

Research Article

COVID-19 MORBIDITY, MORTALITY AND RISK FACTORS IN BLUE NILE STATE, SUDAN, 2020-2022

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ABSTRACT

Background: The SARS-CoV-2 novel coronavirus was identified in Wuhan, Hubei province of China in December 2019 by the Chinese Center for Disease and Prevention from the throat swab of a patient and the virus is named severe acute respiratory distress CoV-2 by WHO which causes Coronaviruses disease 2019 (COVID-19). **Objectives:** The aim of this study was to review the COVID-19 morbidity and mortality and risk factors in Blue Nile State, 2020-2022. **Materials and methods:** A descriptive cross sectional study health facility-based. The study was conducted in Blue Nile State. All patients during the outbreak attending to health facilities with COVID-19 symptoms. Data was analyzed using SPSS version 24.0. Descriptive statistics was used. Chi-square test was used to find an association between variables. P-value considered significant at less than 0.05 levels. **Results:** The vast majority of corona virus cases were reported in Eldamazin locality 89.5% followed by Elroseris locality 8.4%. The prevalence of corona virus was 149 (44.7%) out of 333 patients tested among patients in Blue Nile State in the period from 2020-2022. The diseases were confirmed by PCR 43(28.9%) while 106 (71.1%) was confirmed by ICT. This infection rate was relatively low compared to worldwide pandemic of corona virus since the emergence of the virus in china. Also the proportion of death (1.5%) and CFR is very low (.0015/1000 population). The most of corona virus cases were reported among age group ranged between 20-49 years (77%). more than two thirds 63.1% of the patients were male while 36.9% were female. Fever and cough was significantly associated with corona virus infection. Most of deaths were significantly occurred among age group more than 60 years (60%). However older age was found as a potential risk factor for death among COVID-19 patients. The morbidity affected by occupation. **Conclusion:** The prevalence of COVID-19 and case fatality rate in Blue Nile State was very low compared to globally pandemic. The prevalence of mortality of patients with COVID-19 is greatly affected by older age groups while the morbidity affected by occupation. Creation of awareness about infection prevention of COVID-19 is very crucial.

Keywords: COVID-19, PREVALENCE, RISK FACTORS BLUE NILE STATE, Sudan, 2020-2022.

INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by a recently discovered RNA virus named corona virus, previously called severe acute respiratory syndromecoronavirus-2 (SARS-CoV-2) (1). It presents with fever, cough, cold, and sometimes death from acute respiratory distress syndrome or pneumonia (2). Corona viruses' are beta corona viruses and constitute the orthocorona virus subfamily. It is a beta corona virus that constitutes the family Coronaviridae. The name "corona virus" is derived from the Latin word corona, meaning crown or wreath. Corona viruses were first discovered in the 1930s in North Dakota in acute respiratory infections in domesticated chickens (1). Of the seven corona viruses known to infect humans and cause disease, HCoV-229E, HCoVOC43, HCoV-NL63, and HCoV-HKU1 generally cause mild illness, often with the side effects of a normal cold. Three other human corona viruses, Middle East respiratory syndrome-associated corona virus (MERS-CoV), severe acute respiratory syndrome corona virus (SARS-CoV), and severe acute respiratory syndrome corona

virus 2 (SARS-CoV-2), can cause severe symptoms and were confirmed in 2012 and 2002, and 2019.(3, 4) The first case of COVID-19 disease was identified on December 8, 2019 by the Chinese Center for Disease Control and Prevention in Wuhan, Hubei Province, China, from a patient's throat swab fluid.(5) Since the first appearance of COVID-19 disease in China, it has rapidly become a global threat Since its first appearance in China, COVID-19 disease has rapidly become a global threat and was declared a pandemic by the World Health Organization (WHO). Since then, the disease has spread to 216 countries and territories worldwide, with 20,995,433 confirmed cases and 760,774 deaths (World Health Organization statistics as of August 15, 2020).(6) The fatality rate of COVID-19 infection is high. The overall global mortality rate is 3.6% (6). The highest number of confirmed cases was in the United States, where 5,150,407 cases were identified and 164,826 deaths were reported. In the European region, the Russian Federation, Spain, the United Kingdom, and Italy (912,823/15,498, 337,334/28 605, 313,802/46 706, and 252,235/35 231 confirmed cases/deaths). In the African region, South Africa (572,865/11 270) had the highest number of cases, and in the Eastern Mediterranean region, Iran (336,324/19 162) had the highest number of cases. In the South east Asia region,

