The Daily COVID-19 Literature Surveillance Summary

October 05, 2020

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COVID-19 Daily Literature Surveillance

COVID19LST

Bringing you real time, distilled information for guiding best practices during the COVID-19 pandemic

LEVEL OF EVIDENCE

Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or *n*-of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, *n*-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or *n*-of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non -randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

*** Level may be graded down on the basis of study quality, imprecision, indirectness (study PICO does not match questions PICO), because of inconsistency between studies, or because the absolute effect size is very small; Level may be graded up if there is a large or very large effect size.**

**** As always, a systematic review is generally better than an individual study.**

How to cite the Levels of Evidence Table

OCEBM Levels of Evidence Working Group*. "The Oxford 2011 Levels of Evidence".
Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=5653

** OCEBM Table of Evidence Working Group = Jeremy Howick, Iain Chalmers (James Lind Library), Paul Glasziou, Trish Greenhalgh, Carl Heneghan, Alessandro Liberati, Ivan Moschetti, Bob Phillips, Hazel Thornton, Olive Goddard and Mary Hodgkinson*

EXECUTIVE SUMMARY

Climate

- Pediatricians and OBGYNs discusses ethical concerns (e.g. reproductive autonomy) surrounding public health policies on pregnancy avoidance during a public health emergency, suggesting that such policies should only be put in place if the pregnancy-related risks associated are well understood, pose a significant risk, cannot be minimized, and if contraception is readily available. The authors conclude that, at this time, COVID-19 does not meet all of these criteria, emphasizing that more information is needed prior to establishing recommendations.

Epidemiology

- A cohort study found that of 598 pregnant patients hospitalized due to COVID-19, 272 (45.5%) were symptomatic upon admission, with 16.2% requiring ICU admission and 8.5% required invasive mechanical ventilation. Out of 458 completed pregnancies during the COVID-19-associated hospitalization, 10 (2.2%) resulted in a pregnancy loss. This study suggests that pregnant persons might be at increased risk for severe disease, making COVID-19 screening in pregnancy and patient education increasingly important as we have not yet fully understood the long-term ramifications of COVID-19 in pregnant persons and their babies.

Transmission & Prevention

- Mechanical engineers tested 18 commercially available topical products using an in vivo model with a custom-built tribometer to mimic the shear loading force against skin in order to identify a practical lubricating solution for medical workers required to wear facial personal protective equipment (PPE) for a prolonged period of time and found the longest-lasting reduction of friction in talcum powder, a petrolatum-lanolin mixture, and a coconut oil-cocoa butter-beeswax mixture.

R&D: Diagnosis & Treatments

- Individuals with COVID-19 infection detected via routine surveillance using low-frequency high-analytic sensitivity (benchmark PCR) tests are likely outside of the transmissible infectious period by the time the results are received, thus allowing for viral spread before the person is aware they are infected, and suggesting that a shift in testing to a low analytic sensitivity test which has quick point-of-care results, inexpensive mass-production, and the ability to be performed frequently would allow for identification, isolation, and filtration of people who could spread infection.

Mental Health & Resilience Needs

- A cross-sectional study of 288 perinatal patients found higher rates of anxiety (34.4%) and depression (39.2%) compared to pre-COVID-19 scores (3.1% for both conditions combined) as measured by the Patient Health Questionnaire Anxiety and Depression Scale, while postnatal groups scored higher than antenatal groups overall ($p<0.0001$), suggesting that perinatal patients, postnatal patients in particular, may experience increased mental health challenges as a result of the COVID-19 pandemic.

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CLIMATE

DELAYING PREGNANCY DURING A PUBLIC HEALTH CRISIS - EXAMINING PUBLIC HEALTH RECOMMENDATIONS FOR COVID-19 AND BEYOND

Rasmussen SA, Lyerly AD, Jamieson DJ.. N Engl J Med. 2020 Sep 30. doi: 10.1056/NEJMp2027940. Online ahead of print.
Level of Evidence: Other - Expert Opinion

BLUF

An opinion article published in NEJM by pediatricians/OBGYNs discusses ethical concerns (e.g. reproductive autonomy) surrounding public health policies on pregnancy avoidance during a public health emergency, suggesting that such policies should only be put in place if the pregnancy-related risks associated are well understood, pose a significant risk, cannot be minimized, and if contraception is readily available. The authors conclude that, at this time, COVID-19 does not meet all of these criteria, emphasizing that more information is needed prior to establishing recommendations.

