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Outcomes and its Associated Factors of Covid 19 Among Patients Admitted to Tgsh Covid 19 Treatment Center, Bahir Dar: Ethiopia: A Retrospective Hospital Based Study

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A RESEARCH THESIS SUBMITTED TO BAHIA DAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCE, DEPARTMENT OF PUBLIC HEALTH IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE SPECIALITY CERTIFICATE IN INTERNAL MEDICINE

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Title of the research	***Outcome and its associated factors of COVID 19 patients admitted to TGSH COVID 19 treatment center Bahir Dar; Ethiopia: retrospective hospital-based study***
Duration of the study	***From September 2020- Aug.2021***
Study Area	***TGSH, Bahir Dar, Ethiopia***

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ACRONYMS:

COVID 19- corona virus disease 2019

CCIS -Charlson's co-morbidity index score

SARS-CoV--severe acute respiratory syndrome

SPSS- Statistical Package for the Social Sciences

NAATs- nucleic acid amplification test

PHEIC- Public Health Emergency of International Concern

RT-PCR- reverse transcriptase polymerase chain reaction

MERS-Cov- middle east respiratory syndrome corona virus

ARDS- acute respiratory distress syndrome

AKI- acute kidney disease

COPD- chronic obstructive pulmonary disease

CKD- chronic kidney disease

IMV- invasive mechanical ventilation

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Abstract

Background: the current pandemic, COVID-19, caused by a novel coronavirus SARS-CoV-2 has claimed over a million lives, 6,561,757 people have died so far from the coronavirus COVID-19 outbreak as of October 10, 2022, 23:59 GMT worldwide according to the worldometer report, warranting the need for more research into the wider determinants of COVID-19 outcomes to support evidence-based policies

Objective: This study aimed to investigate the outcome and factors determine the mortality of individuals with COVID-19.

Methods: A retrospective cross sectional chart review for patients admitted to COVID treatment center and all the necessary data were collected from hospitalized patients' cards using the pre-developed data collection format. Data was collected via Epicollect-5 and then exported to SPSS 25 version software database for analysis. The sample size was determined using computer-based Epi info7 software Stat Cal to be 221. In the specified study period from 620 patient, 221 COVID19 patient charts were taken by using simple random sampling with lottery method. The analysis results were summarized using descriptive summary measure by using frequency tables and charts. Binary logistic regression was used to assess the association of dependent and independent variables. Both bi-variable and multi-variable analysis was conducted. Independent variables with a p-value of less than 0.25 in the bi-variable analysis were considered in the multivariable analysis. Odds ratio with 95 % confidence intervals and associated p-values was computed to assess the presence and degree of association between dependent and independent variables.

Result: a total of 221 patients fulfilled the inclusion criteria and were included in this study. The median age was 56.7. Among the total of 221 cases 142 (64.3%) were males and 79 (35.7%) were females. 108 cases (48.9%) lives in rural area and the remaining 51.13% lives in urban area. Among a total of 221 cases, 104 (47%) had one or more preexisting comorbidities. Hypertension is the most common comorbidity identified accounting for 23.1% of cases, Diabetes (19%), RVI (4.1%) and asthma (6.8%). Among the study population, 81cases (36.7%) were moderate in severity,115 (52%) were severe and 25 cases (11.3%) were critical at presentation. Among the study population, 171 (77.4%) patients were discharged with improvement, 50 cases (22.6%) patients were died. Age above 60, (AOR= 7.44 CI: 95%, 1.88-29.34, P= 0.004), hypertension (AOR= 2.82, CI: 95%, 1.17-6.79 p=0.02), diabetes mellitus (3.34, 1.29-8.65, CI: 95% P= 0.013), severity of the illness being severe and critical requiring mechanical ventilator (AOR 13, 2.69-62.84 p=0.001, AOR 271.8, 33.17-2227.2 p= <0.001respectively) were independent variables statistically significantly associated with poor COVID 19 treatment outcome.

DISCUSSION: the proportion of death among COVID19 patients admitted to TGSH is 22.6%. age, presence of comorbidities such as hypertension, diabetes mellitus and clinical condition/severity of the illness at presentation are significantly associated with the outcome. Therefore, critical follow–up and management of patients with underlying diseases and worsening health conditions during admission is required.

Keywords: corona virus disease 2019, outcome, associated factors

1. Introduction

1.1 Background:

Coronaviruses are enveloped positive-stranded RNA viruses. Full-genome sequencing and phylogenic analysis indicated that the coronavirus that causes COVID-19 is a betacoronavirus in the same subgenus as the severe acute respiratory syndrome (SARS) virus (as well as several bat coronaviruses), but in a different clade. The Coronavirus Study Group of the International Committee on Taxonomy of Viruses has proposed that this virus be designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1)

Like other RNA viruses, SARS-CoV-2 is constantly evolving through random mutations. Any new mutations can potentially increase or decrease infectiousness and virulence. In addition, mutations can increase the virus' ability to evade adaptive immune responses from past SARS-CoV-2 infection or vaccination (2). Direct person-to-person respiratory transmission is the primary means of transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is thought to occur mainly through close-range contact (ie, within approximately six feet or two meters) via respiratory particles; virus released in the respiratory secretions when a person with infection coughs, sneezes, or talks can infect another person if it is inhaled or makes direct contact with the mucous membranes. Infection might also occur if a person's hands are contaminated by these secretions or by touching contaminated surfaces and then they touch their eyes, nose, or mouth, although contaminated surfaces are not thought to be a major route of transmission(1).

