

# Epidemiological Pattern of COVID-19 Infection from March to November 2020 in Situbondo District, East Java, Indonesia

Mohmed Gesmalah<sup>1\*</sup>, Atik Choirul Hidajah<sup>2</sup>

<sup>1</sup>Master Program of Epidemiology, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

<sup>2</sup>Department of Epidemiology, Biostatistics, Population Studies, and Health Promotion, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

## Abstract

The COVID-19 pandemic continues to pose a global threat. As of March 31, 2020, there were 1,528 confirmed COVID-19 cases with 136 deaths in Indonesia. This study aimed to describe the epidemiological features and clinical course of COVID-19 in Situbondo District, East Java Province, Indonesia, to facilitate understanding of the epidemiological situation and the spread of infection in the community to improve the control and prevention measures. This study examined the epidemiological features of COVID-19 cases in Situbondo using descriptive analysis. The results revealed that from March to November 2020, there were 1,622 suspected cases and 816 confirmed cases. Moreover, females (total case 470%) were more likely to be infected than males (total case 346%). Mainly, the cases of COVID-19 infection were in the age group of 19-37 years old (36.8%), and almost half of the confirmed cases (41 cases) were caused by the infection from close contact to confirmed cases, based on the epidemiological investigation report. People with comorbidities were more susceptible to being infected. Hypertension (8.7%), diabetes (8.6%), heart disease (3.7%), kidney failure, and COPD, each by (1%) were the highest reported comorbidities in COVID-19 patients. There was another disease with a low percentage like asthma, pulmonary TB, and cancer. This study opens the gate to further studies, which are needed to understand more about the epidemiological COVID-19 situation in the community.

**Keywords:** COVID-19, epidemiological pattern, infection, Situbondo

## Introduction

The novel coronavirus disease is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The COVID-19 pandemic continues to pose a global threat. Despite extensive research efforts worldwide, scientists have yet to develop either an effective vaccine or viable treatment options.<sup>1</sup> As of March 31, 2020, there were 1,528 confirmed COVID-19 cases with 136 deaths in Indonesia.<sup>2</sup>

After the emergence of many cases of respiratory infection in Wuhan, Hubei Province, China, in December 2019, coronavirus was identified as the primary cause behind the disease and death cases; as of January 31, 2020, this pandemic has spread to 19 countries, where the number of confirmed cases was about 11,791 including 213 deaths. The World Health Organization (WHO) declared this pandemic a Public Health Emergency of International Concern (PHEIC).<sup>3</sup>

Coronaviruses are members of the Coronaviridae (Coronavirinae) virus family, infecting a wide range of

hosts and can spread through direct or intermediate hosts, including avians and bats, bovines, camels, canines, civets, felines, murines, and porcine. Bats have been proposed as natural reservoirs for SARS-CoV and most coronaviruses.<sup>4</sup> The symptoms of infection also ranging from the common cold to severe and ultimately fatal infections such as SARS, MERS, and, most recently, COVID-19. SARS-CoV-2 is one of seven human-infecting members of the Coronavirus family; the International Committee on Virus Taxonomy (ICTV) has named this virus as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>5</sup> The transmission of COVID-19 from one person to another can be where aerosols can penetrate the human body, for instance, through the lungs by inhalation through the nose or mouth, which occurs due to close contact with an infected person or exposure to coughing, sneezing respiratory droplets, or aerosols.<sup>6</sup> Moreover, the transmission of droplets (a diameter of > 5-10 µm) may also occur through evaporation in the natural environment, where the indirect transmission can

**Correspondence\*:** Mohmed Gesmalah, Master Program of Epidemiology Faculty of Public Health Universitas Airlangga, Campus C, Mulyorejo, City of Surabaya, East Java 60115, Indonesia, E-mail: mohmed.gesmalah.saad2019@fkm.unair.ac.id, Phone: +62-85-530077512, Fax: 0315924618

Received : June 1, 2021

Accepted : July 5, 2021

Published : July 31, 2021

occur through surfaces in the immediate environment or other items used by an infected person.<sup>7</sup>