AFFECTING THE HEALTHCARE WORKFORCE

UPDATE: CHARACTERISTICS OF HEALTH CARE PERSONNEL WITH COVID-19 - UNITED STATES, FEBRUARY 12-JULY 16, 2020

Hughes MM, Groenewold MR, Lessem SE, Xu K, Ussery EN, Wiegand RE, Qin X, Do T, Thomas D, Tsai S, Davidson A, Latash J, Eckel S, Collins J, Ojo M, McHugh L, Li W, Chen J, Chan J, Wortham JM, Reagan-Steiner S, Lee JT, Reddy SC, Kuhar DT, Burrer SL, Stuckey MJ.. MMWR Morb Mortal Wkly Rep. 2020 Sep 25;69(38):1364-1368. doi: 10.15585/mmwr.mm6938a3.
Level of Evidence: 3 - Local non-random sample

BLUF

The CDC COVID-19 Response Team presents an updated report on the demographic characteristics, hospitalization, ICU admissions, occupation type, and job setting of 100,570 Health Care Personnel (HCP) with COVID-19 voluntarily reported to the CDC between February 12 - July 16, 2020. This data (see summary) signifies the importance of communication maintenance between HCPs at risk of severe COVID-19 and their employers, in addition to emphasizing the need for adequate PPE and social distancing measures to protect HCPs and the communities they serve (Tables 1, 2).

SUMMARY

The data revealed the following: 79% were female, 57% were between 16-44 years of age, 47% were non-Hispanic whites, 8% were hospitalized, 5% were admitted to the ICU, 32% were healthcare support workers, 29.5% were nurses, and 66.8% worked at nursing and residential facilities. Of the 641 fatal cases, mortality was higher among males (38%), Non-Hispanic Whites (36%), Blacks (32%), Asians (20%), and had underlying disease (92%).

ABSTRACT

As of September 21, 2020, the coronavirus disease 2019 (COVID-19) pandemic had resulted in 6,786,352 cases and 199,024 deaths in the United States.* Health care personnel (HCP) are essential workers at risk for exposure to patients or infectious materials (1). The impact of COVID-19 on U.S. HCP was first described using national case surveillance data in April 2020 (2). Since then, the number of reported HCP with COVID-19 has increased tenfold. This update describes demographic characteristics, underlying medical conditions, hospitalizations, and intensive care unit (ICU) admissions, stratified by vital status, among 100,570 HCP with COVID-19 reported to CDC during February 12-July 16, 2020. HCP occupation type and job setting are newly reported. HCP status was available for 571,708 (22%) of 2,633,585 cases reported to CDC. Most HCP with COVID-19 were female (79%), aged 16-44 years (57%), not hospitalized (92%), and lacked all 10 underlying medical conditions specified on the case report form (56%). Of HCP with COVID-19, 641 died. Compared with nonfatal COVID-19 HCP cases, a higher percentage of fatal cases occurred in males (38% versus 22%), persons aged >=65 years (44% versus 4%), non-Hispanic Asians (Asians) (20% versus 9%), non-Hispanic Blacks (Blacks) (32% versus 25%), and persons with any of the 10 underlying medical conditions specified on the case report form (92% versus 41%). From a subset of jurisdictions reporting occupation type or job setting for HCP with COVID-19, nurses were the most frequently identified single occupation type (30%), and nursing and residential care facilities were the most common job setting (67%). Ensuring access to personal protective equipment (PPE) and training, and practices such as universal use of face masks at work, wearing masks in the community, and observing social distancing remain critical strategies to protect HCP and those they serve.