At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei Province of China. It rapidly spread, resulting in an epidemic throughout China, followed by a global pandemic. In February 2020, the World Health Organization designated the disease COVID-19, which stands for coronavirus disease 2019. The virus that causes COVID-19 is designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); previously, it was referred to as 2019-nCoV (1). COVID-19 (SARS-CoV-2, corona virus) is currently among the leading causes of death globally(3). WHO declared the SARS-CoV-2 outbreak as a Public Health Emergency of International Concern (PHEIC)(4).The continuing spread of SARS-CoV-2 remains a public health emergency of international concern, resulting in an enormous global disease burden. As of early August, 2021, more than 200 million COVID-19 cases have been confirmed globally, and more than 4·3 million people have died following SARS-CoV-2 infection (5).

The estimated incubation period for COVID-19 is up to 14 days from the time of exposure, with a median incubation period of 4 to 5 days. The spectrum of illness can range from asymptomatic infection to severe pneumonia with acute respiratory distress syndrome and death. Among 72,314 persons with COVID-19 in China, 81% of cases were reported to be mild (defined in this study as no pneumonia or mild pneumonia), 14% were severe (defined as dyspnea, respiratory

frequency ≥30 breaths/min, oxygen saturation [SpO2] ≤93%, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen [PaO2/FiO2] <300 mm Hg, and/or lung infiltrates >50% within 24 to 48 hours), and 5% were critical (defined as respiratory failure, septic shock, and/or multiorgan dysfunction or failure). In a report on more than 370,000 confirmed COVID-19 cases with reported symptoms in the United States, 70% of patients experienced fever, cough, or shortness of breath, 36% had muscle aches, and 34% reported headaches. Other reported symptoms have included, but are not limited to, diarrhea, dizziness, rhinorrhea, anosmia, dysgeusia, sore throat, abdominal pain, anorexia, and vomiting(2).

The diagnosis of COVID-19 is made primarily by direct detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA by nucleic acid amplification tests (NAATs), most commonly reverse-transcription polymerase chain reaction (RT-PCR) from the upper respiratory tract. Antigen testing as an alternative to NAAT — Tests that detect SARS-CoV-2 antigen can be performed rapidly and at the point of care and thus may be more accessible with a faster time to results than some NAATs. Antigen tests are typically less sensitive than NAATs(1).

1.2 Statement of the Problem

The contagiousness of SARSCoV-2 is higher than severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV), and the scale of morbidity and mortality of COVID-19 are far greater than severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The case fatality rates of severe and critical cases are relatively high, critical patients witness significantly higher mortality which is up to 49.0%, by contrast with 2.3% for overall COVID-19 patients(6).

Older age and frailty are chief risk factors associated with mortality in COVID-19 patients hospitalized to an acute medical unit at secondary care level(7).The severity and outcome of coronavirus disease 2019 (COVID-19) largely depends on a patient's age. Adults over 65 years of age represent 80% of hospitalizations and have a 23-fold greater risk of death than those under 65(8). The ability to control viral load is one of the best prognostics of whether a patient will have mild or severe COVID-19 symptoms. For the immune system to effectively suppress then eliminate SARSCoV-2, it must perform four main tasks: (1) recognize, (2) alert, (3) destroy and (4) clear. Each of these mechanisms is known to be dysfunctional and increasingly heterogeneous in older people(9).

The probability of serious COVID-19 disease is higher in people aged ≥60 years, those living in a nursing home or long-term care facility, and those with chronic medical conditions (2). Chronic illness such diabetes and hypertension are identifiable risk factors for morbidity and mortality via facilitation of viral entry and impairment of the immune response(10).Coronavirus related risk of mortality was significantly associated with smoker patients when compared to non-smoker patients(11). Female with coronavirus have lower rates of hospitalization and mortality than male(12). Early diagnosis and having exposure history reduced the risks of COVID-19 severity. Meanwhile, the risk factors of developing severe COVID-19 including male, older age, fever, fatigue, cough, hypertension, diabetes, and chronic kidney disease, which are very helpful to predict and prevent developing severe cases of COVID-19(6).

1.3 Significance of the Study

This study aimed to investigate outcome and factors determined the mortality and length of hospitalization in individuals with COVID-19. COVID 19 is a deadly disease that affects all groups of population. However, its mortality and morbidity are different among populations. For better outcome and interventions, identifying determinants of COVID-19 outcomes that require urgent attention is important. Additionally, this study will suggest strategies to augment area-specific efforts at curbing the COVID-19 problem.

2. Literature Review

2.1 COVID 19 outcome and its associated factors

A study done in different WHO regions (African, Region of the Americas, South-East Asia Region, European Region, Eastern Mediterranean Region and Western Pacific Region) to evaluate the trend of reported case fatality rate (rCFR) of COVID-19 over time, using globally reported COVID-19 cases and mortality data, showed that The weekly global cumulative COVID-19 rCFR reached a peak at 7.23% during the 17th week (April 22–28, 2020), then a strong declining trend up until the 53rd week (post-peak period) toward 2.2% (December 29–31, 2020)(13). A systematic review on Determinants of COVID-19 outcomes, the studies spanned nine countries, (China, USA, Spain, England, Kuwait, Mexico, France, Italy, and Austria), reviewed on March 23, 2021, Of the COVID-19 outcomes, 19 studies focused on COVID-19 mortality, 2 on COVID-19 length of hospital stay and 1 on both COVID-19 mortality and length of hospital stay. The review findings showed that increasing age and co morbidities are more likely to determine COVID-19 outcomes(3).