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India had the most (2,461,190/64,553). In Bangladesh, 269,115 cases were identified through August 15, 2020, with 3,557 deaths (6). Patients with COVID-19 present with a variety of symptoms, mainly fever, cough, dyspnea, myalgia, and fatigue.(7,8) Most patients with COVID-19 infection are expected to recover in a few days, but male patients, older patients (age>60 years),and patients with a variety of chronic diseases may have a fetal outcome possible (9).

Several factors contribute to the severity of COVID-19infection and mortality. Various studies have found that patients with comorbidities such as hypertension, diabetes, acute respiratory distress syndrome (ARDS), cardiovascular disease, cancer, COPD, asthma, kidney disease, liver disease, liver disease, pneumonia, obesity, and smoking history contribute to the incidence and mortality.(10)The mortality rate of COVID-19 patients is similar to that of intensive care unit (ICU) patients and non-ICU patients, as well as between critically ill and non critically ill patients. Various studies have found that mortality rates are higher in patients admitted to ICUs and in critically ill patients than in patients not admitted to ICUs or in none critically ill patients (11). In a low- and middle-income country like Bangladesh, COVID-19 disease represents a certain threat to the health and economic sectors. The lack of appropriate therapies and medications to treat those infected with corona virus and vaccines to prevent it makes adequate social distance, essential to preventing the disease, impossible for many; many patients require ICU care and ventilators, which are difficult to arrange in many developing countries (11). Appropriate measures need to be taken to prevent this disease and reduce mortality. Several studies have reported risk factors associated withmortalityinCOVID-19 patients (10). The purpose of this study is to examine the morbidity and mortality of COVID-19and risk factors in Blue Nile Statein2020-2022.

MATERIALS AND METHODS

Study design:

A descriptive cross sectional study health facility-based.

Study area:

Blue Nile State lied in southern part of the country bordering from southeast Ethiopia, southwest of South Sudan and north is Sinner state. With an area of 38,000 km square and 1,250.00 populations. Blue Nile River is crossing the state from south to north fed by numbers of streams and tributes. This gives unique feature for agricultural and live stocks herding activities. Rainy season starts early in June and ends in late October. Elroseres High Dam famous hydro-electric project that supplies country with electricity and irrigation water sources, particularly Aljazeera agriculture scheme and it is rich of mechanized agriculture in Al Tadamon locality. BNS is served by number of (160) health facilities (HFs). The population at Blue Nile State depends on different water sources. Water from network, which covers approximately (25%) of the population; The other sources are out network e.g., Hand pumps, water yards, dug wells (open/closed), river, seasonal streams, open sources (shallow wells, hafeers).

Study population:

Blue Nile State Community.

Inclusion criteria:

All patients during the outbreak attending to health facilities with COVID-19 symptoms.

Exclusion criteria:

Patients with other respiratory diseases.

Sample size and sampling technique:

All COVID-19 cases during outbreak period 2020-2022.

Data collection:

Data will be collected from all health facilities according to outbreak records.

Data analysis:

Data was analyzed using SPSS version 24.0. Descriptive statistics was used. Chi-square test was used to find an association between variables. P-value considered significant at less than 0.05 levels.