FIGURES

Characteristic*	No. (%) Total	Alive	Deceased†	Unknown	Case fatality ratio,§ no./total no.
Total	**100,570**	**67,105**	**641**	**32,824**	**0.95 (641/67,746)**
Age group (yrs)	**N = 100,432**	**N = 67,023**	**N = 641**	**N = 32,768**	—
16–44	**57,742 (57)**	39,018 (58)	57 (9)	18,667 (57)	0.15 (57/39,075)
45–54	**20,981 (21)**	13,836 (21)	99 (15)	7,046 (22)	0.71 (99/13,935)
55–64	**17,052 (17)**	11,264 (17)	205 (32)	5,583 (17)	1.79 (205/11,469)
≥65	**4,657 (5)**	2,905 (4)	280 (44)	1,472 (4)	8.79 (280/3,185)
Sex	**N = 99,741**	**N = 66,796**	**N = 639**	**N = 32,306**	—
Female	**78,328 (79)**	52,366 (78)	395 (62)	25,567 (79)	0.75 (395/52,761)
Male	**21,413 (21)**	14,430 (22)	244 (38)	6,739 (21)	1.66 (244/14,674)
Race/Ethnicity	**N = 69,678**	**N = 45,104**	**N = 552**	**N = 24,022**	—
American Indian/Alaska Native, non-Hispanic	**253 (0)**	186 (0)	0 (0)	67 (0)	—
Asian, non-Hispanic	**6,010 (9)**	4,083 (9)	111 (20)	1,816 (8)	2.65 (111/4,194)
Black, non-Hispanic	**18,117 (26)**	11,172 (25)	177 (32)	6,768 (28)	1.56 (177/11,349)
Hispanic/Latino¶	**8,030 (12)**	4,262 (9)	49 (9)	3,719 (15)	1.14 (49/4,311)
Multiple/Other, non-Hispanic	**4,195 (6)**	2,662 (6)	13 (2)	1,520 (6)	0.49 (13/2,675)
Native Hawaiian/Other Pacific Islander, non-Hispanic	**422 (1)**	314 (1)	4 (1)	104 (0)	1.26 (4/318)
White, non-Hispanic	**32,651 (47)**	22,425 (50)	198 (36)	10,028 (42)	0.88 (198/22,623)
Underlying medical conditions**	**N = 40,582**	**N = 26,868**	**N = 378**	**N = 13,336**	—
Any underlying medical condition	**17,838 (44)**	11,012 (41)	348 (92)	6,478 (49)	3.06 (348/11,360)
Any chronic lung disease	**6,422 (16)**	4,064 (15)	89 (24)	2,269 (17)	2.14 (89/4,153)
Any cardiovascular disease	**7,348 (18)**	4,331 (16)	229 (61)	2,788 (21)	5.02 (229/4,560)
Diabetes mellitus	**5,466 (13)**	3,314 (12)	198 (52)	1,954 (15)	5.64 (198/3,512)
Immunosuppressing condition	**1,504 (4)**	1,070 (4)	24 (6)	410 (3)	2.19 (24/1,094)
Severe obesity	**1,101 (3)**	453 (2)	27 (7)	621 (5)	5.63 (27/480)
Chronic renal disease	**503 (1)**	279 (1)	45 (12)	179 (1)	13.89 (45/324)
Neurologic/Neurodevelopmental disability	**528 (1)**	333 (1)	34 (9)	161 (1)	9.26 (34/367)
Chronic liver disease	**242 (1)**	148 (1)	10 (3)	84 (1)	6.33 (10/158)
Autoimmune condition	**479 (1)**	262 (1)	3 (1)	214 (2)	1.13 (3/265)
Psychologic/psychiatric condition	**353 (1)**	191 (1)	4 (1)	158 (1)	2.05 (4/195)
Admission to hospital	**N = 83,202**	**N = 55,415**	**N = 591**	**N = 27,196**	—
Yes	**6,832 (8)**	4,207 (8)	518 (88)	2,107 (8)	10.96 (518/4,725)
Admission to ICU	**N = 33,694**	**N = 22,545**	**N = 377**	**N = 10,772**	—
Yes	**1,684 (5)**	662 (3)	295 (78)	727 (7)	30.83 (295/957)

Abbreviation: COVID-19 = coronavirus disease 2019.

Table 1: Demographics, underlying medical conditions, hospitalization status, and intensive care unit (ICU) status among health care personnel (HCP) with COVID-19, by vital status — United States, February 12–July 16, 2020.

Characteristic (no. with available information)†	No. (%)
Occupation type (5,913)§	
Health care support worker¶	1,895 (32.1)
Nurse**	1,742 (29.5)
Administrative staff member	581 (9.8)
Environmental services worker	330 (5.6)
Physician	190 (3.2)
Medical technician	135 (2.3)
Behavioral health worker	128 (2.2)
First responder	113 (1.9)
Dietary services worker	113 (1.9)
Dental worker	98 (1.7)
Laboratorian	68 (1.2)
Occupational, physical, or speech therapist	65 (1.1)
Pharmacy worker	62 (1.1)
Respiratory therapist	44 (0.7)
Phlebotomist	25 (0.4)
Physician assistant	13 (0.2)
Other	311 (5.3)
Job setting (6,955)§	
Nursing and residential care facility††,§§	4,649 (66.8)
Hospital	1,231 (17.7)
Ambulatory health care service¶¶	804 (11.6)
Other	271 (3.9)

Abbreviation: COVID-19 = coronavirus disease 2019.

Table 2: Occupation type and job setting of health care personnel (HCP) with COVID-19 — six jurisdictions,* February 12–July 16, 2020.

PREGNANT PERSONS

CHARACTERISTICS AND MATERNAL AND BIRTH OUTCOMES OF HOSPITALIZED PREGNANT WOMEN WITH LABORATORY-CONFIRMED COVID-19 - COVID-NET, 13 STATES, MARCH 1-AUGUST 22, 2020

Delahoy MJ, Whitaker M, O'Halloran A, Chai SJ, Kirley PD, Alden N, Kawasaki B, Meek J, Yousey-Hindes K, Anderson EJ, Openo KP, Monroe ML, Ryan PA, Fox K, Kim S, Lynfield R, Siebman S, Davis SS, Sosin DM, Barney G, Muse A, Bennett NM, Felsen CB, Billing LM, Shiltz J, Sutton M, West N, Schaffner W, Talbot HK, George A, Spencer M, Ellington S, Galang RR, Gilboa SM, Tong VT, Piasecki A, Brammer L, Fry AM, Hall AJ, Wortham JM, Kim L, Garg S; COVID-NET Surveillance Team.. MMWR Morb Mortal Wkly Rep. 2020 Sep 25;69(38):1347-1354. doi: 10.15585/mmwr.mm6938e1.
Level of Evidence: 3 - Local non-random sample