COVID-19 infection symptoms usually occur after a period of around 5.2 days of incubation.<sup>8</sup> The average number of days from infection to symptom onset is approximately 14 days. In addition, the time between the beginning of COVID-19 symptoms and death varies between 6 and 41 days. The efficacy of the human body's immune system and age dictate this interval; it is shorter in older age groups (70 years old).<sup>9</sup> The most common symptoms of COVID-19 infection are fever, cough, and tiredness, while other signs and symptoms include sputum production, nausea, and vomiting. Symptoms of lymphopenia include headache, hemoptysis, diarrhea, dyspnea, and lymphopenia.<sup>10,11</sup> In addition, according to the findings of another study, fever and cough were the most common COVID-19 symptoms, and they were accompanied by myalgia, tiredness, dyspnea, and anorexia.<sup>12</sup>

Individuals infected with COVID-19 rarely had intestinal signs and symptoms (e.g., diarrhea); around 20% to 25% of patients infected with SARS-CoV and MERS-SARS suffered from diarrhea.<sup>12</sup> According to the findings of research conducted in Mainland China, hypertension and diabetes were the most-often reported comorbidities in patients with COVID-19 infection, along with COPD and malignancies.<sup>13</sup> Other studies reveal that obesity also is one of the common comorbidity in COVID-19 patients.<sup>14</sup> The goal of this study was to characterize the epidemiological characteristics and clinical course of COVID-19 in Situbondo District to better understand the epidemiological situation and the transmission of infection in the community and improve control and preventative efforts.

During epidemic week 47, November 2020, there had been an increase in the confirmed cases of COVID-19 in Indonesia. Also, there was an increase of confirmed cases (29,419) which were higher (17.8%) compared to the rise in cases epidemic week 46 (24,995). Twenty-two provinces experienced an increase in confirmed cases, while only 12 provinces experienced a decrease in cases. East Java is still in the second position with the highest number of positive confirmed cases in Indonesia (November 2020). It has a total of 55,286 cases and is still in the first position concerning the highest number of cumulative deaths with a CFR of 7.15%.<sup>16</sup>

Situbondo District is one of the regions in East Java Province. This area is located in the northern part of East Java, with a total population of about 685,776. The region is significant in terms of intense economical activity and geographical location, as it is located on the Java-Bali road route, leading to the island of Bali, and has faced an unrelenting rise in the incidence of COVID-19 infection and death. These factors made it critical for the authors to conduct this study in this district. The total of suspect-

ed cases was 1,622 (from March-November 2020). The confirmed cases were 816 via the laboratory confirmation testing using the rapid test and SWAB analysis for all the confirmed cases. In addition, the growing of confirmed positive cases suggested that the epidemic has continued to spread in the community, which culminates in a more significant burden on the health system to deal with the epidemic.

## Method

A descriptive Epidemiology study was utilized, and the study results were interpreted using percentages, numbers, and graphs. The data of COVID-19 were collected from The Epidemiological Surveillance system in the Situbondo District. Data from March 28 to November 16, 2020, were extracted in this study. The positive cases of COVID-19 were confirmed according to the results of a quantitative Reverse Transcription-Polymerase Chain Reaction (qRT-PCR) assay of throat or inside the nose swab specimens of those identified as confirmed cases of COVID-19. All the cases with incomplete information were excluded. Data were analyzed using (SPSS) Statistics (25.0) Excel program and presented using tables, graphs, and charts for analysis, display, and interpretation.

## Results

From March to November 2020, the number of suspected cases was 1,622, and confirmed cases were 816. Females were more likely to be infected with COVID-19 than males, with a total confirmed case of females was 470 (58 %), and the male was 346 (43%) (Table 1). The most significant number of positive confirmed cases, with 36.8%, were in the age range of 19-37 years old. The second-largest percentage was from the age group of 38-56 years old (32.5%). It was followed by the age group of 57-75 years old (18.9%), 0-18 years old (9.4%), and 76-94 years old (1.6%). Some exposure criteria were identified and presented in Table 1 of the confirmed positive cases.