RESULTS

Figure 1 indicates that the vast majority of corona virus cases was reported in Eldamazin locality 89.5% followed by Elrosaris locality 8.4% while the proportion of cases in Bau locality was 0.9%, Out of state 0.6%, Eltadamon locality 0.3% and Geisan locality 0.3%.

The most of corona virus cases were reported among age group ranged between 20-49 years (77%) and between age group more than 50 years old was 16.5% while the lowest cases was reported among age group ranged between 0-9 years 6.3%, figure 2. Figure 3 shows that more than two thirds 63.1% of the patients were male while 36.9% were female. Figure 4 illustrates that more than half of the patients 54.7% were not employee, 24.9% were employee, 13.8% were students and 6.6% were healthcare workers.

Figure 5 shows that the proportion of deaths due to corona virus was 1.5% with case fatality rate (CFR) of 0.0015/1000 population. The majority of corona virus positivity was confirmed by ICT 76% while 24% was confirmed by PCR as shown in figure 5.

Figure 6 shows that the positivity of corona virus was 44.7% among patients. In terms of Corona virus symptoms only 24% had fever, 44.7% had cough, 60.7% had breathing difficulty, 60.4% had sore throat, 21.3% had headache, 53.5% had muscle pain, 56.2% had nasal discharge while 32.7% came with loss of hearing and taste characteristic and 67.3% had pneumonia, table 1.

Table 2 shows there was no significance difference between age group and corona virus infection, $p>0.05$. Also there was no significance difference between gender and corona virus infection, $p>0.05$ as shown in table 3.

Table 4 shows that there was significance difference between occupation and corona virus infection, $p<0.05$. Not employees were significantly having high proportion of corona virus infection 56.4% compared to other occupations.

Table 5 shows that there was association between corona virus infection and type of diagnosis, $p<0.05$. The positivity of corona virus infection was high by ICT detection 71.1% compared to PCR 28.9%.

Table 6 shows that fever and cough was significantly associated with corona virus infection, $p< 0.05$. The odds of having Corona virus infection was significantly increased 1.6 folds (OR=1.6; 95% CI (.9-2.7) among patients attend with fever. Fever and cough was significantly associated with corona virus infection. Table 7 shows that there was association between age group and corona deaths, $p<0.05$. Most of deaths were significantly occurred among age group more than 60 years (60%).

Table 8 there was no association between corona death and gender, $p> 0.05$. Male was not significantly high among male 80% compared to female 20%. The probability of corona death was increased .4 folds among male gender (OR=.4; 95% CI (.05-3.8)).

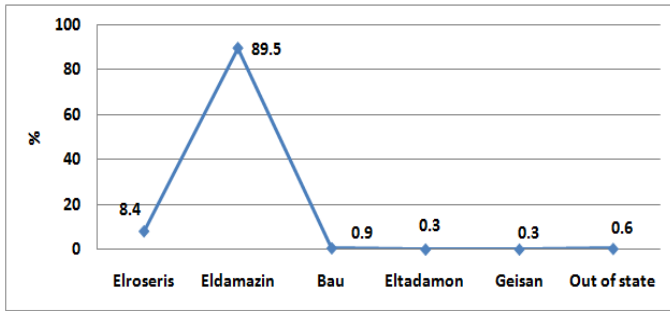


Fig.1. Distribution of Corona virus cases by localities in Blue Nile State 2020-2022 (n=333)

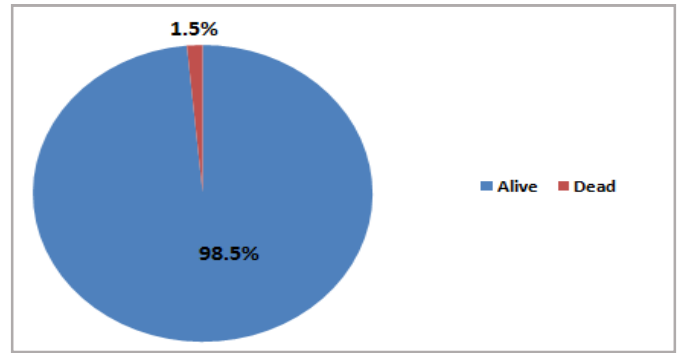


Fig.5. Distribution of deaths among Corona virus cases in Blue Nile State 2020-2022 (n=333)

