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COVID-19 patients have a wide range of diseases, from asymptomatic to extremely severe cases. World Health Organization (WHO) reported that the majority of COVID-19 patients (about 80%) are asymptomatic or mild, 15% are severe, require oxygen, and 5% are critical cases that require mechanical ventilation [18-20]. Therefore, COVID-19 and other common colds can be difficult to distinguish due to their similar initial symptoms [21-23].

Further, several previous studies have shown that the appearance of comorbidities such as elderly, cardiac disease, diabetes, chronic lung disease, and obesity contribute to severe outcomes [12,14,24-28]. The initial stages of COVID-19 patients were managed in China and further management procedures were performed globally [29]. On the other hand, our report is the first to examine the correlations of patient-related factors to the COVID-19 patient rate in Mongolia, and in this respect, this report provides new knowledge. Our study showed that risk factors for cardiovascular disease and hypertension are also important risk factors for severe COVID-19. In particular, hypertension has been reported as a common comorbidity of COVID-19, especially among patients with more serious diseases. In a cohort of 138 inpatients with COVID-19, the reported hypertension rate was 31% [30]. Further, Kong, et al. reported that 22.6% had hypertension [31]. In a large series of COVID-19 patients, of 3335 Italian patients died in the hospital where the clinic charts could be analyzed. Only 136 deaths (4.1%) did not have a pathological report, while 493 (14.8%), 716 (21.5%) and 1990 (59.7%) had one and two, respectively. Reported to have one or at least three chronic diseases. Of these, hypertension is the most frequently reported comorbidity, followed by diabetes and ischemic heart disease [30].

Consistent with these data, an analysis of 44,672 confirmed COVID-19 cases from Wuhan, China, showed increased case fatality in the presence of cardiovascular disease (10.5%) and hypertension (6.0%) [32]. In the Italian retrospective case series, hypertension, regardless of age, is the most common comorbidity of COVID-19 patients referred to the Intensive Care Unit (ICU), with a global prevalence of 49%, followed by cardiovascular disease (21%) and hypercholesterolemia (18%) [33]. The prevalence of hypertension was also higher in critically ill patients who died in the intensive care unit (ICU) compared to individuals discharged from the ICU [33]. Therefore, the findings of our data also support previous data that individuals with cardiovascular disease and hypertension may have a tendency to mortality of COVID-19 patients and that treatment of these diseases may improve prognosis.

In our report, cancers were significantly found

patients showed a higher proportion of infected patients. They assume that patients with later-stage cancer may be more susceptible to SARS-CoV-2 [29,44,48,49]. Therefore, our results are inconsistent with these previous results. This may be due to the Mongolian social system. Compared to the vast territory of Mongolia, there are small numbers of hospitals, which have radiographic diagnostic equipment, which mostly exist in Ulaanbaatar (half of Mongolia's population lives in this city). Even if symptoms of infectious diseases are observed, patients are not possible to be hospitalized for appropriate diagnosis and treatment due to the symptoms of COVID-19 patients may resemble a usual infection as we mention above. On the other hand, cancer patients can be preferentially admitted and receive sufficient treatment not only for COVID-19 but also for general infectious diseases. These may have caused our results to conflict with other reports.

COVID-19 and radiographic equipment

In our data, we found a significantly high ratio of abnormal findings in both x-rays and CT in non-survival patients (Table 2). Nevertheless, many sources now acknowledge that radiographic findings are more sensitive than RT-PCR in detecting SARS-CoV-2 and the previously reported cases could have a SARS-CoV-2 infection because of a false negative PCR test [50,51]. Ai, et al. reported that compared to RT-PCR, chest CT imaging may be a more reliable, practical, and rapid method to diagnose and assess COVID-19 patients, especially in the epidemic area. With RT-PCR results as a reference in 1,014 patients, the sensitivity, specificity, and accuracy of chest CT in indicating SARS-CoV-2 infection were 97%, 25%, and 68%, respectively [50]. In contrast, the positive rate of RT-PCR assay for throat swab samples was 59%. Further, Kohli, et al. reported that commonality of CT findings regardless of RT-PCR status in a large cohort of 2,581 patients and due to its high sensitivity with quick turnaround time is a very useful support method for RT-PCR [51]. These previous reports and our data suggest that the mortality risk of COVID-19 patients can be reduced by advanced diagnostic equipment.

However, in Mongolia, there are few medical facilities equipped with CT, and MRI, and most of them only evaluate respiratory diseases by x-ray. Our available 715 cases showed that, 667 cases were x-rayed, 127 were CT and there was no MRI (Table 3). Further, as chest x-ray was regarded as an insensitive tool, the American College of Radiologists and the Fisher Society have suggested that imaging is not advised for patients who tested positive by RT-PCR who were asymptomatic or have mild symptoms and a CT scan should be performed for patients with a progressive disease course [32,50]. However, the reported total of 190 chest x-rays were obtained for the 88 patients with a total of 59 (31%) abnormal chest x-rays and 85% of the COVID-19 patients had negative chest x-rays [54,55]. Therefore, our country's radiographic diagnosis must be improved in the future, but it may depend on the social and financial situation in Mongolia.

Conclusion

From our data, elderly, dyspnea, cough, chest pain, cardiovascular disease, and hypertension were the major predictors of COVID-19 patient mortality in the multivariate analysis. From these findings, improving prognosis in Mongolian patients may require greater attention and improvement in the management of characters of patients with COVID-19. However, in an environment with limited economic resources like our country, high costs could be restrictive in Mongolia.

Our study has several limitations. First, Mongolia is in a special position to monitor the effects of SARS-CoV-2 vaccines as four approved

ones including the BNT-162b2 (BioNTech/Pfizer) mRNA vaccine, the BBIBP-CorV (Sinopharm), inactivated whole virus vaccine, and the

Centers for disease control and prevention similarities and differences between flu and COVID-19,

Differences and similarities in the conceptualization of COVID-19 and other diseases in the first Italian lockdown. *Sci Rep*

comparative systematic review of COVID-19 and influenza

Effects of cancer on patients

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patients more susceptible to COVID-19?

help in reducing RT-PCR false negative rate for COVID-19?

Chest x-ray findings