

Epidemiological outcome of COVID-19 among confirmed cases admitted to Guder Primary Hospital, Central Ethiopia: A cohort study of ten-months

Tesfaye Solomon^{1*}, Adugna Dufera¹, Tufa Kolola², Mekdes Tsegaye³, Sintayehu Abate¹ and Akberet Lemlem¹

¹Ethiopian Public Health Institute, Addis Ababa, Ethiopia

²Public Health Department, Ambo University, Ambo, Ethiopia

³Guder Hospital, Oromia Regional State, Guder, Ethiopia

*Corresponding Author: abdiikoo50@gmail.com

Cellphone +251-920117147

Abstract

Background: Coronavirus disease 19 (COVID-19) is a highly transmittable and pathogenic viral infection that emerged in Wuhan, China and spread around the world. Limited evidence is available about the epidemiological, clinical features, and outcomes of admitted cases in the Western part of Oromia Region, Ethiopia. This study was conducted to provide insight into the epidemiological outcome of confirmed COVID-19 cases admitted to Guder Primary Hospital in West Oromia Zone, Central Ethiopia.

Methods: In this retrospective cohort study, patient data for all confirmed cases of COVID-19 admitted to Guder Primary Hospital from May 16 to December 31, 2020 were obtained from the positive track excel database available in the hospital and supplemented by reviewing medical records. Cases were confirmed by Real-Time Polymerase Chain Reaction. Data were analyzed by using descriptive statistics. A Chi-squared test was used to see the strength of association between clinical outcomes and other categorical variables.

Results: A total of 260 confirmed COVID-19 cases including 180 men and 80 women were admitted. Of these cases, 184 (70.8%) were asymptomatic at admission. The median age of the patients was 31 years with an interquartile range of 20 years. Adults aged 15 and above years accounted for 254 (97.7%). Meantime in the hospital was 14.3 [SD: 3] days. The frequent symptom was cough (43[16.5%]). The case fatality rate among the admitted cases was 12 (4.6%). Of these deaths, seven (58.3%) were females aged 45-59 years, and eight had known comorbidities.

Conclusion: The COVID-19 infection has affected more adult males and death was common in females with comorbidities during the first ten months in the study area. The disease remains largely asymptomatic among the admitted cases. Therefore, mitigation strategies should give emphasis to treatment centers to avert morbidity and mortality due to COVID-19. Further study is needed to explore the risk of mortality and its determinants among admitted cases.

Keywords: COVID-19 case fatality rate, Comorbidity and COVID-19 cases, Epidemiology of COVID-19, Guder Primary Hospital, Outcome of COVID-19

Introduction

Coronavirus disease 19 (COVID-19), which is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) is a highly transmittable and pathogenic viral infection that emerged in Wuhan, China in December 2019 and spread around the world (WHO 2020d).

The World Health Organization (WHO) has declared the COVID-19 outbreak as a public health emergency of international concern on January 30th, 2020 (WHO 2020a) and a pandemic on March 11th, 2020 when the novel coronavirus total case count surpassed that for Severe Acute Respiratory Syndrome Coronavirus 1 (SARS-COV-1), which affected 8,096 people globally (WHO 2019).

The first case of COVID-19 in Ethiopia was reported on March 13, 2020 (MOH-Ethiopia, 2020b). As of December 31, 2020, the total number of cases had risen to 124,264 cases, of which 112,096 had recovered. Among 114,019 closed cases that had an outcome, 112,096 (98.3%) had recovered and 1,923 (1.7%) have died (MOH-Ethiopia 2021). On April 14, 2020, Ethiopia has

declared a five-month State of Emergency to limit the spread of the Coronavirus (MOH-Ethiopia 2020a).