There is still debate about whether gender is a predisposing factor for COVID-19. Many reports conducted in China and other countries stated that the male gender

Table 1. The Sex Ratio and Age Groups for a Confirmed Case of COVID-19 in Situbondo District on March to November 2020

Variable	Category	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Gender	Male	346	42.4	42.4	42.4
	Female	470	57.6	57.6	57.6
	Total	816	100.0	100.0	
Age Group	0-18	84	10.3	10.3	10.3
	19-37	300	36.8	36.8	47.1
	38-56	265	32.5	32.5	79.5
	57-75	154	18.9	18.9	98.4
	76-94	13	1.6	1.6	100.0
	Total	816	100.0	100.0	

has more severity and high mortality.<sup>16,17</sup> Men's cases tended to be more severe than women's ( $p = 0.035$ ), according to research by Jin *et al.*<sup>19</sup> Based on statistics in Situbondo, the number of males who died from COVID-19 is 2.4 or twice the number of women. The SARS-CoV-2 virus targets the cells via an angiotensin-converting enzyme (ACE2) receptor, where had previously been reported that increased ACE2 receptor protein expression in distinct organs was associated with specific organ failures as evidenced by clinical data in SARS patients.<sup>18</sup> It has been shown that circulating ACE2 levels are higher in men than in women and patients with diabetes or cardiovascular diseases.<sup>19</sup> There is still no universal surveillance description for recovery in COVID-19 patients; even though they were not hospitalized for SARS-CoV-2 infection, many people experience long-term symptoms, ill health, and diminished functioning.<sup>20</sup> Long-haul COVID must be transformed from an anecdote into something that is regularly quantified and tracked, just as deaths and positive tests are now.<sup>21</sup>

The COVID-19 cases must be counted in addition to positive test statistics to make this pass. Healing should be described in terms of symptom length, fluctuations, severity, quality of life, and functions, rather than relying solely on no active SARS-CoV-2 infection or hospital discharge. Thus, the number of people who have been sick for a long time must be monitored, not just to provide treatment and care but also to redefine the true impact of the epidemic and report the appropriate response. This is obtained information by knowing the actual number of recovered cases from infection SARS-CoV-2. It is critical to improving reporting of clinical cases without laboratory confirmation by defining how current programs should perform. To assess the actual risk of disease associated with SARS-CoV-2 infection, public health agencies must also agree on definitions of what constitutes recovery.<sup>22</sup> The findings of the study also indicated that, in Situbondo (Figure 1), at least 681 persons recovered from all instances of coronavirus infection (84 %), while the number of fatalities was 72 (9%).

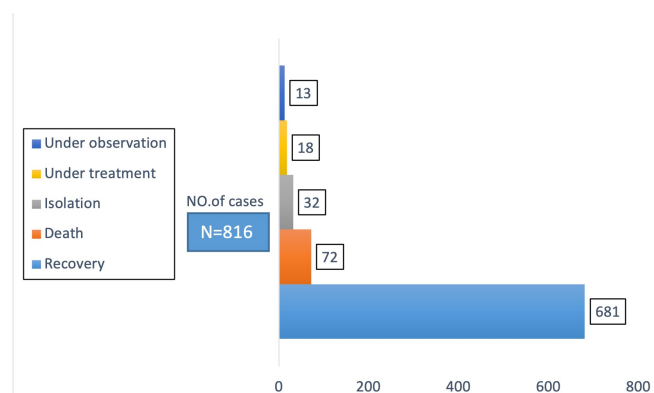


Figure 1. The COVID-19 Case in the Situbondo Area from March to November 2020

Transmission of coronavirus infection from asymptomatic persons is a severe issue in the COVID-19 pandemic. This was because individuals with no or mild symptoms might be unrecognized and would be a source of infection among the community, especially when health services are weak or non-existent in some places.<sup>23</sup> Also, the level of health awareness and the economic influence transmission of the virus in the community. Some test results may not identify the person who carries the virus. Yet, Serologic testing for SARS-CoV showed a positive rate of 13% in asymptomatic individuals compared to 82% in severe disease and 4% with mild symptoms.<sup>24</sup> The result obtained in Figure 2 showed that the number of 41% cases was in close contact with confirmed cases. Also, the most significant percentage of disease transmission was among those exposed while going to their workplaces or by people who interacted with them daily, either in the work environment or elsewhere. One of the reasons behind a high infection rate in society was the failure to follow health protocols in dealing with infected cases, especially in terms of home quarantine.