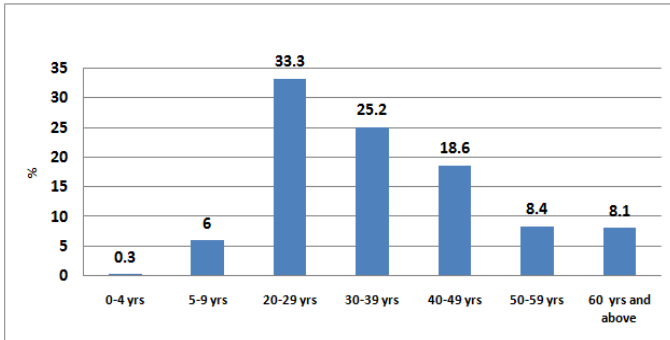


Fig.2. Distribution of Corona virus cases according to age group in Blue Nile State 2020-2022 (n=333)

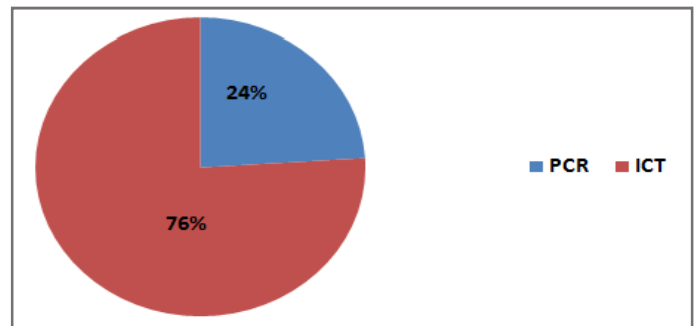


Fig.5. Distribution of Corona virus cases according to type of diagnosis in Blue Nile State 2020-2022 (n=333)

Mean age = mean ± SD (36.0±14.1) yrs; Maximum age = 85 yrs; Minimum age = 2 yrs

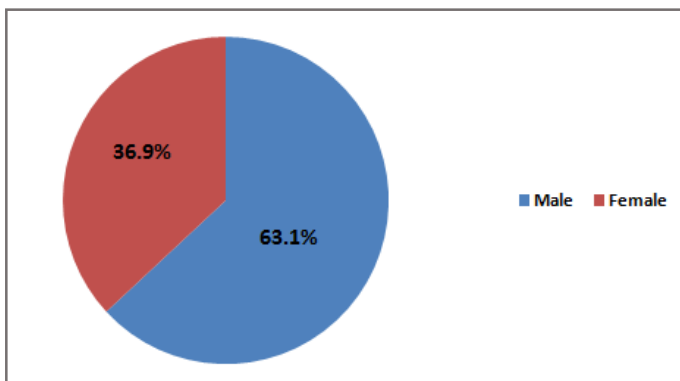


Fig.3. Distribution of Corona virus cases according to gender in Blue Nile State 2020-2022 (n=333)

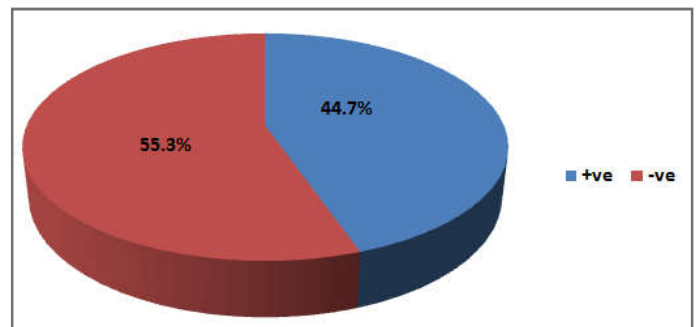


Fig.6. Distribution of Corona virus cases according to positivity in Blue Nile State 2020-2022 (n=333)