BLUF

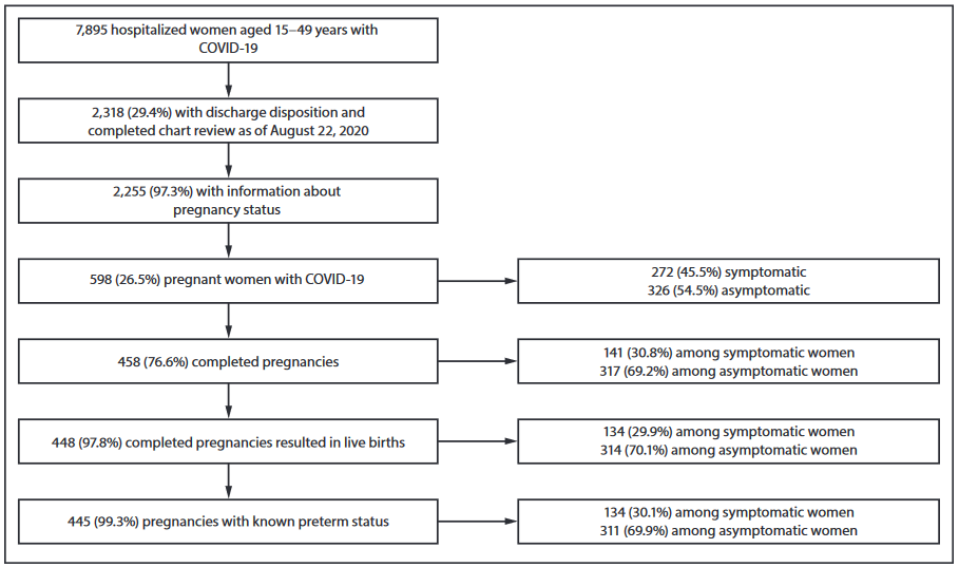
An observational cohort study using data from the COVID-19-Associated Hospitalization Surveillance Network, which compiled information on hospitalized patients across 12 states from March 1 - August 22, 2020, found that of 598 pregnant patients hospitalized due to COVID-19, 272 (45.5%) were symptomatic upon admission, with 16.2% requiring ICU admission, in addition to 8.5% requiring invasive mechanical ventilation. Out of 458 completed pregnancies during the COVID-19-associated hospitalization, 10 (2.2%) resulted in a pregnancy loss (Figure 1). This study suggests that pregnant women might be at increased risk for severe disease, making COVID-19 screening in pregnancy and patient education increasingly important as we have not yet fully understood the long-term ramifications of COVID-19 in pregnant women and their babies.

ABSTRACT

Pregnant women might be at increased risk for severe coronavirus disease 2019 (COVID-19) (1,2). The COVID-19-Associated Hospitalization Surveillance Network (COVID-NET) (3) collects data on hospitalized pregnant women with laboratory-confirmed SARS-CoV-2, the virus that causes COVID-19; to date, such data have been limited. During March 1-August 22, 2020, approximately one in four hospitalized women aged 15-49 years with COVID-19 was pregnant. Among 598 hospitalized pregnant women with COVID-19, 54.5% were asymptomatic at admission. Among 272 pregnant women with COVID-19 who were symptomatic at hospital admission, 16.2% were admitted to an intensive care unit (ICU), and 8.5% required invasive mechanical ventilation. During COVID-19-associated hospitalizations, 448 of 458 (97.8%) completed pregnancies resulted in a live birth and 10 (2.2%) resulted in a pregnancy loss. Testing policies based on the presence of symptoms might miss COVID-19 infections during pregnancy. Surveillance of pregnant women with COVID-19, including those with asymptomatic infections, is important to understand the short- and long-term consequences of COVID-19 for mothers and newborns. Identifying COVID-19 in women during birth hospitalizations is important to guide preventive measures to protect pregnant women, parents, newborns, other patients, and hospital personnel. Pregnant women and health care providers should be made aware of the potential risks for severe COVID-19 illness, adverse pregnancy outcomes, and ways to prevent infection.

FIGURES

FIGURE 1. Pregnancy status, signs and symptoms,* and birth outcomes†,§,¶ among hospitalized women aged 15–49 years with COVID-19 — COVID-NET, 13 states,†† March 1–August 22, 2020**



SEROPREVALENCE OF SARS-COV-2 ANTIBODIES AMONG PREGNANT WOMEN IN ESTONIA: A CALL FOR EPIDEMIOLOGICAL STUDIES

Veerus P, Salumets A, Naaber P, Krjutškov K, Tilk K, Laanpere M, Uusküla A.. Acta Obstet Gynecol Scand. 2020 Sep 24. doi: 10.1111/aogs.13995. Online ahead of print.
Level of Evidence: Other - Expert Opinion

BLUF

Researchers in Estonia respond to a systemic review of maternal and perinatal outcomes during the COVID-19 pandemic (Zaigham and Anderson, 2020) emphasizing a need for further epidemiological studies to investigate impacts of COVID-19 on pregnancy using serological studies. Authors highlight effectiveness of serologic COVID-19 tests (i.e. chemiluminescent microparticle immunoassay) and support their use to assess COVID-19 rates in pregnant patients compared to the general population in a given country and among different countries in a given region. They argue this epidemiological data could offer better understanding of COVID-19 impacts on pregnant patients and potential perinatal effects of infection.