On the other hand, the technique of wearing a mask comprised the following eight steps where health standards must be included in the use of personal protective equipment. The use of masks was not just when caring for sick people at home, which was essential, but also by those who have symptoms and signs of disease: (1) wash your hands before putting on the mask; (2) choose the correct mask scale; (3) make sure the mask's colored side is facing outward (for colored masks), or the folds are facing downward and outward (for folded masks) (for uncolored masks); (4) keep in mind that the metal strip is on the upper side of the element; (5) ensure that the elastic bands or cords are in the right place; (6) press the steel strip tightly so that it molds according to the nose and face bridge shape; (7) cover the nose, mouth, and chin with a face mask; and (8) avoid rubbing the mask on the face until it has been covered and wash your hands before and after touching the mask. The following four procedures should be followed before removing a mask properly: (1) before removing the mask, wash your

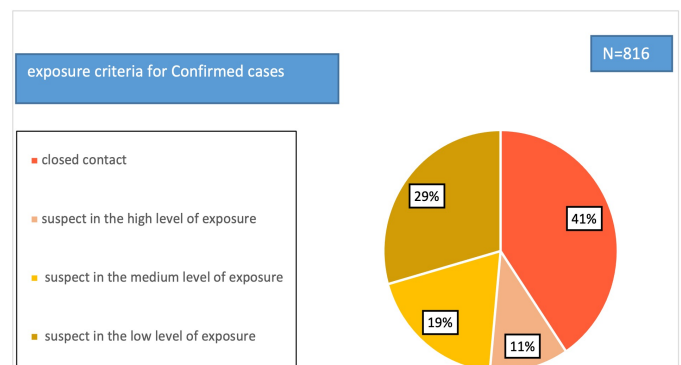


Figure 2. Identify Exposure Criteria of COVID-19 from March to November 2020 in Situbondo District

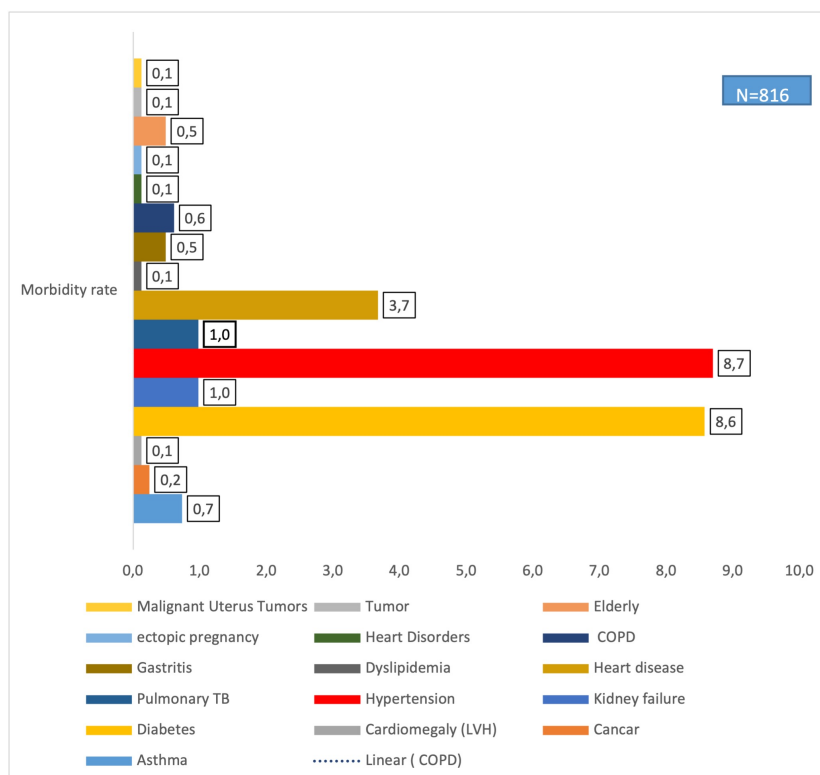


Figure 3. Comorbidities of COVID-19 from March to November 2020 in Situbondo District

hands; (2) only the elastic bands can be touched; (3) place the used mask in a plastic or paper bag or a trash can with a lid; and (4) after removing the mask, wash your hands.<sup>24</sup>

According to the total number of COVID-19 positive cases in the Situbondo District, some of the deaths were accompanied by comorbidities such as diabetes, heart disease, malignant uterine tumor, cancer, asthma, pulmonary TB, cardiomegaly, hypertension, COPD, and renal failure (Figure 3).