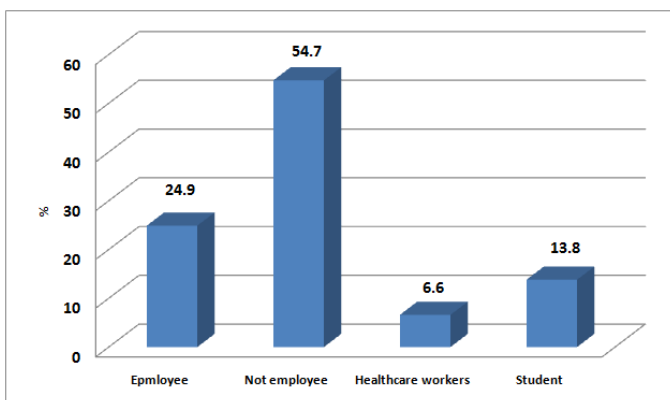


Fig.4. Distribution of Corona virus cases according to occupation in Blue Nile State 2020-2022 (n=333)

Table 1. Distribution of corona virus symptoms among patients in Blue Nile State 2020-2022

Symptoms	No.	%
Fever		
Yes	80	24.0
No	253	76.0
Total	333	100.0
Cough		
Yes	149	44.7
No	184	55.3
Total	333	100.0
Breathing difficulty		
Yes	202	60.7
No	131	39.3
Total	333	100.0
Sore throat pain		
Yes	201	60.4
No	132	39.6
Total	333	100.0

Headache			
Yes		71	21.3
No		262	78.7
Total		333	100.0
Muscle pain			
Yes		178	53.5
No		155	46.5
Total		333	100.0
Nasal discharge			
Yes		187	56.2
No		146	43.8
Total		333	100.0
Other			
Loss of hearing and taste characteristic		109	32.7
Pneumonia		224	67.3
Total		333	100.0

Table 2. Distribution of corona virus positivity by age group in Blue Nile State 2020-2022

Age	Test result			Total
		+ve	-ve	
0-4	n	0	1	1
	%	.0%	.5%	.3%
10-19	n	5	15	20
	%	3.4%	8.2%	6.0%
20-29	n	50	61	111
	%	33.6%	33.2%	33.3%
30-39	n	34	50	84
	%	22.8%	27.2%	25.2%
40-49	n	27	35	62
	%	18.1%	19.0%	18.6%
50-59	n	17	11	28
	%	11.4%	6.0%	8.4%
60 and above	n	16	11	27
	%	10.7%	6.0%	8.1%
Total	n	149	184	333
	%	100.0%	100.0%	100.0%

$\chi^2 = 9.8$; $df = 6$; p -value = .133 (Not significant)

Table 3. Distribution of corona virus positivity by gender in Blue Nile State 2020-2022

Sex	Test result			Total
		+ve	-ve	
Male	n	96	114	210
	%	64.4%	62.0%	63.1%
Female	n	53	70	123
	%	35.6%	38.0%	36.9%
Total	n	149	184	333
	%	100.0%	100.0%	100.0%

$\chi^2 = .216$; $df = 1$; p -value = .363 (Not significant)

OR (Odds Ratio)= value (95% CI (Lower-Upper)) =1.1 (.7-1.7)

Table 4. Distribution of corona virus positivity by occupation in Blue Nile State 2020-2022

Occupation	Test result			Total
		+ve	-ve	
Employee	n	36	47	83
	%	24.2%	25.5%	24.9%
Not employee	n	84	98	182
	%	56.4%	53.3%	54.7%
Healthcare workers	n	16	6	22
	%	10.7%	3.3%	6.6%
Students	n	13	33	46
	%	8.7%	17.9%	13.8%
Total	n	149	184	333
	%	100.0%	100.0%	100.0%