COVID-19 has shown a clear male-biased severity and mortality in different countries(14). The difference in immune system function between males and females could be an important determinant. Females are known to show a robust immune response to pathogens which could help them to better regulate viral load and viral clearance compared with males. Since many immune genes are present on X chromosome, the XX and XY genetic constitutions could also contribute to COVID- 19 severity. Other differences including steroid hormone milieu and sex organs could also play a crucial role in pathogenesis. Estrogen in females can have immune-enhancing effects while testosterone secreted by the testis can have immune-suppressive effects(15). One study in Spain showed that Women appear to project a more responsible attitude toward the COVID-19 pandemic than men. Women report greater concern about the pandemic, higher compliance with safety measures, greater care about washing hands, and stricter attitude towards keeping distance from others in public places in contrast to men. women reported statistically significantly greater ($Z = 2.60$, $p = .009$, effect size, Eta squared [$\eta 2$] = .11) perceived control ($M = 7.58$, $SD = 1.36$) than men ($M = 3.42$, $SD = 1.68$)(16). These differences in attitudes suggest that women appear to take the threat more seriously or with greater concern, as well as with greater adherence to preventive measures than men which could be related to the

lower incidence of COVID-19 deaths in women compared to men(17). Data from China published on NEJM, revealed a gender gap in deaths, where 41.9% of the admitted patients were female with majority of male sufferers dying compared to women(18). The biological differences in the immune systems between men and women exist which may impact our ability to fight an infection including SARS-2-CoV-2. Generally, females are more resistant to infections than men, and this is possibly mediated by several factors including sex hormones and high expression of coronavirus receptors (ACE 2) in men but also life style, such as higher levels of smoking and drinking among men as compared to women(19).

A combined prospective and retrospective, multicenter, cohort study, published on November 2020, was conducted at 10 sites in Austria in 247 people with diabetes or newly diagnosed prediabetes who were hospitalized with COVID-19, showed that in people with diabetes and prediabetes using a simple score upon hospital admission showed that the hospital mortality for COVID-19 was high in people with diabetes but not significantly different to the risk in people with prediabetes. The mortality rate in people with diabetes was numerically higher (26.7%) compared with those with prediabetes (14.9%)(20). A cohort study done in Netherland, 1604 Patients from eight participating hospitals, including two university hospitals from the CovidPredict cohort showed that the accumulation of hypertension, dyslipidemia and diabetes leads to a stepwise increased risk for short-term mortality in hospitalized COVID-19 patients independent of age and sex. the use of ≥2 antidiabetics and ≥2 antihypertensive was associated with mortality independent of age and sex with HRs of, respectively, 2.09 (95% CI 1.55 to 2.80) and 1.46 (95% CI 1.11 to 1.91) (21). A nationwide study in 2020, France, on Obesity, diabetes, hypertension and severe outcomes among inpatients with coronavirus disease 2019, showed that among 134 209 inpatients with COVID-19, mortality was more frequent among patients with obesity and diabetes. IMV was more frequently necessary for inpatients with obesity, diabetes and hypertension. Patients for whom these were incident co-morbidities were particularly at risk. Among this cohort, IMV was required for 13 596 inpatients, and 19 969 patients died and death were more frequent in male patients (16.7%) than female (12.9%) (Adjusted odds ratio (aOR) 2.0, 95% CI 1.9e2.1 and aOR 1.5, 95% CI 1.4e1.5, respectively), IMV in patients with co-morbidities (aOR 2.1, 95% CI 2.0e2.2 for CCIS ¼ 2 and aOR 3.0, 95% CI 2.8e3.1 for CCIS 5), and death in patients aged 80 or above (30.1%) ((aOR 17.0, 95%CI 15.5e18.6). Adjusted on age, gender and CCIS, death was more frequent among inpatients with obesity 15.2% (4902)), non-

obese (14.8% (15 067)) ((aOR 1.2, 95% CI 1.1e1.2) and diabetes (20.0% (6446)), non-diabetes (13.3% (13 523)) (aOR 1.2, 95% CI 1.1e1.2). IMV was more frequently necessary for inpatients with obesity (aOR 1.9, 95% CI 1.8e2.0), diabetes (aOR 1.4, 95% CI 1.3e1.4) and hypertension (aOR 1.7, 95% CI 1.6e1.8). Comparatively, IMV was more often required for patients with the following incident co-morbidities: obesity (aOR 3.5, 95% CI 3.3e3.7), diabetes (aOR 2.0, 95% CI 1.8e2.1) and hypertension (aOR 2.5, 95% CI 2.4e2.6) (22).Patients who were male, with advanced age, obesity, a history of smoking, hypertension, diabetes, malignancy, coronary heart disease, hypertension, chronic liver disease, COPD or CKD are more likely to develop severe COVID-19 symptoms. ARDS, shock and AKI were thought to be the main hindrances to recovery(23).