ABSTRACT

On April 7, 2020 Mehreen Zaigham and Ola Andersson published a systematic review of maternal and perinatal outcomes in 108 pregnancies with Covid-19 concluding that careful monitoring of such pregnancies and is warranted.1 We would like to emphasise the need to assess objectively the impact of the novel Severe Acute Respiratory Coronavirus Type 2 (SARS-CoV-2) causing Covid-19 disease on pregnancy and perinatal outcomes by conducting epidemiological studies among pregnant women.

THE CHANGES OF THE PERIPHERAL CD4+ LYMPHOCYTES AND INFLAMMATORY CYTOKINES IN PATIENTS WITH COVID-19

Sun HB, Zhang YM, Huang LG, Lai QN, Mo Q, Ye XZ, Wang T, Zhu ZZ, Lv XL, Luo YJ, Gao SD, Xu JS, Zhu HH, Li T, Wang ZK.. PLoS One. 2020 Sep 25;15(9):e0239532. doi: 10.1371/journal.pone.0239532. eCollection 2020.
Level of Evidence: 4 - Cohort study or control arm of randomized trial

BLUF

Chinese clinical researchers conducted a cohort study of COVID-19 positive patients (n=35; confirmed via RT-PCR) at The Affiliated Infectious Diseases Hospital of Nanchang University and found decreased CD4+ lymphocyte counts and CD4+/CD8+ ratio (Figures 1,2) as well as elevated interleukin 6 and tissue necrosis factor α (IL-6 and TNF-α; Figure 3) compared to healthy individuals (n=20), which also correlated with severity of infection. Authors assert that COVID-19 associated lymphocytopenia may provide evidence for severity of infection and improved understanding of these mechanisms could offer assistance in development of novel treatments.

ABSTRACT

To investigate the clinical value of changes in the subtypes of peripheral blood lymphocytes and levels of inflammatory cytokines in patients with COVID-19, the total numbers of lymphocytes and CD4+ lymphocytes and the ratio of CD4+/CD8+ lymphocytes were calculated and observed in different groups of patients with COVID-19. The results show that the lymphocytopenia in patients with COVID-19 was mainly manifested by decreases in the CD4+ T lymphocyte number and the CD4+/CD8+ ratio. The decreased number of CD4+ T lymphocytes and the elevated levels of TNF-alpha and IL-6 were correlated with the severity of COVID-19 disease.

FIGURES

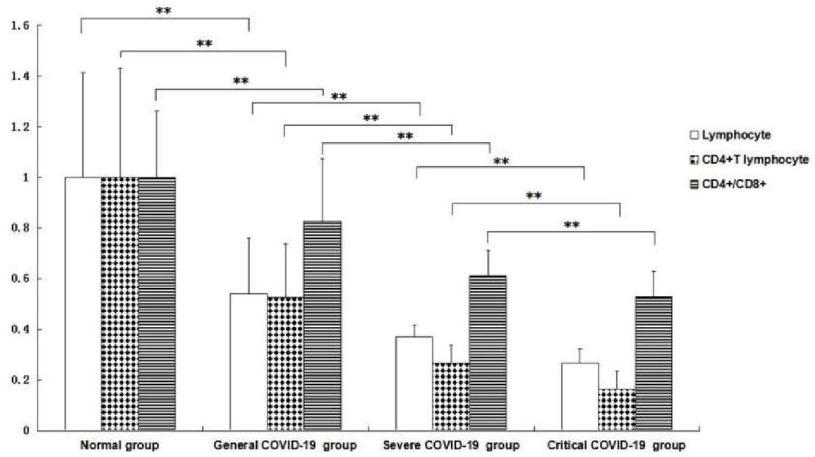


Figure 1. Changes in the total numbers of lymphocytes and CD4+ lymphocytes and the ratio of CD4+/CD8+ lymphocytes in the peripheral blood of patients with different severities of COVID-19. The total numbers of lymphocytes and CD4+ lymphocytes and the ratio of CD4+/CD8+ lymphocytes in the patients in the general COVID19 group were significantly lower than those in the normal control group. The levels in the severe COVID-19 group were significantly lower than those in the general COVID-19 group, and the levels in the critical COVID-19 group were significantly lower than those in the severe COVID-19 group. The total number of lymphocytes (109 cells/L) and CD4+ lymphocytes (cells/μL) and the ratio of CD4+/CD8+ lymphocytes of the patients in the normal control group were all set to 1.0. ** p less than 0.01.