$\chi^2 = 12.2$; $df = 3$; p -value = .007 (Significant)

Table 5. Distribution of corona virus positivity by type of diagnosis in Blue Nile State 2020-2022

Diagnosis	Test result			Total
		+ve	-ve	
PCR	n	43	37	80
	%	28.9%	20.1%	24.0%
ICT	n	106	147	253
	%	71.1%	79.9%	76.0%
Total	n	149	184	333
	%	100.0%	100.0%	100.0%

$\chi^2 = 3.4$; $df = 1$; p -value = .042 (Significant)

OR (Odds Ratio) = value (95% CI (Lower-Upper)) = 1.6 (.9-2.7)

Table 6. Distribution of corona virus positivity and symptoms in Blue Nile State 2020-2022

Symptoms		Test result		Total	P-value	OR	95% CI		
		+ve	-ve				Lower	Upper	
Fever	Yes	n	43	37	80	.042	1.6	.9	2.7
		%	28.9%	20.1%	24.0%				
Cough	Yes	n	149	0	149	.000	-	-	-
		%	100.0%	.0%	44.7%				
Breathing difficulties (Dyspena)	Yes	N	97	105	202	.084	1.4	.9	2.2
		%	65.1%	57.1%	60.7%				
Sore throat pain	Yes	N	97	104	201	.069	1.4	.9	2.2
		%	65.1%	56.5%	60.4%				
Headache	Yes	N	35	36	71	.231	1.3	.7	2.1
		%	23.5%	19.6%	21.3%				
Muscle pain	Yes	N	81	97	178	.425	1.1	.7	1.6
		%	54.4%	52.7%	53.5%				
Nasal discharge	Yes	N	84	103	187	.515	1.0	.6	1.6
		%	56.4%	56.0%	56.2%				
Other	Loss of hearing and taste	N	52	57	109	.261	1.2	.7	1.9
		%	34.9%	31.0%	32.7%				
	Pneumonia	N	97	127	224				
		%	65.1%	69.0%	67.3%				

Table 7. Distribution of corona virus related death by age group in Blue Nile State 2020-2022

Age	General condition		Total	
	Alive	Dead		
0-4	n	1	0	1
	%	.3%	.0%	.3%
10-19	n	19	1	20
	%	5.8%	20.0%	6.0%
20-29	n	111	0	111
	%	33.8%	.0%	33.3%
30-39	n	84	0	84
	%	25.6%	.0%	25.2%
40-49	n	61	1	62
	%	18.6%	20.0%	18.6%
50-59	n	28	0	28
	%	8.5%	.0%	8.4%
60 and above	n	24	3	27
	%	7.3%	60.0%	8.1%
Total	n	328	5	333
	%	100.0%	100.0%	100.0%

$\chi^2 = 21.9$; $df = 6$; p -value = .001 (Significant)

Table 7. Distribution of corona virus related gender in Blue Nile State 2020-2022

Gender	General condition		Total	
	Alive	Dead		
Male	N	206	4	210
	%	62.8%	80.0%	63.1%
Female	N	122	1	123
	%	37.2%	20.0%	36.9%
Total	N	328	5	333
	%	100.0%	100.0%	100.0%

$\chi^2 = .62$; $df = 1$; p -value = .391 (Not significant)

OR (Odds Ratio) = value (95% CI (Lower-Upper)) = .4 (.05-3.8)