A large-scale observational and Mendelian randomization (MR) analysis using UK Biobank, United Kingdom, on Smoking and COVID-19 outcomes shows that Coronavirus related risk of mortality was significantly associated with smoker patients when compared to non-smoker patients. In this study There were 421 469 eligible participants, 1649 confirmed infections, 968 COVID-19-related hospitalizations and 444 COVID-19-related deaths. Compared with never-smokers, current smokers had higher risks of hospitalization (OR 1.80, 95% CI 1.26 to 2.29) and mortality (smoking 1–9/day: OR 2.14, 95% CI 0.87 to 5.24; 10–19/day: OR 5.91, 95% CI 3.66 to 9.54; 20+/day: OR 6.11, 95% CI 3.59 to 10.42). In MR analyses of 281 105 White British participants, genetically predicted propensity to initiate smoking was associated with higher risks of infection (OR 1.45, 95% CI 1.10 to 1.91) and hospitalization (OR 1.60, 95% CI 1.13 to 2.27). Genetically predicted higher number of cigarettes smoked per day was associated with higher risks of all outcomes (infection OR 2.51, 95% CI 1.20 to 5.24; hospitalization OR 5.08, 95% CI 2.04 to 12.66; and death OR 10.02, 95% CI 2.53 to 39.72)(11).

A prospective study from three COVID-19 referral care centers in West Africa, A total of 1,805 patients, Mortality was 5% overall, and 1%, 5% and 14% in patients aged <40, 40–59 and 60 years, respectively. and In multivariable analysis, the risk of death was higher in men (aOR 2.0, 95% CI 1.1; 3.6), people aged 60 years (aOR 2.9, 95% CI 1.7; 4.8) and those with chronic hypertension (aOR 2.1, 95% CI 1.2; 3.4)(24).

A Retrospective Cohort Study done at a Private Tertiary Hospital in Tanzania; Of the 157 patients, 107 (68.1%) patients survived and 50 (31.8%) died. Mortality was highest in patients suffering with severe (26%) and critical (68%) forms of the disease. The median age of the cohort was 52 years (IQR 42–61), majority of patients were male (86%) and of African origin (46%), who presented with fever (69%), cough (62%) and difficulty in breathing (43%). Factors that were associated with mortality among our cohort were advanced age (OR 1.07, 95% CI 1.03–1.11), being overweight and obese (OR 9.44, 95% CI 2.71–41.0), suffering with severe form of the disease (OR 4.77, 95% CI 1.18–25.0) and being admitted to ICU (OR 6.68, 95% CI 2.06–24.6)(25).

Clinical Profile and Treatment of COVID-19 Patients: Experiences from an Ethiopian Treatment Center retrospective cross-sectional study done at BORU meda hospital, a total of 279 COVID-19 patients were included in the final analysis. The majority (69.5%) were male. Around a quarter (n =73; 26.2%) of the patients were symptomatic, of which cough (n = 49; 67.1%) and fever (n = 32; 43.8%) were common
symptoms. Among symptomatic patients, 48 (65.8%) were mild, four (5.5%) moderate, 12 (16.4%) severe, and nine (12.3%) were critical. The case fatality rate was 2.1%. By this study Hypertension, age older than 25 years, and HIV/AIDS were significantly associated with symptomatic infection. In this study, most of the COVID-19 patients were asymptomatic. However, the proportion of severe and critical patients among those with symptoms was high(26).