People with COVID-19 have had a wide range of symptoms reported—ranging from mild symptoms to severe illness and may appear 2-14 days after exposure to the virus. Based on 72,314 cases of COVID-19 in China as of February 11, 2020 has found that 80.9% of infections are mild with flu-like symptoms and can recover at home while 13.8% are severe, developing severe diseases including pneumonia and shortness of breath. About 4.7% are critical and can include multi-organ failure finally which results in death (WHO 2020b). Initially, the Federal Ministry of Health (FMOH) and Ethiopian Public Health Institute (EPHI) recommended the management of all confirmed COVID-19 cases must be at the case treatment centers. Gradually, the concept of home-based isolation and care was considered since July, 2020 due to the overflow of patients and limitation of resources at health facilities and the majority of the cases need no treatment. By the time of this study, only moderate and severe COVID-19 patients are allowed to seek

treatment at the treatment center where they get treatment for non-COVID-related morbidities and disease conditions(MOH-Ethiopia. EPHI 2020).

A patient diagnosed with COVID-19 can be discharged from the treatment center when the symptoms are subsisted, the body temperature remains at a normal range for at least three days, and two consecutive laboratory tests are negative(EPHI 2019).

The first laboratory-confirmed COVID-19 cases in West Shewa Zone were reported within a family on 16 May 2020 from Ginchi town and admitted to Guder Primary Hospital. In the zone, 14,914 individuals were tested for COVID-19 during the period 13 March to 31 December 2020 of which 542 were confirmed cases and 19 deaths (3.5%) in the zone(West Shewa Zonal Health Department 2020).

Limited evidence is available about the epidemiological, clinical features, and outcome of admitted cases of COVID-19 in the study area. Therefore, further description of the admitted cases and their clinical outcomes are important to understand the current epidemiology of COVID-19 and help to set up health facilities particularly a case treatment centers to design and implement mitigation strategies especially outside the capital city. This study was aimed to describe the epidemiology and outcomes of confirmed COVID-19 cases admitted to Guder Primary Hospital in West Shewa Zone, the fourth most populous zone in Oromia Regional State, Ethiopia during the early ten months of the outbreak.

Materials and Methods

Study area and setting: This study was conducted at Guder Primary Hospital which is one of the primary hospitals in the West Shewa Zone of Oromia Region, Ethiopia. It is located 126Kms West of Addis Ababa, the capital city of Ethiopia. In the West Shewa Zone, there are eight hospitals serving the communities. During the preparedness phase, before the introduction of COVID-19, Guder Primary Hospital has been selected as a case treatment center admitting those positive cases from the Western part of the Oromia region since it is located at a center for all districts, towns, and other hospitals in the West Shewa Zone to refer to the positive cases. The hospital is relatively nearest to Ambo town and has been selected as case treatment center in order to ensure the continuity of essential health services at other hospitals(West Shewa Zonal Health Department, 2020).

Study design and period: A retrospective cohort study was conducted by extracting patient data for all confirmed cases of COVID-19 admitted to Guder Primary Hospital from May 16 to December 31, 2020.

Data collection: Data of all confirmed COVID-19

cases admitted to Guder Primary Hospital who were diagnosed as having COVID-19 infection with RT-PCR diagnosis from May 16 to December 31, 2020 were collected from the database available at the hospital.

Data quality assurance: The database was checked for the variables it contains before the beginning of the data collection period. The collected data were checked for completeness and the missing values for ten cases were completed by reviewing patient medical records. One-day orientation on the data extraction format and objective of the study was provided to the data collector and supervisor.

Data analyses: All data of confirmed COVID-19 cases admitted during the study period and registered on the positive track excel database at the hospital were cleaned, exported, coded, and analyzed by SPSS version 22 in person, place, and time. Mean with standard deviation was used to describe normally distributed variables. Median with interquartile range was used for non-normally distributed data. For categorical data, frequency and percentage points were used.

Operational definitions: Based on the WHO Interim Guidance for Public Health Surveillance for COVID-19 and International Guidelines for Certification and Classification(WHO, 2020c)(EPHI, 2020):

Suspected case: A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease (e.g., cough, shortness of breath), regardless of a history of travel to or residence in a location reporting community transmission of COVID -19 disease, or regardless of having contact history with a confirmed or probable COVID-19 case, or Requiring hospitalization and in the absence of an alternative diagnosis that fully explains the clinical presentation.