DISCUSSION

This study aimed to review the COVID-19 morbidity and mortality and risk factors in Blue Nile State, 2020-2022. The prevalence of corona virus was 149 (44.7%) out of 333 patients tested among patients in Blue Nile State in the period from 2020-2022. The diseases were confirmed by PCR 43 (28.9%) while 106 (71.1%) was confirmed by ICT. This infection rate was relatively low compared to worldwide pandemic of corona virus since the emergence of the virus in china. Also the proportion of death and CFR is very low. From that time, this disease has spread to 216 countries and territories around the world, with 20,995,433 confirmed cases and 760,774 deaths (World Health Organization statistics as on August 15, 2020) (12). The case fatality rate is high for COVID-19 infection. Globally the death rate was 3.6% (6). The highest confirmed number of cases was reported in the United States of America with 5,150,407 confirmed cases with 164,826 deaths. From the European region, the majority of confirmed cases/death was accounted from the Russian Federation, Spain, UK, Italy (912,823/15,498, 337,334/28 605, 313,802/46 706, 252,235/35 231) respectively. In the African region, the highest confirmed cases/death was found in South Africa (572,865/11 270) and in the Eastern Mediterranean region highest cases/death was found in Iran (336,324/19 162). From the South-East Asia region, India accounted for the highest number of cases/death (2,461,190/64 553). In

Bangladesh, the confirmed number of cases was 269,115 with 3557 deaths up to August 15, 2020 (12).

The highest number of mortality for COVID-19 infection was observed in Europe. Among the European region, the highest mortality was observed in Italy (16, 61) followed by Spain (13, 14). The case fatality rate was also highest in USA (15, 16). Compared to European and American countries, the case fatality rate was low in Asian countries. The mortality rate among COVID-19 patients in Bangladesh was 10% (17) followed by Iran and Kuwait 8.06% and 1.73% respectively (18, 19). Among the Asian region, the highest mortality was found in China and South Korea (20). A large variation of prevalence of mortality was found among the Chinese population (21).

The study reported that the corona virus symptoms were only 24% had fever, 44.7% had cough, 60.7% had breathing difficulty, 60.4% had sore throat, 21.3% had headache, 53.5% had muscle pain, 56.2% had nasal discharge while 32.7% came with loss of hearing and taste characteristic and 67.3% had pneumonia. Fever and cough was significantly associated with corona virus infection, $p < 0.05$. The odds of having Corona virus infection was significantly increased 1.6 folds (OR=1.6; 95% CI (.9-2.7) among patients attend with fever. Fever and cough was significantly associated with corona virus infection. The finding in line with statements that patients with COVID-19 present primarily with various symptoms like fever, cough, dyspnea, myalgia, and fatigue (22, 23). Although most of the COVID-19 infected patients are thought to be recovered after few days, male patients, older patients (age greater than 60 years) and patients with various chronic diseases may have fetal outcomes (24).

There was association between age group and corona deaths, $p < 0.05$. Most of deaths were significantly occurred among age group more than 60 years (60%). There was no association between corona death and gender, $p > 0.05$. Male was not significantly high among male 80% compared to female 20%. The probability of corona death was increased .4 folds among male gender (OR=.4; 95% CI (.05-3.8)). In accordance studies showed that from several previous studies, older age was found as a potential risk factor for death among COVID-19 patients (25, 26). Most of the older patients have several chronic diseases and less body fitness to fight with a viral infection, which may be one of the main reasons for fatal outcomes (26, 80). Older age was also a risk factor for severity and mortality among SARS and MERS infected patients (27, 28). Male patients with COVID-19 were more likely to die compared to female patients (29, 30). Different sexual hormones could also be responsible for it. Mortality among male patients was also high for SARS and MERS infected patients compared to female patients (27, 28).

CONCLUSION

The prevalence of COVID-19 and case fatality rate in Blue Nile State was very low compared to globally pandemic. The prevalence of mortality of patients with COVID-19 is greatly affected by older age groups while the morbidity affected by occupation. Creation of awareness about infection prevention of COVID-19 is very crucial.

DECLARATION OF COMPETING INTEREST:

The authors declared that there is no conflict of interest.

ACKNOWLEDGEMENTS:

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