2.2 Conceptual framework

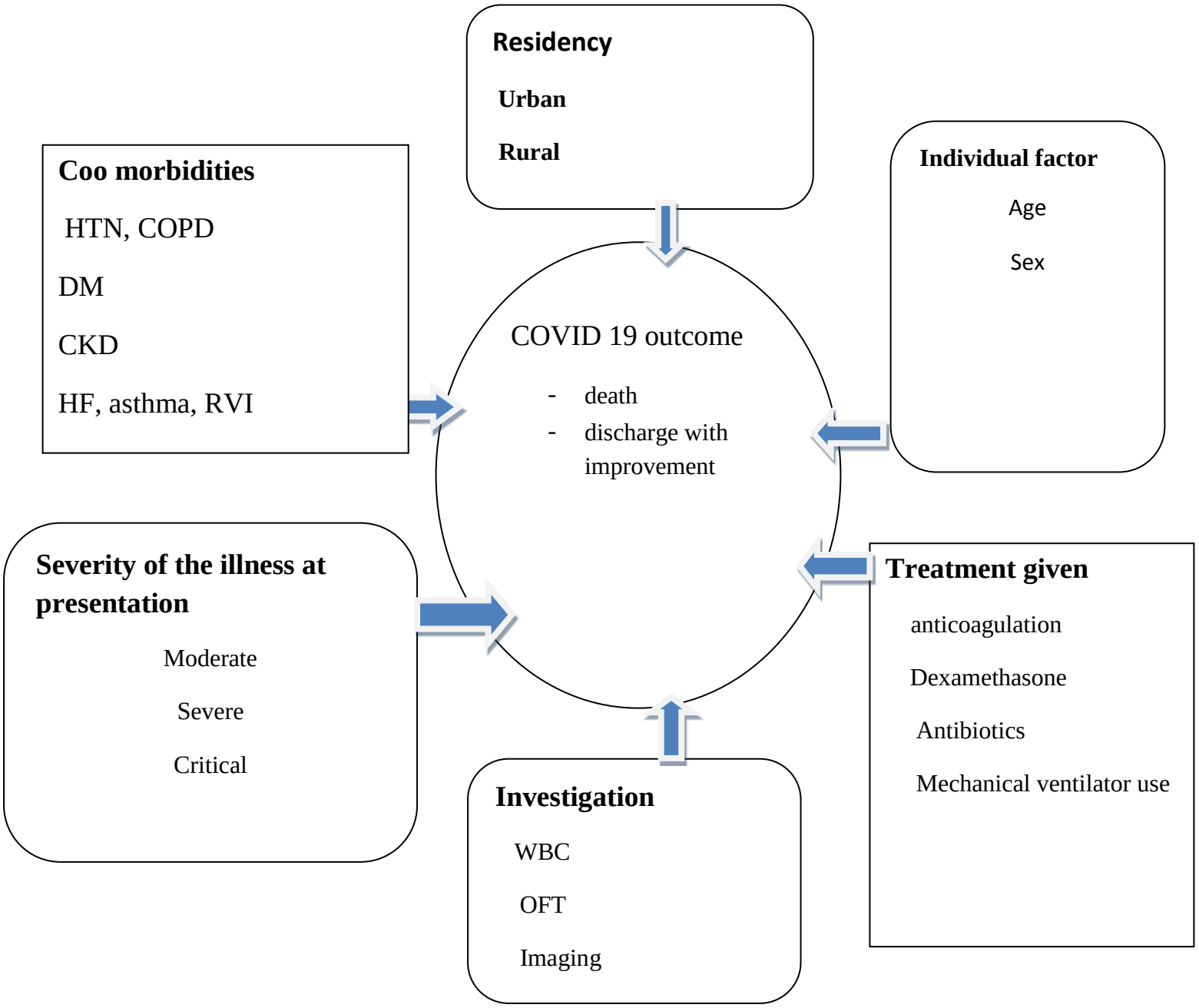

Figure 1. Conceptual framework; taken from different literatures.

3. OBJECTIVE

3.1 General objective

To assess the Outcomes and its associated factors of COVID 19 among patients admitted to TGSH COVID 19 treatment center.

3.2 Specific objective

To describe the Outcomes of COVID 19 among patients admitted to TGSH COVID 19 treatment center.

To identify associated factors of COVID 19 outcome among patients admitted to TGSH COVID 19 treatment center

4. Materials and methods

4.1 Study setting and period

Bahir Dar (Meaning "Sea shore") is a city in north-western Ethiopia and the capital of the Amhara Region. Bahir Dar is one of the leading tourist destinations in Ethiopia, with a variety of attractions in the nearby; Lake Tana and Blue Nile River. The city is known for its wide avenues lined with palm trees and a variety of colorful flowers. Bahir Dar is situated on the southern shore of Lake Tana, the source of the Blue Nile (Abay). The city is located approximately 578 km north-northwest of Addis Ababa, having a latitude and longitude of 11°36′N 37°23′E and an elevation of about 1,800 meters (5,906 feet) above sea level.

Tibebegion specialized hospital is located about 10km south from the city center and about 7 km from the new bus station on the way to Adet District and about 23 km from the Blue Nile Falls (locally called 'TisEsat'. It is a tertiary university teaching hospital with 450 bed capacity out of which 72 are occupied by medical adult patients. The COVID treatment center had 78 beds, 3 mechanical ventilator machines and currently there are a total of 30 staffs working in the treatment center. The hospital receives patients who are referred from across the Amhara region and gives outpatient and inpatient services in all major departments. The study will be conducted in Tibebeghion specialized hospital starting from Sep 2020 to Sep 2021.

4.2. Study design

Retrospective analysis of data recorded on COVID19 Patients admitted at COVID 19 treatment center, Tibebgion Specialized Hospital from Sep. 2020 to Aug. 2021.

4.3. Population

4.3.1. Source Population

All COVID 19 positive patients admitted to the treatment center of Tibebegion Specialized Hospital

4.3.2. Study Population

All COVID 19 positive patients admitted to the treatment center of Tibebegion Specialized Hospital those are available during the study period.

4.3.3. Inclusion Criteria

Patients admitted to treatment center and tested positive, either by PCR or RDT test.

4.3.4. Exclusion Criteria

- Patients who have incomplete data>20%
- Those who left home against medical treatment

4.4. Study Variables

4.4.1. Dependent Variables

Outcome of COVID 19 patients admitted to TGSH

4.4.2. Independent Variables

- Age, Sex, educational status, socioeconomic status
- Obesity, smoking history, HIV co-infection, DM, alcohol consumption, hypertension, CKD, asthma, heart failure, treatment given, severity of the illness, time from the onset of the illness to hospital visit.

5. Sample Size and sampling procedure

5.1. Sample size

The sample size was determined by using the following assumptions; the in-hospital mortality rate among severe cases of COVID-19 in the previous study was 28.6%. In the same study, cases with coo morbidities (malignancy, DM, cardiovascular disease, COPD including asthma were analyzed; and the mortality was 32%, 7.73%, 7.73%, 3.93% respectively). The sample size was calculated from the total number of cases seen which were 620 by taking the largest number 32% as p value, 95% confidence level (1.96), level of precession 0.5%, and by Using Epi info version 7, the sample will be 217, and adding 10% of it for possible missed charts, the sample size will be 239. From 239 collected samples,18 samples were not fulfilling the inclusion criteria and those were omitted. so, the final sample size to be analyzed were 221 cases.

5.2. Sampling Technique

A sampling frame of 620 patients registered from discharge catalog in TGSH covid-19 treatment center were taken. Systematic random sampling was used for a calculated sample size of 239 to make K value of two (620/239). The first patient card was selected by lottery method, and then every two interval the patient card was selected and reviewed.

5.3. Data Collection Procedure

Data collection checklist was used to collect data on patient's socio-demographic characteristics and all clinical information. Data was collected by the principal investigator, and health professionals. Training was given about data collection procedure and the purpose of the research for those who were involved on data collection. Data quality was assessed every day after data collection to tackle the problems early.

5.4 Operational definition

Mild illness: Individuals who have any of the various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging.

