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## LETTER TO THE EDITOR

## The potential benefits of antihistamine therapy and exercise rehabilitation in women with post-COVID-19 syndrome



Dear Editor,

Infection with severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) can result in a wide range of ailments from no symptoms to multisystem failure. The World Health Organization estimates that between 10% and 20% of COVID-19 patients with symptomatic acute COVID-19 will develop persistent symptoms lasting more than one month, with chronic illness such as fatigue, dyspnea, chest pain, cognitive deficits, arthralgia and decline in quality of life.<sup>1,2</sup>

In a cohort study, which enrolled 2469 patients with COVID-19 infection, who had been discharged from Wuhan's Hospital. Survivors of COVID-19 were mainly troubled with fatigue or muscle weakness, sleep difficulties, and anxiety or depression. The results indicated that 76% of patients reported at least one symptom at 6 months after symptom onset. In addition, women tend to be more affected than men and the association between fatigue anxiety/depression is significantly more frequent in females than males.<sup>3</sup> In particular, persistent cardiopulmonary abnormalities following a COVID-19 infection may impair exercise tolerance in women.<sup>4</sup>

The hyper-inflammatory responses seen in acute COVID-19 infection and post-COVID-19 syndrome (PCS) have been supposed to be prompted in part by mast cell activation (MCA), where the mast cells release histamine in response to a viral infection.<sup>5</sup>

Female sex hormones have long been suspected to affect mast cell (MC) behavior. Estrogen, the primary female sex hormone, has been found to activate MC,<sup>6</sup> resulting in the release of histamine. In addition, the level of histamine is increased by estrogen and vice versa. In the same way, Oestrogen can also influence endogenous histamine levels by downregulating Diamine oxidase (DAO) activity,<sup>7</sup> an enzyme responsible for the metabolism of ingested histamine.<sup>8</sup> Interestingly, new findings suggest that PCS patients may experience alleviation of symptoms after receiving antihistamines.<sup>9,10</sup>

Based on the experience of the treatment of SARS, physical activity and exercise treatment could be applied as main

methods of rehabilitation to research clinical sports rehabilitation of the COVID-19 epidemic to comprehensively guide the rehabilitation of patients with COVID-19.<sup>11</sup>

The World Health Organization has recommended countries prioritize rehabilitation into the treatment of patients with medium and long term consequences of covid-19, as well as to collect more systematic information about PCS.<sup>12</sup>

Comprehensive and interdisciplinary therapy, such as pulmonary rehabilitation, should be delivered to COVID-19 survivors based on their particular impairments, with a focus on improving respiratory function, physical and psychological impairments, as suggested by various international expert groups.<sup>13</sup>

Future studies on the current topic are therefore recommended to examine more closely the benefits of antihistamine therapy and exercise rehabilitation in women with PCS.

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