Confirmed case: A person with real-time polymerase chain reaction (RT-PCR) confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

Death due to COVID-19: A COVID-19 death is defined for surveillance purposes as a death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case unless there is a clear alternative cause of death that cannot be related to COVID-19 disease. There should be no period of complete recovery between the illness and death.

Results

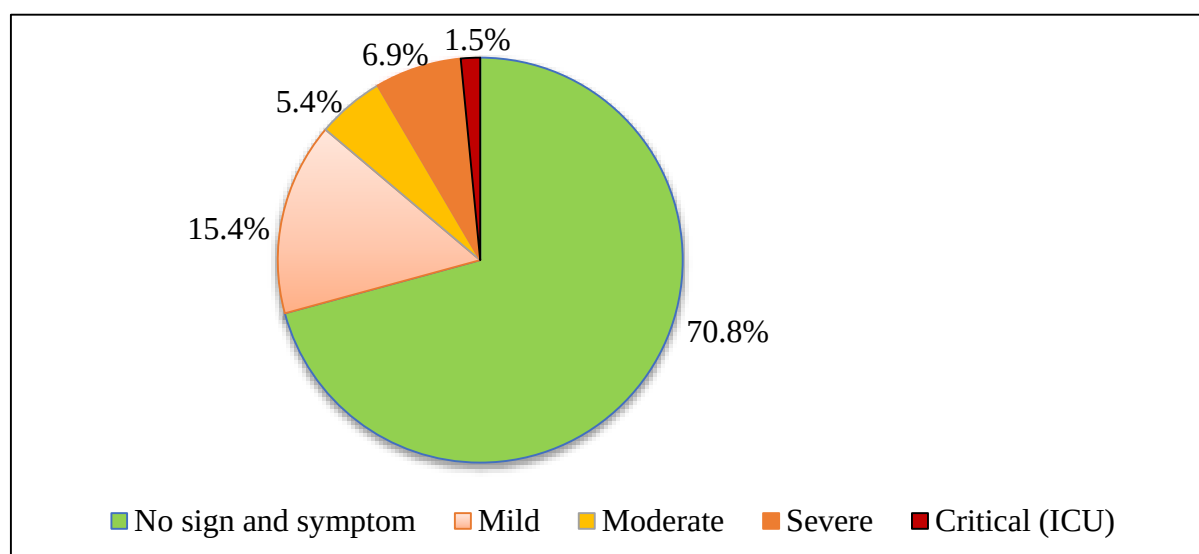
Demographic characteristics: A total of 260 RT-PCR confirmed COVID-19 were included. Of these cases, 180(69.2%) were males and 80(30.8%) were females. The median age of the cases was 31 years with the interquartile range of 20 years (Table 1).

Table 1: Demographic and baseline characteristics of confirmed COVID-19 cases admitted to Guder Primary Hospital, Central Ethiopia, 2020.

Characteristic	Categories	Frequency	Percent
Age category	5-14	6	2.3
	15-24	53	20.4
	25-34	90	34.6
	35-44	45	17.3
	45-59	40	15.4
	>=60	26	10.0
Sex	Male	180	69.2
	Female	80	30.8
Occupation	Gov't employed	105	40.4
	Merchant	66	25.4
	Student	25	9.6
	Prisoner	18	6.9
	Housewife	11	4.2
	Road construction	11	4.2
	Blank	10	3.8
	Farmer	7	2.7
	Self-employed	7	2.7
Residence	West Shewa	194	74.6
	Ambo Town	34	13.1
	Horo Guduru, Wollega	14	5.4
	Addis Ababa	7	2.7
	Burayu Town	5	1.9
	Gambella	2	0.8
	Addis Ababa	1	0.4
	Gelan Town	1	0.4
	Jimma	1	0.4
	Tigray	1	0.4

Admission status: Of the total cases, 184(70.8%) were asymptomatic and 40(15.4%) were mild cases as they developed upper respiratory tract infection like symptoms with no evidence of pneumonia

(Figure 1). Among symptomatic cases, the frequent symptom was cough, 43(16.5%) (Figure 2). The development of signs or symptoms was more common in the older age (Figure 3).