Moderate illness: Individuals who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation measured by pulse oximetry (SpO2) ≥94% on room air at sea level.

Severe illness: Individuals who have SpO2 <94% on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) <300 mm Hg, a respiratory rate >30 breaths/min, or lung infiltrates >50%.

Critical illness: Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction.

5.5. Data Quality Assurance

The data collection process was supervised by the principal investigator and the data were checked for completeness and accuracy on daily base. Pretest was conducted one week prior to actual data collection by data collectors on patient cards and checked for consistency; accuracy and any ambiguity in the questionnaires were corrected before final data collection.

5.6. Data Processing and Analysis

The data was entered by EPI-collect 5 then to excel to be cleaned, edited and exported to be analyzed by SPSS version 25 by the principal investigator. Data cleaning was performed to check for accuracy, consistencies and missed values and variables. The descriptive analysis was done by simple frequencies and proportions, and the results were presented with tables, and graphs. At bivariate analysis independent variables with P-value of <0.2 was candidate for multiple variable logistic regression analysis. Multiple variable logistic regression analysis was carried out to control confounders and identify independently associated factors. In multiple variable analyses, variables with p-value less than 0.05 were considered as statistically significant associated factors.

6. Ethical Considerations

Ethical clearance was obtained from Bahir Dar University Ethics Review Committee. A support letter was sent to Tibebegion Specialized Hospital. Name was be used in collecting the data from the medical files. Confidentiality was maintained by keeping the data collection forms locked in a secure cabinet and the electronic data file was kept securely in a password protected computer. Data obtained in the course of study was only handled by the research team.

7. Result

7.1 Socio demographic characteristics

From a total of 221 study subjects included in this study, 142 (64.3%) were males and 79 (35.7%) were females. The proportion of age distribution: 39.4% of the cases are in the range of 40-60 years and those who are above 60 years have the same proportion of 39.4% with a mean age of patients 56.7. 108 cases (48.9%) lives in rural area and the remaining 51.13% lives in urban area. see table1 below.

Table 1 socio demographic characteristics of COVID patients admitted in TGSH COVID treatment center

Variable	Group	Frequency	Percent
Age in years	20-40	47	21.3
	41-60	87	39.4
	>60	87	39.4
Sex	Male	142	64.3
	Female	79	37.5
Residency	Urban	113	51.13
	Rural	108	48.9

7.2 Clinical characteristics

Among a total of 221 cases, 81cases (36.7%) were moderate in severity,115 (52%) were severe and 25 cases (11.3%) were critical at presentation. 47 percent of patients had one or more preexisting comorbidities. Hypertension is the most common comorbidity identified accounting for 23.1 percent of cases, 19 percent had Diabetes, 4.1 percent of cases had RVI and 6.8 percent were asthmatic.43 cases (19.5%) were requiring facemask oxygen therapy; of those 19 cases (38%) were died. 12 cases (5.4%) were in the ICU on mechanical ventilator and among them 6 cases were died. The average hospital stay was 7 days.

7.3 Patient Treatment Outcome

Among 221 COVID-19 patients, 171 (77.4%) had favorable treatment outcomes, while 50 cases (22.6%) died in the treatment center.

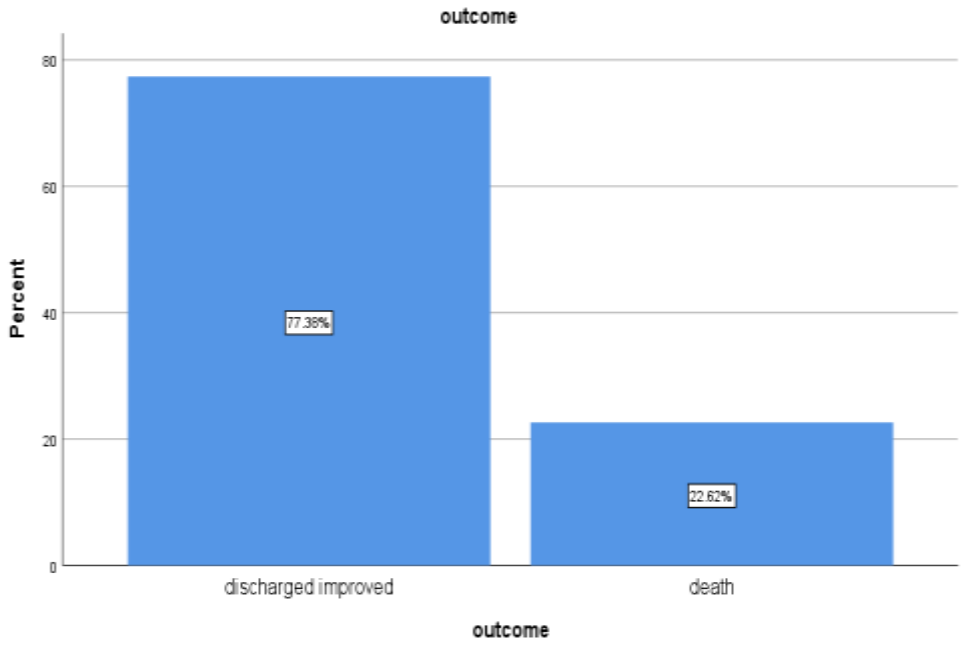

Figure 2. Patient treatment outcome

Table 2. clinical characteristics of cases

Characteristics	Frequency	Percentage
Severity		
Moderate	81	36.7
Severe	115	52
Critical	25	11.3
Co morbidity		
Yes	104	47.1
no	117	52.9
Comorbidity type		
Diabetes mellitus	42	19
Hypertension	55	23.1
Asthma	15	6.8
CKD	3	1.4
HIV/AIDS	9	4.1
Bronchiectasis	3	1.4
Heart failure	6	2.7
Outcome		
Discharged improved	171	77.4
Dead	50	22.6

