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Letter to the Editor

Bee venom and SARS-CoV-2

According to data from Johns Hopkins Coronavirus Resource Center, the global number of confirmed COVID-19 case exceeded 2.0 million on the 15th of April. I am a physician, and I participated the prevention and control of coronavirus in China.

There is one discovery we would like to report here. It reminds us the story of the discovery of cowpox and the eventual victory of humans over this disease (Bennett and Baxby, 1996). In Hubei province, the epicentre of COVID-19 in China, the local beekeepers association conducted a survey of beekeepers (Fig. 1). A total of 5115 beekeepers were surveyed from February 23 to March 8, including 723 in Wuhan, the outbreak epicentre of Hubei. None of these beekeepers developed symptoms associated with COVID-19, and their health was totally normal. After that, we interviewed five apitherapists in Wuhan and followed 121 patients of their apitherapy clinic. These patients had received apitherapy from October 2019 to December 2019, and all the five bee apitherapists have the habit of self-apitherapy for their own health care (apitherapy means making use of bee venom from the honeybee's sting to treat or prevent certain diseases). Without any protective measures, two of the five apitherapists were exposed to suspected COVID-19 cases and others were exposed to confirmed COVID-19 cases, but none of them were infected eventually. None of the 121 patients were infected by SARS-CoV-2, and three of them had close contact with immediate family members who were confirmed SARS-CoV-2 Infection cases. It might be supposed that beekeepers are less likely to be exposed to SARS-CoV-2 because they live in less densely populated rural areas. But the five apitherapists and their patients are from densely populated areas in Wuhan. These people have one thing in common: they develop a tolerance to bee sting.

Bee sting can cause allergic reactions (Park and Lee, 2016), and it can even lead to death due to the excessive stress response of the immune system (Vazquez-Revuelta and Madrigal-Burgaleta, 2018). Bee venom can affect the body's immune system (Cherniack and Govorushko, 2018) and enhance the differentiation of human regulatory T cells (Caramalho et al., 2015), which play an important role in control of SARS-CoV infection (Chen et al., 2010). Does the stimulation of the immune system caused by bee venom reduce susceptibility to SARS-CoV-2? To test this, animal experiments would be needed. Monkeys might be suitable for this study. Monkeys could be divided into two experimental groups with the same breed and age. One group could be made tolerant to bee venom after a period of daily bee stings, while the other group receives no intervention. They could then be raised in the same environment contaminated by SARS-CoV-2, and multiple tests performed to see if they were infected by SARS-CoV-2.

Our purpose in writing this letter is to ask scholars with appropriate research conditions to test this assumption. In the absence of vaccine of SARS-CoV-2, if this method works, then it could offer one hope towards victory over COVID-19.

Ethical statement

The research conforms to moral and ethical norms. Project number of the funding: 0020190293.

Declaration of competing interest

The authors have no conflicts of interest to declare. The survey data of beekeepers in Hubei province were provided by professor Fu-liang Hu, an expert of apiology. Dr. Xu gave me a lot of support on my task

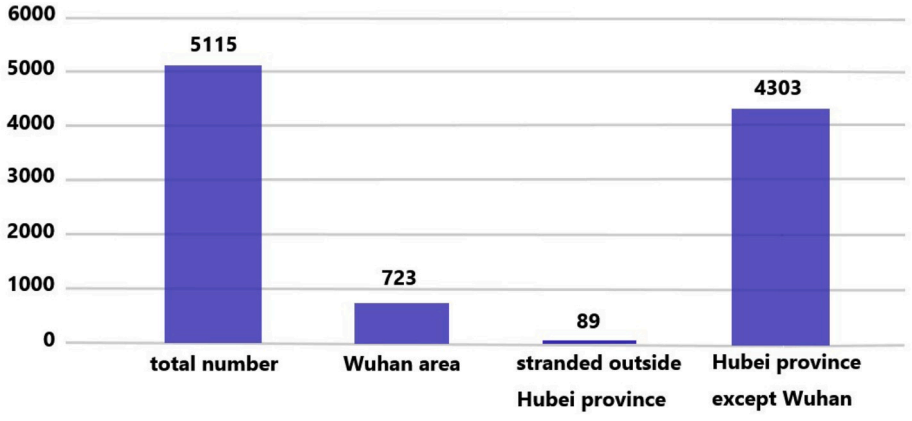

Fig. 1. Investigation histogram of beekeepers in Hubei.

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of the prevention and control of coronavirus.

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