Comorbidity is a medical term used to describe a condition present simultaneously in those with a related medical condition. Comorbidity basically refers to the impact of any additional conditions, physiological or psychological, that a patient may have, and the primary condition of concern. Combining a long-term illness and a severe viral infection such as COVID-19 thus presents a difficult challenge to the medical community in saving lives.<sup>25</sup> The results of this epidemiological study in Situbondo District showed the features and comorbidity in COVID-19 patients. The five highest reported comorbidities in the Situbondo District were hypertension with a percentage of 8.7%, diabetes (8.6%), heart disease (3.7%), kidney failure, and COPD, each by 1%. Other diseases with low prevalence rates included asthma, pulmonary tuberculosis, tumors, and cancer. Diabetes, cardiovascular disease, and hypertension were the most prevalent chronic comorbidities among persons with severe asthma, accord-

ing to research by Barron *et al.*<sup>26</sup>

Hypertension is a prevalent condition that affects the elderly. This group of persons appears to be at a higher risk of contracting the SARS-CoV-2 virus and developing severe COVID-19 symptoms and consequences. Older age is often associated with weakened immunity, which is thought to increase vulnerability to COVID-19 infection.<sup>25</sup> It is yet uncertain if uncontrolled blood pressure is a risk factor for COVID-19 infection; nonetheless, even if it does not influence susceptibility to the illness, managing blood pressure is an essential concern for reducing the disease burden when infected with the SARS-CoV-2 virus.<sup>27</sup> Diabetes was the second most common comorbidity in the Situbondo District. The host's defenses, particularly granulocyte and macrophage function, are known to be harmed by this condition. People with diabetes are more susceptible to a variety of dangerous illnesses. Poor glycemic control has been linked to major infections and hospitalization and is thought to increase the hyperimmune response related to severe COVID-19 infection.<sup>28</sup>

## Conclusion

The study results showed that the spread of infection within the community is occurring mainly because the community is still not disciplined in carrying out social distancing and independent isolation. In several public places, such as traditional markets, the use of masks is



still not completely obeyed. Additionally, in certain confirmed positive cases with mild symptoms, some had not carried out independent isolation according to the protocol for various reasons, one of which was earning a living according to the people's daily activity. Additionally, people with comorbidities such as hypertension and diabetes are more susceptible to being infected with COVID 19. Thus, early discovery, diagnosis, treatment, and quarantine, as well as limiting secondary infections among close contacts, are all necessary steps in preventing COVID-19 from spreading from person to person.

#### Abbreviations

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; WHO: World Health Organization; PHEIC: Public Health Emergency of International Concern; ICTV: International Committee on Virus Taxonomy; ACE2: angiotensin-converting enzyme.

#### Ethics Approval and Consent to Participate

This study was conducted based on secondary data from the epidemiological surveillance system in the Situbondo District Health Office.

#### Competing Interest

The authors state no conflict of interest.

#### Availability of Data and Materials

The result of this study depends on the COVID-19 data from the epidemiological surveillance system department at the Situbondo District Health Office, East Java, Indonesia. The data was gathered from the daily epidemiological activities and follow-up of the pattern of the disease spread in Situbondo District. The data derived supporting the findings of this study are available from the corresponding author on request.

#### Authors' Contribution

MG collected, processed, and analyzed the data, and wrote the discussion. ACH analyzed the data and wrote the discussion. MG and ACH have accepted responsibility for the entire content of this manuscript and approved its submission.

#### Acknowledgment

The authors thank the colleagues from the Department of Epidemiology, Biostatistics, Population Studies, and Health Promotion, Faculty of Public Health Universitas Airlangga, for the assistance provided during this study.

