

## Predictive factors for severe COVID-19 infection in Terengganu state of Malaysia

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### **ABSTRACT:**

**Introduction:** COVID-19 has a varied clinical presentation and may progress to severe form which could be fatal. Previous systematic reviews reported that 19.2% to 21.33% of COVID-19 patients progressed to severe form. Determination of risk factors for severe form of infection would be beneficial in averting COVID-19 mortality in Terengganu setting.

**Methods:** A case-control study between mild and severe COVID-19 groups was conducted in Terengganu state from 1st March 2020 until 31st January 2021 based on retrospective record review. Cases were severe COVID-19 patients (COVID-19 patients grouped in category IV or V upon diagnosis) while controls were mild COVID-19 patients (COVID-19 patients grouped in category I, II or III upon diagnosis). Individuals with laboratory RT-PCR confirmed positive test for COVID-19 were included as study samples. Descriptive statistics, simple and multiple logistic regression analyses were employed for statistical analysis.

**Results:** There were 2142 COVID-19 cases in Terengganu during the studied period. The proportion of severe COVID-19 infection was 2.1% (95%CI: 0.01, 0.03). Among the severe COVID-19 cases, their mean ( $\pm$ SD) age was 52 ( $\pm$ 16) and majority of them were male (59.1%) and had comorbidity (56.8%). The common symptoms among severe COVID-19 cases included fever (68.2%), cough (63.6%), coryza (22.7%), sore throat (13.6%) and anosmia (11.4%). Multiple logistic regression revealed older age, presence of comorbidity, having symptoms of fever, cough and anosmia as the significant associated factors for severe COVID-19 with adjusted odds ratio (AOR) of 1.07 (95%CI: 1.03, 1.11),  $p < 0.001$ ; AOR 5.97 (95%CI: 2.09, 17.01),  $p = 0.001$ ; AOR 4.78 (95%CI: 1.63, 14.05),  $p = 0.004$ ; AOR 4.81 (95%CI: 1.70, 13.60),  $p = 0.003$ ; and AOR 8.39 (95%CI: 1.39, 50.33),  $p = 0.020$ , respectively.

**Discussion:** Advanced age tend to acquire severe form of COVID-19 due to age-related immunocompromised state and concomitant infections which are commonly associated with elderly, which subsequently posed higher risk for SARS-CoV-2 transmissibility. Presence of comorbidity posed higher risk for severe COVID-19 infection as individuals with comorbidity (mostly from elderly group) have weaker immune function, alterations in physiologic functions of the respiratory system and also tendency towards dysfunction of multi-system organ and even failure. Unremitting fever is usually associated with dysregulation of inflammation which may cause cytokine storm and further promotes inflammation and severity of COVID-19. Chest pain may result from the pleural inflammation while dyspnoea is related to the severe damage to alveoli in severe COVID-19 patients. COVID-19 patients tend to have anosmia as nasal epithelial cells demonstrate strong angiotensin converting enzyme 2 (ACE2) expression during SARS-CoV-2 infection, hence permitting extensive viral entry. Subsequently, SARS-CoV-2 will induce direct neuronal injury within brainstem cardiorespiratory centres and promotes progression of severe COVID-19. Our results might be helpful in early prediction and risk reduction of mortality in patients with advanced age and comorbidity infected with COVID-19. The occurrence of the predictive symptoms (fever, cough, anosmia) could help clinicians identify the disease severity in clinical practice. Identifying predictive factors of severe COVID-19 will aid in assessment for early hospitalization and reduce mortality.

### **KEYWORDS:**