7.4 laboratory findings

Of the 221 patients, complete blood count wase done for 201 patients. most of the cases that is 62% had normal white blood cell count, 22.2% of cases had leukocytosis and 6.8% of them had leukopenia. Lymphocyte count was low (<1500) in 43% of the cases. Of the total cases, renal function test was done for 171 cases, among them 145 (65.6%) cases had normal renal function test and 26 (11.8%) cases had deranged renal function test (had AKI). Chest x ray was done for only 110 cases, among them, 34% of the cases had bilateral lower one-half lung involvement(infiltration/opacity), 11% had bilateral (more than 50%) lung involvement

7.5 Treatment given in the hospital

Almost all patients were given antibiotic. Anticoagulation, dexamethasone and oxygen therapy was given based on the indication as per protocol. Three patients were given antiviral remdesivir. There is no significant association on the type of treatment given with the outcome of the patient. The following table shows the type of treatment given and the choice of antibiotics.

Table 3. type of treatment given

	Frequency	Percent	Valid Percent	Cumulative Percent
antibiotics, anticoagulation, dexamethasone, oxygen	115	52.0	52.0	52.0
antibiotics, anticoagulation, dexamethasone	23	10.4	10.4	62.4
antibiotics, dexamethasone	32	14.5	14.5	76.9
oxygen, antibiotics, anticoagulation	4	1.8	1.8	78.7
oxygen, antibiotics, dexamethasone	31	14.0	14.0	92.8
oxygen, antibiotics	3	1.4	1.4	94.1
Antibiotics	10	4.5	4.5	98.6
oxygen, antibiotics, dexamethasone, antiviral-r remdesivir, anticoagulation	3	1.4	1.4	100.0
Total	221	100.0	100.0	

Table 4. Type of oxygen given

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not require	66	29.9	29.9	29.9
	Intranasal	100	45.2	45.2	75.1
	facemask	43	19.5	19.5	94.6
	MV	12	5.4	5.4	94.1
	Total	221	100.0	100.0	

Table 5. choice of antibiotics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not given	1	.5	.5	.5
	ceftriaxone, azithromycin	120	54.3	54.3	54.8
	vancomycin, cefepime	31	14.0	14.0	68.8
	ceftriaxone, vancomycin	23	10.4	10.4	79.2
	vancomycin, ceftazidime	43	19.5	19.5	98.6
	Cefepime	3	1.4	1.4	100.0
	Total	221	100.0	100.0	

7.6 Factors associated with COVID 19 outcome

Both Bivariable and multivariable logistic regression analysis were used to identify the association of independent variables with the dependent variable. The logistic regression model was statistically significant, (chi square=72.8, df=9, p<0.001). the model explained 42.7% (Nagel kerke R2) of the variance in the outcome and correctly classifies 84.2% of cases. Hosmer and Lemeshow test assured that the model is appropriately fit with P-value of 0.86.

Binary logistic regression was performed to ascertain the effect of sex, age, presence of different comorbidities like hypertension, diabetes mellitus, asthma, HIV infection, CKD, severity of the illness, degree of chest x ray involvement, time from the onset of the illness to arrival and type of treatment given on the likely that outcome is discharged improved or death. Age, severity of the illness, hypertension diabetes mellitus, degree of chest x ray involvement, having deranged renal function test were candidates for multivariable logistic regression analysis as these were significantly associated with p value < 0.25 in bivariate analysis. On multivariable logistic regression, Age, hypertension, diabetes mellitus, sever and critical clinical condition at presentation were significantly associated with covid 19 outcome (Table 6). Patients who had significant odds of poor treatment outcome were age above 60 years, hypertensive, diabetic and worsened clinical condition at initial presentation, which is 7, 2,3, 3 times more likely to have death than their counterparts as shown in the table below.

Table 6 multivariate analysis of covid patients admitted in treatment center TGSH

Variables	Frequency	AOR (95%CI)	P-value
Age 20-40	46		
41-60	87		
>60	87	7.4(1.88-29.34)	0.004
Hypertension Yes	55	2.82(1.17-6.79)	0.020
no	165		
Diabetes mellitus Yes	42	3.34(1.29- 8.65)	0.013
no	178		
Severity of the illness Moderate	81		
severe	114	3.357(1.096-10.27)	0.034
critical	25	49.3(9-257.8)	<0.001

COR=crude odd ratio, P=P-value

8. Discussion

This study is intended to assess covid 19 outcome and its associated factors of patients admitted to TGSH covid treatment center from the year Sep.2020 to Aug.2021, a one-year institution based retrospective case analysis. A total of 221 cases were taken for analysis: among them male proportion was high accounting for 64.4% of cases. this is similar to an Experiences from an Ethiopian Treatment Center retrospective cross-sectional study done at BORU meda hospital, a total of 279 COVID-19 patients were included in the analysis. The majority (69.5%) were male(26). the media age is 56.7 (ranges from 20-97) years. 39.4% of the case are aged above 60 years. A study done in southern central Ethiopia; Arsi Zone showed that from a total of 374 cases 59.5% of participants were males. The majority (25.4%) of patients were above 54 years old(27), which is consistent with our result. The difference in immune system function between males and females could be an important determinant. Females are known to show a robust immune response to pathogens which could help them to better regulate viral load and viral clearance compared with males(15). High expression of coronavirus receptors (ACE 2) in men but also life style, such as higher levels of smoking and drinking among men as compared to women(19),which may also contribute for higher male prevalence of hospitalization.