**Figure 1: Admission status of confirmed COVID-19 cases at Guder Primary Hospital, Central Ethiopia, 2020**

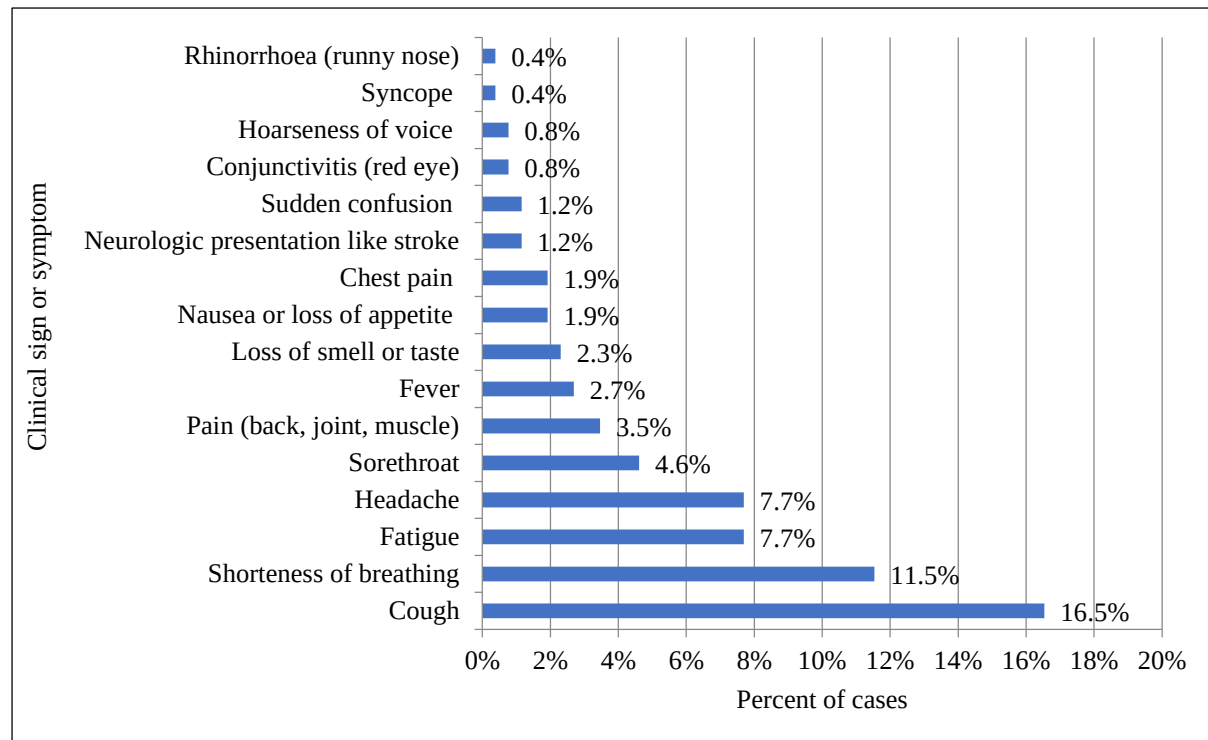


Figure 2: Clinical presentation of confirmed COVID-19 cases admitted to Guder Primary Hospital, Central Ethiopia, 2020