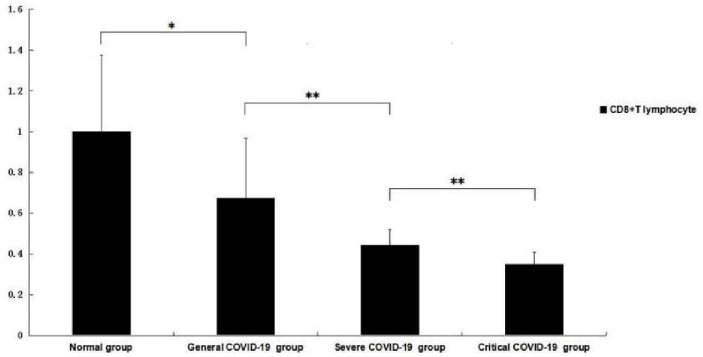


Figure 2. Changes in the number of CD8+ lymphocytes in the peripheral blood of patients with different severities of COVID-19. The total number of CD8+ lymphocytes in the patients in the general COVID-19 group was significantly lower than that in the normal control group, the levels in the severe COVID-19 group were significantly lower than those in the general COVID-19 group, and the levels in the critical COVID-19 group were significantly lower than those in the severe COVID-19 group. The total number of lymphocytes (109 cells/L) and CD4+ lymphocytes (cells/μL) and the ratio of CD4+/CD8+ lymphocytes of the patients in the normal control group were all set to 1.0. * p less than 0.05; ** p less than 0.01.

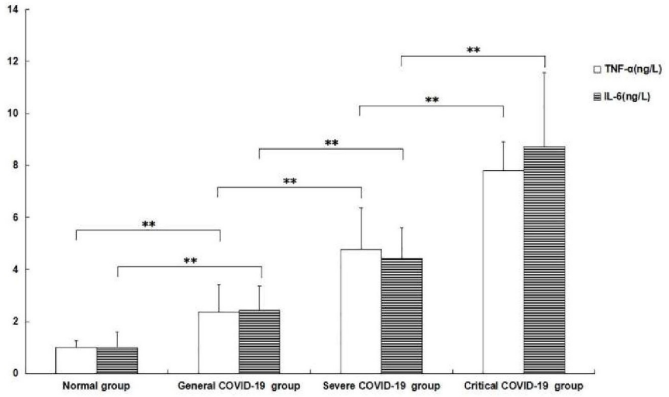


Fig 3. Changes in TNF-α and IL-6 levels in the peripheral blood of patients with different severities of COVID-19. The TNF-α and IL-6 levels of the patients in the general COVID-19 group were significantly higher than those in the normal control group. The levels in the severe COVID-19 group were significantly higher than those in the general COVID-19 group, and the levels in the critical COVID-19 group were significantly higher than those in the severe COVID-19 group. The TNF-α and IL-6 levels in the peripheral blood of patients in the normal control group were all set to 1.0. ** p less than 0.01.

NEUROLOGICAL COMPLICATIONS ASSOCIATED WITH THE BLOOD-BRAIN BARRIER DAMAGE INDUCED BY THE INFLAMMATORY RESPONSE DURING SARS-COV-2 INFECTION

Alquisiras-Burgos I, Peralta-Arrieta I, Alonso-Palomares LA, Zacapala-Gómez AE, Salmerón-Bárcenas EG, Aguilera P.. Mol Neurobiol. 2020 Sep 25. doi: 10.1007/s12035-020-02134-7. Online ahead of print.
Level of Evidence: Other - Review / Literature Review

BLUF

Researchers from different laboratories in Mexico and Chile reviewed studies detailing the pathophysiological effects of coronaviruses on brain damage and neurological dysfunction. They found that infiltration of neurotoxic proteins such as amyloid-β peptides and pro-inflammatory cytokines such as IFN-γ, and CD4+ T-lymphocytes may lead to the breakdown of the blood- brain-barrier (Figure 2). Further, autopsy studies of SARS-CoV-2-infected patients revealed multifocal hemorrhage due to loss of cerebral vascular integrity and infiltration by monocytes and lymphocytes, necrosis, edema, hyperplasia of glial cell and neuronal degeneration. Clinically patients are presenting with diseases including multiple sclerosis, Alzheimer's disease, Guillain-Barré syndrome, acute myelitis, and acute hemorrhagic necrotizing encephalopathy. The authors recommend further studies to substantiate these findings.

ABSTRACT

The main discussion above of the novel pathogenic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has focused substantially on the immediate risks and impact on the respiratory system; however, the effects induced to the central nervous system are currently unknown. Some authors have suggested that SARS-CoV-2 infection can dramatically affect brain function and exacerbate neurodegenerative diseases in patients, but the mechanisms have not been entirely described. In this review, we gather information from past and actual studies on coronaviruses that informed neurological dysfunction and brain damage. Then, we analyzed and described the possible mechanisms causative of brain injury after SARS-CoV-2 infection. We proposed that potential routes of SARS-CoV-2 neuro-invasion are determinant factors in the process. We considered that the hematogenous route of infection can directly affect the brain microvascular endothelium cells that integrate the blood-brain barrier and be fundamental in initiation of brain damage. Additionally, activation of the inflammatory response against the infection represents a critical step on injury induction of the brain tissue. Consequently, the virus' ability to infect brain cells and induce the inflammatory response can promote or increase the risk to acquire central nervous system diseases. Here, we contribute to the understanding of the neurological conditions found in patients with SARS-CoV-2 infection and its association with the blood-brain barrier integrity.

