

Cytokine storm is a treatable complication of COVID-19



Use of an immunosuppressive strategy can improve recovery and lower death rates in COVID-19-associated CSS.

INTRODUCTION

COVID-19 is the disease caused by a new type of coronavirus called severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). It was declared a pandemic by the World Health Organization on 11 March 2020. COVID-19 has forced people to change their behaviours to try to limit the spread of infection.

COVID-19 can cause something called *cytokine storm syndrome* (shortened to CSS). Cytokines are proteins that work as part of the immune system. A cytokine storm causes a very high level of inflammation all over the body. COVID-19-associated CSS affects people's breathing. It is diagnosed when people have quickly worsening respiratory symptoms, high fever, plus an increase in at least two of three markers in their blood.

About a quarter of people admitted to hospital with COVID-19 have CSS. These people are more likely to die than people with COVID-19 but no CSS. The symptoms of CSS in people with COVID-19 look similar to those seen in some inflammatory rheumatic and musculoskeletal diseases.

WHAT DID THE AUTHORS HOPE TO FIND?

The authors wanted to work out a treatment for people with COVID-19-associated CSS. They based this treatment on what they know about rheumatic diseases. They thought treatments that suppress the immune system might help to control the large inflammatory response that happens in COVID-19-associated CSS.

WHO WAS STUDIED?

The study looked at 172 people in the Netherlands with COVID-19-associated CSS. Everyone had been admitted to the hospital due to COVID-19.

HOW WAS THE STUDY CONDUCTED?

This was a prospective observational study, which means the researchers watched for outcomes and compared them to a historical control group. From April 2020, 86 people admitted to the hospital with COVID-19-associated CSS were treated with an immunosuppressive strategy. First, a steroid called methylprednisolone was used to try to bring the CSS down. If this did not work, a second immunosuppressive called tocilizumab was added. The study recorded information about how well people recovered. The authors then compared the results to the medical records of another 86 people with COVID-associated CSS who had been admitted to the hospital in March 2020, before the treatment strategy was being used. This was the control group. These people had received only supportive care to help ease their symptoms, and were not given any immunosuppressive drugs.

WHAT WAS THE MAIN FINDING?

The authors found that the treatment strategy worked to speed up people's recovery. Overall, there was a 79% higher chance of respiratory symptoms improving. People also got better quicker. The recovery from CSS in people who took the immunosuppressive drugs was 7 days faster than in people earlier in the pandemic who had not been treated. Fewer people who got the immunosuppressive drugs died in hospital (65% lower). In case of deterioration they were less likely to need to go on a ventilator to help them breathe (71% lower) compared to people who got only supportive care.

ARE THESE FINDINGS NEW?

Yes. This is the first study to look at an immunosuppressive treatment strategy in people with COVID-19-associated CSS.

WHAT ARE THE LIMITATIONS OF THIS STUDY?

The main limitation is that this was an observational study, not a randomised clinical trial. This means it is not certain that the results are due to the treatment, and not to any other factors. Randomised trials are a stronger way to test treatments because they allocate people to groups by chance. This may mean some people do not receive any treatment. However, the authors did not think it would be ethical to do a randomised trial when around 40% of people without treatment were dying. Also, they had recent information that they could compare it with. This information was from a very similar group of people with the same symptoms before the new treatment strategy had been worked out.

WHAT DO THE AUTHORS PLAN TO DO WITH THIS INFORMATION?

The treatment strategy is now being used for everyone with COVID-19-associated CSS in the hospital of the study. The authors hope sharing their results will encourage other hospitals to try the same. The authors are still collecting information from the people in the study. This is to see how well they do as time goes on, and to see if people who had the immunosuppressive treatment continue to do better than those who did not. Despite the promising results, further confirmation is still needed.

WHAT DOES THIS MEAN FOR ME?

These results mean that CSS as a complication of COVID-19 possibly can be treated. If you are admitted to hospital with COVID-19-associated CSS, you may be given treatments that suppress your immune system. This may help your body bring down the inflammation.

Protect yourself from COVID-19 by following the advice of the government in your country, including washing your hands regularly, avoiding touching your face, and following social distancing rules.

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