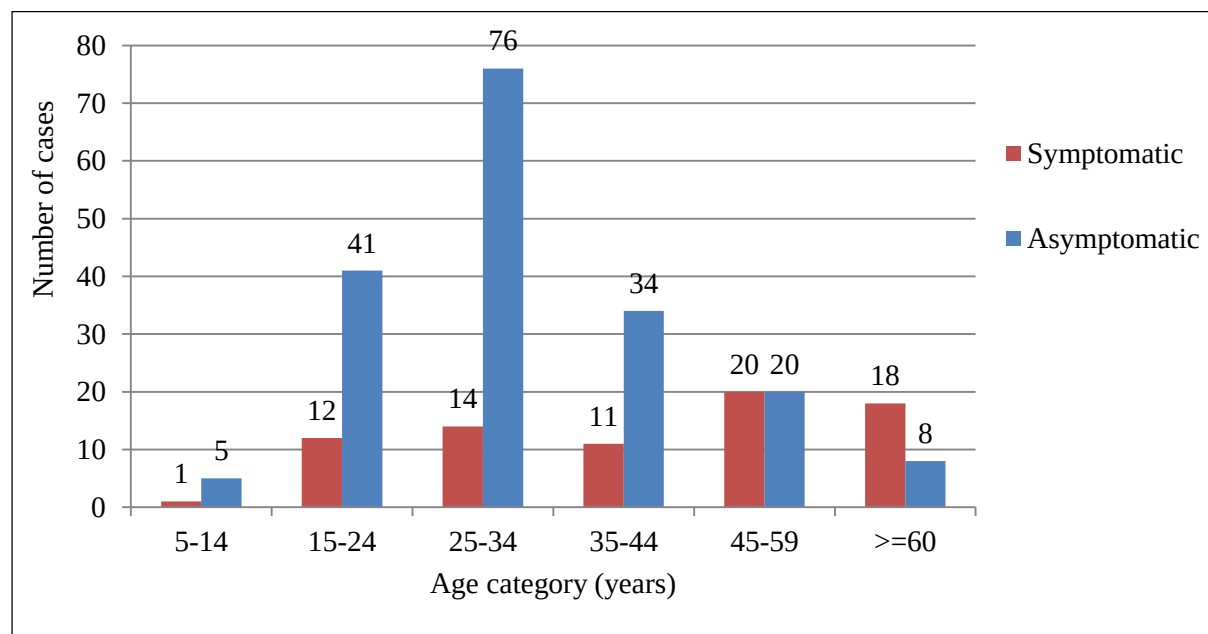


Figure 3: Manifestation of confirmed COVID-19 cases admitted to Guder Primary Hospital, Central Ethiopia, 2020

Laboratory tests: Before discharge from case treatment centre, follow up laboratory tests were done for patients in the Hospital. Of the admitted cases, 184(70.8%) were tested on the first follow up test and 62(23.8%) were found to be positive. On the second and third follow up tests, 29(11.2%) and two

(0.8%) were tested and seven (2.7%) and two (0.8%) positives were detected from them, respectively.

Clinical outcomes: Among 260 confirmed cases, 243(93.5%) had recovered. The average length of stay in the hospital was 14.3 days (Table 2).

Table 2: Clinical outcomes of confirmed COVID-19 cases admitted to Guder Primary Hospital by demographic characteristics, Central Ethiopia, 2020

Variables	Category	Outcomes						X ² -value (p-value)
		Died	Lost	Recovered	Referred	Total	Percent	
Status admission	No sign & symptom	1	1	180	2	184	70.8	124.24 (.001)
	Mild	2	0	38	0	40	15.4	
	Moderate	0	1	13	0	14	5.4	
	Severe	5	0	12	1	18	6.9	
	Critical	4	0	0	0	4	1.5	
Age category	5-14	0	0	6	0	6	2.3	28.52 (.019)
	15-24	0	0	52	1	53	20.4	
	25-34	0	1	88	1	90	34.6	
	35-44	4	0	40	1	45	17.3	
	45-59	7	1	32	0	40	15.4	
	>=60	1	0	25	0	26	10.0	
Sex	Female	7	0	73	0	80	30.8	6.56 (.087)
	Male	5	2	170	3	180	69.2	
Occupation	Government employed	1	0	103	1	105	40.4	91.04 (0.001)
	Merchant	3	0	62	1	66	25.4	
	Student	1	0	24	0	25	9.6	
	Prisoner	0	1	17	0	18	6.9	
	Constructions	0	0	11	0	11	4.2	
	Housewife	3	0	8	0	11	4.2	
	Blank	4	1	4	1	10	3.8	
	Self-employed	0	0	7	0	7	2.7	
	Farmer	0	0	7	0	7	2.7	

The case fatality rate (CFR) among the admitted cases during the study period was 12(4.6%). Of these deaths, the deadliest affected age group was 45-59 years; the age-specific CFR was 7(17.5%).

