol/l)	5.2±1.2	4.7±1.1	0.083 (0.751)
Peripheral Capillary Oxygen Saturation (SPO2)(%)	87.9±29.0	90.1±27.5	-0.284 (0.756)
Heart rate (BPM)	84.2±12.6	85.6±11.0	-0.45 (0.573)
Respiratory (CPM)	20.5±3.1	20.4±2.4	0.156 (0.103)
Systolic Blood Pressure (mmHg)	137.5±25.8	124.2±15.1	2.293 (0.011)*
Diastolic Blood Pressure (mmHg)	85.7±12.7	81.7±11.7	1.214 (0.743)

4. DISCUSSION

The main objective of this study was to analyze sex differences in presenting symptoms, comorbidities and haematological parameters of patients hospitalized for COVID-19 within a given time frame in a single COVID-19 treatment center.

In this study, more males were admitted during the given time frame compared to females and the mean age of males was higher compared to females. This is similar to observations made by researchers in China [24] and Bangladesh [25]. It is possible that more males were hospitalized because they were probably exposed to occupations that required their physical presence instead of working from home. Another reason could be due to the activity of angiotensin converting enzyme (ACE 2) in males compared to females.

In this study, about twenty percent of the patients hospitalized had pre-existing co-morbidities, and hypertension was predominant in about eighty percent of males and eighteen percent of the females who had pre-existing co-morbidities. Hypertension has also been found by other researchers [26-28] to be a prevalent comorbidity among COVID-19 patients. Other predominant comorbidities were peptic ulcer and diabetes mellitus, which was present among four percent of comorbid patients. While males seemed to have a higher prevalence of these comorbidities, the observed difference in prevalence was not significant. However, we recommend that close attention be made to COVID-19 patients who are males for this reason. Other uncommon pre-existing conditions found among patients in this study were; COPD, malignancy and hypothyroidism. Hypertension, diabetes and COPD are diseases that have been listed by the World Health Organization as leading causes of

deaths, [29] therefore the pre-existence of these diseases may have facilitated hospitalization of these patients.

The presenting symptoms among patients in this study were fever, anosmia, loss of taste, dry cough and body pain, sore/itchy throat, headache, fatigue, breathing difficulty, chills, diarrhea, catarrh and loss of consciousness. Fever, anosmia, loss of taste, dry cough and body pains were the most prevalent symptoms and this can assist medical personnel in Nigeria to strongly suspect infection with the Corona Virus for patients with similar presenting complains. Though, fever is a common symptom of other locally endemic diseases in Nigeria such as Malaria and Lassa fever, therefore confirmatory methods of management should be considered when caring for the patients. Findings from this study in clinical presentation differs from other studies that have commonly reported fever and cough [9-11] as the prevalent symptoms however other studies have reported that anosmia and loss of taste are common symptoms of COVID-19 patients with less severe disease and is an indication of infection with the virus [30,31].

There was almost similar prevalence in the symptoms presented among the gender groups and difficulty in breathing was the only symptom prevalent among females that was significant and this is similar to findings made by Wang et al in Beijing although that was not significant [32] but is in contrast with a similar study done in China were males had a higher prevalence of dyspnea but the findings were not significant [33]. This could be due to the pre-existing comorbidities present in females. A significant difference was also observed in lactate dehydrogenase levels and this corroborates with findings by Meng et al. [24]. The lactate dehydrogenase level was lower among females; this could result from the cytokine storm and may be a sign of poor prognosis [34,35]. Systolic blood pressure was significantly higher among males compared to the females and this supports observation of hypertension as the prevalent comorbidity among males in this study.

5. LIMITATIONS

Some limitations identified in this study are; firstly, the small sample size, which limits inferences made from this study to be applied to the general population. Secondly, is the limited

availability of data collected in a short time frame of observation and in a single treatment centre. Thirdly, analysis done was limited regarding the clinical and laboratory parameters and this may limit conclusions about observations made in this study. Fourthly, the study did not consider age disparity for instance if the infection was more common in the middle age or the aged.

6. CONCLUSION

In conclusion, we observe in this study that there are sex differences in clinical symptoms and haematological parameters of patients with COVID-19. Although there are varying reports from various studies about sex differences, a knowledge of these features assist in the management and prognosis of patients and their outcomes. We recommend large scale observational and experimental studies for verification of the findings reported in this study.

CONSENT

It is not applicable.

ETHICAL CONSIDERATIONS

Ethical approval was sought from the Health Research and Ethics Committee of the Rivers State, the State Ministry of Health and the Rivers State Hospital Management Board. Confidentiality for patient information was anonymous and professionally maintained.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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