In this study, we found that the overall death rate among 221 admitted patients is 22.6%. This result is consistent with a retrospective study done in western Ethiopia at two sites, Assosa and Pawe, Of the total 288 cases, 58 (20.2%) were died, whereas the remaining 230 (78. 8%) cases were cured(28). Two studies in Ethiopia: southern central Ethiopia; Arsi Zone and BORU meda hospital showed death rate of 12.5% and 2.1% respectively(27)(26). This disparity may be due to different in study population that in these study mild cases were included in the analysis. Retrospective Cohort Study done at a Private Tertiary Hospital in Tanzania; Of the 157 patients, 107 (68.1%) patients survived and 50 (31.8%) died(25). This study is consistent with the results when compared to a multicenter study done in France (20.04%), and Germany reported a fatality rate (4.54%) United Kingdom (14.21%) or Spain (11.95%)(29). These disparities could be the result of differences in care quality, sample size, age, comorbidities, study time, and settings.

In this study, when compared to their counterparts, patients with severe/critical conditions during admission were more likely, with significant odds ratio (3 and 49 times), to have poor treatment outcomes. Taking those who are critical at initial presentation, the death rate was very high that reach up to 84% and in severe cases reaches up to 52%. The severity of the illness in turn depends on the presence of underlying comorbidities as well as the age of patients. Two study from Ethiopia, Arsi Zone and Boru meda hospitals(27),26)), Tanzania (25) and India(30) also reported the same trends among patients with worsening health conditions during admission.

We discovered that the likelihood of a poor treatment outcome rises with age. Older patients were more likely than younger patients to have poor treatment results. Patients with age above 60 years had seven times increased risk of death compared to those age below 40 years. Which is similar to a study done in southern central Ethiopia; Arsi Zone showed that people aged 55 and

above years old (AOR = 4:35, 95% CI: 1.30– 14.60) were nearly four times more likely to have poor treatment outcomes compared to 0-24 years(27). In Tanzania cohort study, factors that were associated with mortality were advanced age (OR 1.07, 95% CI 1.03–1.11). studies in China, USA, Spain, England, Kuwait, Mexico, France, Italy, and Austria had also similar report that that increasing age is more likely to determine COVID-19 outcome(4). This could be related to the body's immune defense system deteriorating with age, and older persons were more prone to severe disease and poor treatment outcomes from COVID-19 infection because they were more likely to have many chronic conditions that hampered their health(31).

This study found that diabetic mellitus patients had higher odds of COVID-19 poor treatment outcome compared to those without disease. Diabetic patients had 3.3 times at increased risk of death compared to those who had no diabetics. This finding is also supported by other studies conducted in A,A Ethiopia, Australia, Netherlands, and France(31),(4)(21)(5).This is since having one or more co-morbid illness results in a decreased immune defense mechanism of the body, it increases the patients' probability of developing a disease from any infectious agent. This effect is accelerated if the comorbid illness/s is not well controlled(32). Furthermore, patients with comorbidity tend to be older, that in-turn adds to the existing decrease in immunity. Hyperglycemia decreases function of neutrophils and monocytes by way of impaired chemotaxis, adherence, phagocytosis and other immune system impairment(33). COVID-19 and DM interact – including the impact of glucotoxicity on the lungs, increased thromboembolic risk, worsened oxidative stress. and inappropriately high levels of cytokine production leading to organ damage(34).

In this study hypertension was the most prevalent comorbidity in COVID-19 accounting for 23.1% of the total 221 cases. Hypertensive patients had significant odds (2.8 times) of increased risk of death than those who had no hypertension. This study is consistent with studies done in Eka Kotebe General Hospital, Addis Ababa, Ethiopia(35), Lagos, Nigeria(36) Netherland(21). This may be due to the higher median age of the patients we included so that existing decreased immunity relating to aging may contribute. Previous use of RAS inhibitors which may increases ACE2 receptor and in turn ACE2 act as an entry for the virus may contribute for the association of hypertension and poor covid outcome(37). Much information about inflammatory factors and immune function was incomplete, so we could not explore the mechanism of adverse prognosis in hypertensive patients with COVID-19. Although the mechanism is still unclear, this study provides an important cautionary note for clinicians.

this study had significant limitations. First, because the data for the study was gathered from secondary sources, incomplete patient information posed a significant barrier and because of the high communicability of the disease, patients were not followed properly which may have an effect on treatment outcome as well as necessary data documentation. Second, due to the retrospective nature of the study design, all factors that were not available on registration were not included in the analysis. Moreover, the cross-sectional nature of the study design also does not indicate the cause-and-effect relationship between the factors.

9. Conclusion and recommendation

In this study, we found that a significant number of patients had unfavorable outcome, accounting for 22.6 percent. Moreover, having complicated conditions at admission and chronic illnesses such as diabetic mellitus, hypertension and elderlies were significantly associated with poor treatment outcomes. Therefore, critical follow–up and management of patients with underlying diseases and sever clinical conditions during admission is required.

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Declaration

I, the under signed, declared that this is my original work, has never been presented in this or any other University, and that all the resources and materials used for the research, have been fully acknowledged.

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