The median age among died patients was 50 years and the mean length of stay in ICU was 4.4 days (SD $\pm$ 4.5). Eight (66.7%) patients had known comorbidities (Table 3).

Table 3: Characteristics of COVID-19 epidemic death intensity at Guder Primary Hospital, Central Ethiopia, 2020

Characteristics	Category	Number	Percent
Sex	Male	5	41.7
	Female	7	58.3
Age category	35-44	4	33.3
	45-59	7	58.3
	>=60	1	8.3
Known comorbidity	Yes	8	66.7
	No	4	33.3
Intensive Care Unit (ICU) admission	Yes	7	58.3
	No	5	41.7
On mechanical ventilator	Yes	6	50.0
	No	6	50.0

The admission of confirmed COVID-19 cases at Guder Primary Hospital started on WHO week 20, 2020 with mean weekly admission of eight cases.

The peak observed on Week 41, 2020 was the result of a mass test campaign for risk populations in the West Shewa zone (Figure 4).

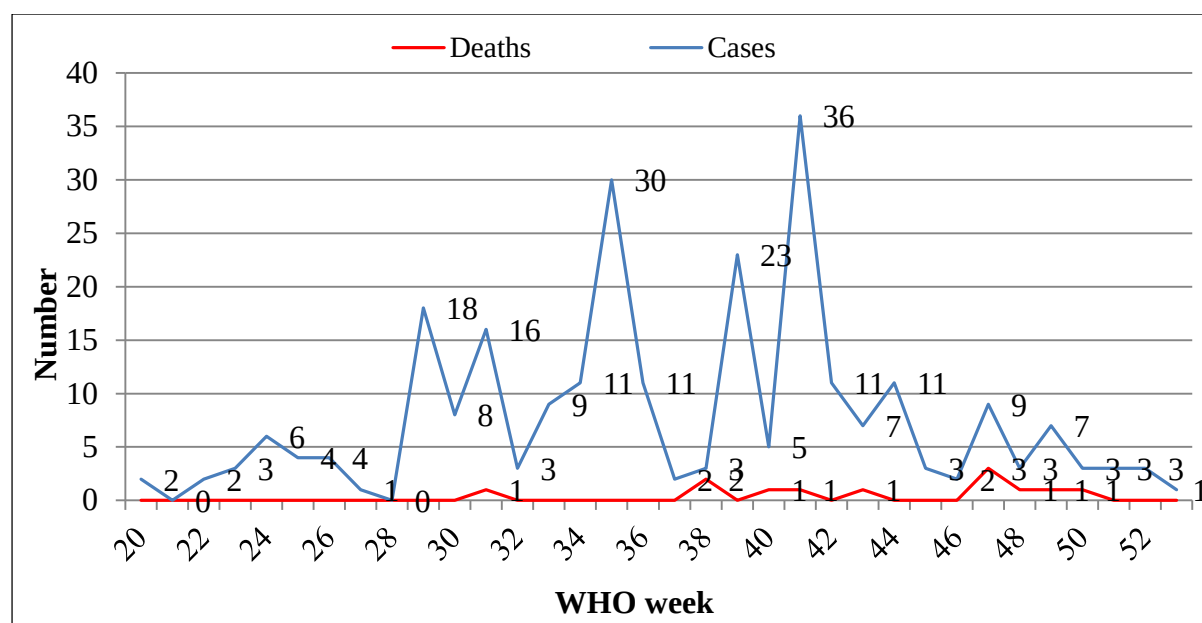


Figure 4: Epidemic curve of confirmed COVID-19 admitted cases and epidemic death at Guder Primary Hospital, WHO week 20 to 53, 2020

Discussion

This study was conducted to assess the epidemiology and outcome of confirmed COVID-19 cases admitted to Guder Primary Hospital from May 16, 2020 to December 31, 2020. The findings of this study revealed that adult males were more infected; and children and youth below the age of 25 years make up 22.7% of the total admitted cases. This result is similar to a study done in Ethiopia, that shows children and youth below the age of 25 make up around 30% of the total COVID-19 cases (UNICEF et al. 2020). This similarity might be due to school closures all over the country due to an outbreak of COVID-19, which might have prevented children from exposure to transmission sources.