FIGURES

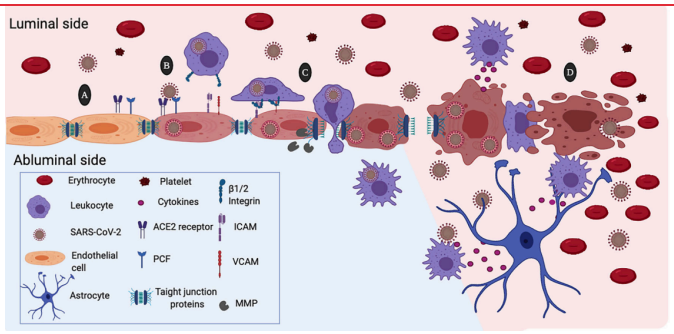


Fig. 2 Possible mechanism of damage to the blood-brain barrier (BBB) by the action of SARS-CoV-2. a Expression of angiotensin-converting enzyme 2 (ACE2) and the pro-protein convertase furin (PCF) in the membrane of the brain microvascular endothelial cells facilitates SARSCoV-2 infection. b SARS-CoV2 infection activates the brain microendothelial cells inducing high expression of the vascular and the intercellular adhesion molecules (VCAM and ICAM). Likewise, SARSCoV 2 induces the expression and activation matrix metalloproteinases (MMP) that degrade tight junctions proteins. c Recognition of ICAM and ICAM through the β1 and β2 integrins causes binding of circulating leukocytes to endothelial cells that lead transcellular extravasation. This process facilitate viral entrance to the cerebral parenchyma through the “Trojan horse” mechanism. d SARS-CoV-2 viral replication induces endothelial cell contraction and lysis. Increased permeability of the BBB allows extravasation of plasma proteins and blood cells. Activation of leukocytes and platelets contributes to the BBB damage. Besides, endothelial cell death disturbs the microenvironment of the brain parenchymaallowing free passage of the SARS-CoV-2 virus and infection of other cells of the central nervous system

SERUM ANTIBODY PROFILE OF A PATIENT WITH COVID-19 REINFECTION

To KK, Hung IF, Chan KH, Yuan S, To WK, Tsang DN, Cheng VC, Chen Z, Kok KH, Yuen KY.. Clin Infect Dis. 2020 Sep 23:ciaa1368. doi: 10.1093/cid/ciaa1368. Online ahead of print.
Level of Evidence: Other - Case Report

BLUF

A case report of an immunocompetent patient from Hong Kong with asymptomatic COVID-19 reinfection found significantly decreased amounts of neutralizing antibodies (in comparison to this patient's initial infection 5 months prior) via conventional virus neutralization test (cVNT) or pseudovirus-based virus neutralization test (pVNT) in the first blood sample following reinfection. Within 8 days of hospitalization with the second infection, high IgG, lack of IgM, and high neutralizing antibodies titers were reported (Figures 1 & 2), suggesting that a 2-dose vaccine schedule may be needed for the COVID-19 vaccine given the potentially waning humoral immunity displayed in this case. Also, more studies on reinfection cases are warranted to help inform the immunological response against COVID-19 and future vaccine strategies.

ABSTRACT

We recently reported a patient with COVID-19 reinfection. Here, we showed that serum neutralizing antibody could be detected during the first episode but not at presentation of the second episode. During reinfection, neutralizing antibody and high avidity IgG were found within 8 days after hospitalization, while IgM response was absent.

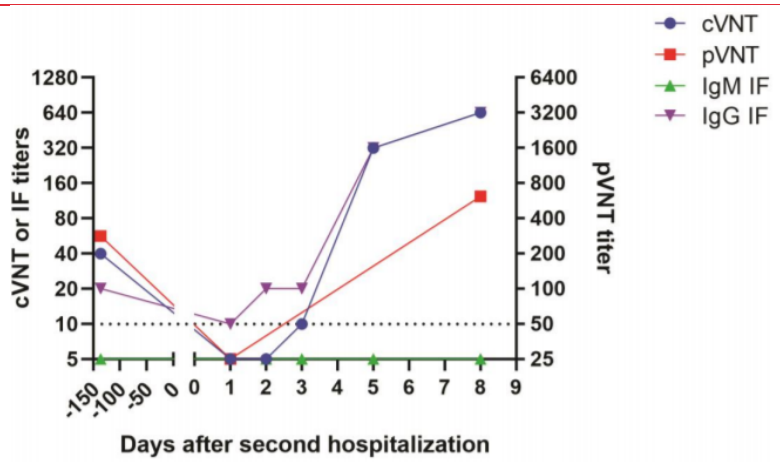


Figure 1: Antibody kinetics of the patient. A) Antibody titers of cVNT, pVNT, IgM IF and IgG IF titer. Dotted line indicates the cutoff for seropositivity. A value of 5 was depicted for serum specimens with cVNT, IgM IF or IgG IF titers of <1:10, and a value of 640 was depicted for serum specimen with cVNT titer >1:320. A value of 25 was depicted for pVNT titers of <1:50. cVNT, conventional virus neutralization test; IgG IF, IgG titer in the indirect immunofluorescence assay; IgM IF, IgM titer in the indirect immunofluorescence assay; pVNT, Pseudovirus-based virus neutralization test.