#### References

- Lotfi M, Hamblin MR, Rezaei N. COVID-19: transmission, prevention, and potential therapeutic opportunities. *Clin Chim Acta*. 2020;508:254–66.
- Setiati S, Azwar MK. COVID-19 and Indonesia. *Acta Med Indones*. 2020;53:7.
- Adhikari SP, Meng S, Wu Y, Mao Y, Ye R, Wang Q, et al. A scoping review of 2019 Novel Coronavirus during the early outbreak period: epidemiology, causes, clinical manifestation and diagnosis, prevention and control. *Infect Dis Poverty BMC*; 2020.
- Dong R, Pei S, Yin C, He RL, Yau SST. Analysis of the hosts and transmission paths of SARS-CoV-2 in the COVID-19 outbreak. *Genes (Basel)*. 2020;11(6):637.
- Dhama K, et al. Coronavirus disease 2019–COVID-19. *Am Soc Microbiol*. 2020;33(4):1–48.
- Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R. COVID-19 infection: origin, transmission, and characteristics of human coronaviruses. *J Adv Res*. 2020;24:91–8.
- World Health Organization. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. Geneva World Heal Organ; 2020.
- Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of Novel Coronavirus–Infected pneumonia. *N Engl J Med*. 2020;382(13):1199–207.
- Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China. *J Med Virol*. 2020;92(4):441–7.
- Ren LL, Wang YM, Wu ZQ, Xiang ZC, Guo L, Xu T, et al. Identification of a novel coronavirus causing severe pneumonia in human: a descriptive study. *Chin Med J (Engl)*. 2020;133(9):1015–24.
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497–506.
- Wan S, Xiang Y, Fang W, Zheng Y, Li B, Hu Y, et al. Clinical features and treatment of COVID-19 patients in Northeast Chongqing. *Journal of Medical Virology*. 2020;92:797–806.
- Guan W, Liang W, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *Eur Respir J*. 2020;74(10):14.
- Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York city area. *JAMA - J Am Med Assoc*. 2020;323(20):2052–9.
- Satuan Tugas Penanganan COVID-19. Analisis data COVID-19 Indonesia per 15 november 2020; 2020.
- Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020;382(18):1708–20.
- Albitar O, Ballouze R, Ping J, Maisharah S, Ghadzi S. Risk factors for mortality among COVID-19 patients. *Diabetes Res Clin Pract*. 2020;166.
- Yang JK, Feng Y, Yuan MY, Yuan SY, Fu HJ, Wu BY, et al. Plasma glucose levels and diabetes are independent predictors for mortality and morbidity in patients with SARS. *Diabet Med*. 2006 Jun;23(6):623–8.
- Jin JM, Bai P, He W, Wu F, Liu XF, Han DM, et al. Gender differences in patients with COVID-19: focus on severity and mortality. *Front Public Heal*. 2020;8:1–6.
- Tenforde MW, Kim SS, Lindsell CJ, Billig Rose E, Shapiro NI, Files DC, et al. Symptom duration and risk factors for delayed return to usual health among outpatients with COVID-19 in a multistate health care systems network — United. *MMWR Morb Mortal Wkly Rep*. 2020;69(30):993–8.

21. Mudd T. World view. *Ind Week*. 2000;249(16):40–1.
22. Alwan NA. Surveillance is underestimating the burden of the COVID-19 pandemic. *Lancet*. 2020;396(10252):e24.
23. Ortiz N, Villarino E, Lee JT, Bajema KL, Ricaldi JN, Smith S, et al. Epidemiologic findings from case investigations and contact tracing for first 200 cases of coronavirus disease, Santa Clara County, California, USA. *Emerg Infect Dis*. 2021;27(5):1301–8.
24. Lee LYK, Lam EPW, Chan CK, Chan SY, Chiu MK, Chong WH, et al. Practice and technique of using face mask amongst adults in the community: a cross-sectional descriptive study. *BMC Public Health*. 2020;20(1):1–11.
25. Das S, K.R. A, Birangal SR, Nikam AN, Pandey A, Mutalik S, et al. Role of comorbidities like diabetes on severe acute respiratory syndrome coronavirus-2: a review. *Life Sciences*. 2020;258.
26. Barron E, Bakhai C, Kar P, Weaver A, Bradley D, Ismail H, et al. Associations of type 1 and type 2 diabetes with COVID-19-related mortality in England: a whole-population study. *Lancet Diabetes Endocrinol*. 2020;8(10):813–22.
27. Schiffrin EL, Flack JM, Ito S, Muntner P, Webb RC. Hypertension and COVID-19. *American Journal of Hypertension*. 2020;33:373–4.
28. Holman N, Knighton P, Kar P, O’Keefe J, Curley M, Weaver A, et al. Risk factors for COVID-19-related mortality in people with type 1 and type 2 diabetes in England: a population-based cohort study. *Lancet Diabetes Endocrinol*. 2020;8(10):823–33.