According to this study, only 10% of those died were older age group (60 and above years). Of the total deaths, seven (58.3%) were females and found in aged category of 45-59 years and eight (66.7%) deaths had pre-existing comorbidities. This finding is different from a study conducted in Wuhan, China that showed the COVID-19 infection is more likely to affect older males with comorbidities (Chen et al. 2020). This might be due to differences in occupational characteristics and life expectancies of the study populations.

The average length of hospitalization was 14.3 (SD 3.6) days. This finding agrees with other studies conducted among hospitalized cases in China (Wang et al. 2020). A study conducted in Zhejiang province of China revealed that children accounted for roughly 5% of total patients with COVID-19 with a mean duration of hospitalization of 14 [SD 3] days (Qiu et al. 2019). This indicates that COVID-19 affects people differently, in terms of biological, sex

and age which might be due to their occupational differences.

This study has found that more than a quarter (29.2%) had one or more symptoms at admission, the commonest symptom being cough (16.5%). These findings are different from a study done in China as of February 11, 2020, which has found that the majority (80.9%) of infections are mild with flu-like symptoms (Wang et al. 2020) and another study was done in the Oromia region of Ethiopia that showed only 64 (0.7%) of the cases had symptoms at diagnosis (Gudina 2020). These differences might be due to the immunological factor of individuals and consideration of mild symptoms not as a disease in the study area.

Of the admitted cases, 93.5% had recovered. This finding agrees with WHO data as of December 19, 2020, that revealed 1.8% of people infected with SARS-CoV-2 have a fatal outcome, while 98.2% recovered in Ethiopia (WHO 2020e). However the present finding was different from another study conducted in the Oromia Region of Ethiopia that showed COVID-19 case fatality rate of 1.2% among all infected cases (Gudina 2020). The dissimilarity from the current study might be due to difference in clinical status of the admitted cases from the general confirmed cases, and currently, the principle of home-based isolation and care for asymptomatic and mild cases have been implemented in Ethiopia.

The case fatality rate among the admitted cases at Guder Primary Hospital was 4.6%, which was above the WHO's overall estimation of around 2% (WHO 2020e). This difference might be due to admission of only symptomatic cases to the treatment center in the study area and large proportion of infected but asymptomatic individuals who are isolated at their homes.

Age group 45-59 years are the most affected with an age-specific case fatality rate of 17.5% in this study. This might be due to lower life expectancy in Ethiopia.

This study encountered certain limitations like lack of complete data on travel history, contact history, and body mass index in the medical records.

Conclusions

The finding of this study revealed that COVID-19 had more likely affected adult males among admitted cases in the early ten months of infection. The disease remains largely asymptomatic and they recovered after 14 days mean time hospitalization. Even though people of all ages can be infected by COVID-19, male adults (15-59 years) appear to be more infected while death is more occurred in females with comorbidities. Therefore, case treatment centers should give emphasise to case management strategies focusing on existing comorbidities in order to avert morbidity and mortality due to COVID-19 infection. In addition, future studies should consider wider geographic areas, larger population and other important variables.

Ethical approval and consent to participate:

Letter of ethical clearance was obtained from the Ethics Committee of Oromia Regional Health Bureau, Public Health Emergency Management and Health Research Directorate (Ref. No: BEFO/HBTFFH/116/788) and officially submitted to West Shewa Zone Health Department and Guder Primary Hospital.

Competing interests: The authors declare that they have no competing interests.

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