

# Five important preventive measures against exacerbation of coronavirus disease

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Dear Editor,

Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is mainly transmitted through droplets and aerosols [1]. Viral RNA is predominantly detected in the oral and nasal cavities; however, it has also occasionally been detected in stool, urine, and lacrimal samples. Infection prevention through use of masks, handwashing, and social distancing may be challenging. Although a lockdown in urban areas can slow the spread of infection and allow time for preparing an adequate response, it is difficult to determine the optimal time for unlocking and lifting quarantine measures and to prevent further spread once people resume their daily schedules. As the virus is spreading worldwide, in part owing to asymptomatic carriers, the incidence of infection will likely continue to fluctuate until herd immunity is achieved, which may take several months to years [2].

The reason for the occurrence of asymptomatic infection in children and adolescents is currently under debate, but antigenic cross-reactivity is believed to be a contributing factor, especially among Asian populations [3]. Healthy immune systems can generate broadly neutralizing antibodies due to exposure to other coronaviruses; these can reduce the severity of SARS-CoV-2 infection and provide some degree of immune protection.

Research on viral cross-reactivity was conducted during the 2009 Japan flu pandemic (influenza A [H1N1] virus). Japanese adults aged 40 years and older were minimally affected because most individuals in this age

group had previously been exposed to other strains of influenza virus, and the similarity between strains led to the production of cross-reactive broadly neutralizing antibodies [4]. On the other hand, younger individuals who had not been exposed to these influenza viruses were susceptible to infection with the novel H1N1 strain. Thus, if SARS-CoV-2 were completely novel, it would be unlikely that susceptibility to infection would vary by age, and there would be few asymptomatic cases. In fact, compared to younger/middle-aged adults, susceptibility to infection for children younger than 10 years is estimated to be significantly lower, while estimated susceptibility to infection in adults older than 60 years is higher [5]. Healthy immune systems with prior exposure to other coronaviruses can generate broadly neutralizing antibodies, which can reduce the severity of COVID-19 [3]. Therefore, it is important to avoid suppressing immune responses in infected individuals. This report emphasizes five key recommendations for the management of COVID-19 that have gained limited attention.

1. Limit the use of antipyretic analgesics in lowering the core body temperature: The ideal body temperature ranges between 36.8°C and 37.1°C. When the body temperature increases, immune function improves. A body temperature of 40°C deactivates common viruses within a short time [6]; therefore, limited use of antipyretic analgesics (e.g., nonsteroidal anti-inflammatory drugs and acetaminophen) is recommended [7]. Instead, a high fever can be managed

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by cooling the cranial, axillary, and cervical regions of the body.

2. Use antimicrobials judiciously: Administration of antimicrobial drugs for viral infections disturbs the microbiome (typically comprising more than 1,000 species of bacteria and dozens of species of fungi in the mouth, nose, intestines, skin, and other parts of the body) [8], which may encourage viral invasion and reproduction [9]. Thus, antimicrobial agents should be used with caution. Moreover, it is important to be cautious with the use of germicidal mouthwashes and soaps [10].

3. Smoking exacerbates pneumonia: Both smoking and exposure to second-hand smoke increase the risk of developing severe pneumonia. Smoking also affects immune function [11]. In previous outbreaks of SARS and Middle East respiratory syndrome, case fatality rates were higher in smokers than in non-smokers. COVID-19 is more likely to be severe in smokers than in non-smokers. Moreover, people with smoking-induced chronic bronchitis, emphysema, decreased heart function, or reduced renal function have an increased risk of developing severe symptoms [12].

4. Psychological stress diminishes immune function: Psychological stress is a common cause of decreased immune function. Acute stressors such as severe sadness, even for a short time (1–3 hours), can reduce immunity [13]; furthermore, excessive worry about an infection can exacerbate the condition. Thus, it is important to encourage patients to manage their thoughts and mood. Also, disruption of the body's internal clock can increase stress levels, resulting in diminished immune function. Therefore, insufficient sleep should be avoided [14].

5. Lipid emulsions can be immunosuppressive: In patients requiring mechanical ventilation, the use of sedatives containing lipid emulsions [15], including propofol [16], can cause immunosuppression [17]. Specifically, the use of lipid emulsions in the treatment of COVID-19 should be avoided whenever possible.

In conclusion, reducing the core body temperature using antipyretic analgesics, overuse of antimicrobials, smoking, psychological stress, and use of lipid emulsions can exacerbate COVID-19 by suppressing the immune system and should, therefore, be avoided.

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