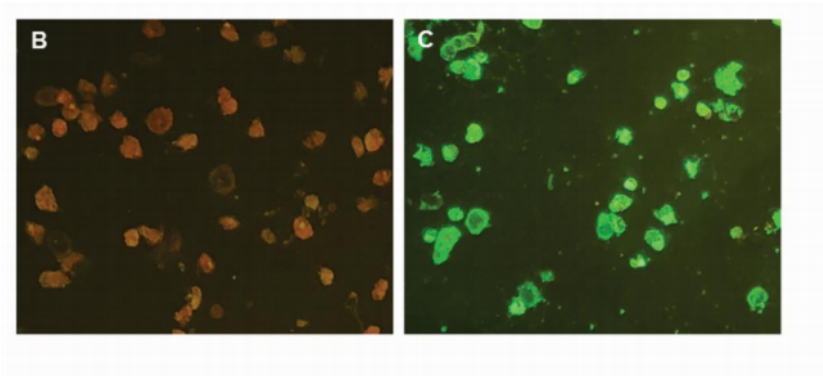


Figure 2: B & C) IgG indirect immunofluorescence assays; B) Negative control with a serum collected from an individual in 2019; C) Patient's serum specimen collected on day 8 after second hospitalization with 1:10 dilution, showing positive staining for IgG (green fluorescence).

SPEECH CAN PRODUCE JET-LIKE TRANSPORT RELEVANT TO ASYMPTOMATIC SPREADING OF VIRUS

Abkarian M, Mendez S, Xue N, Yang F, Stone HA.. Proc Natl Acad Sci U S A. 2020 Sep 25:202012156. doi: 10.1073/pnas.2012156117. Online ahead of print.
Level of Evidence: Other - Mechanism-based reasoning

BLUF

Researchers from Princeton University and University of Montpellier developed a model of transmission for SARS-CoV-2 (among other pathogens) that assessed fluid dynamics of speech and quantified the complex flows associated with breathing and speaking from one individual (a 44 year-old healthy male) using flow visualizations (Figure 1), correlation image velocity (Figure 2), and numerical simulations (Figure 4). Authors hope these findings can contribute to further understanding of SARS-CoV-2 transmission.

ABSTRACT

Many scientific reports document that asymptomatic and presymptomatic individuals contribute to the spread of COVID-19, probably during conversations in social interactions. Droplet emission occurs during speech, yet few studies document the flow to provide the transport mechanism. This lack of understanding prevents informed public health guidance for risk reduction and mitigation strategies, e.g., the "6-foot rule." Here we analyze flows during breathing and speaking, including phonetic features, using orders-of-magnitude estimates, numerical simulations, and laboratory experiments. We document the spatiotemporal structure of the expelled airflow. Phonetic characteristics of plosive sounds like "P" lead to enhanced directed transport, including jet-like flows that entrain the surrounding air. We highlight three distinct temporal scaling laws for the transport distance of exhaled material including 1) transport over a short distance (<0.5 m) in a fraction of a second, with large angular variations due to the complexity of speech; 2) a longer distance, ~1 m, where directed transport is driven by individual vortical puffs corresponding to plosive sounds; and 3) a distance out to about 2 m, or even farther, where sequential plosives in a sentence, corresponding effectively to a train of puffs, create conical, jet-like flows. The latter dictates the long-time transport in a conversation. We believe that this work will inform thinking about the role of ventilation, aerosol transport in disease transmission for humans and other animals, and yield a better understanding of linguistic aerodynamics, i.e., aerophonetics.

FIGURES

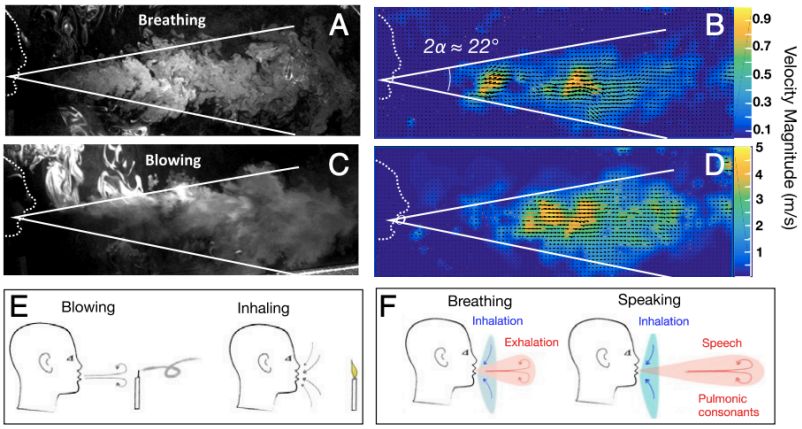


Figure 1. Flow visualization snapshot of exhalation in a laboratory-generated fog and parallel to a laser sheet in two different breathing situations. (A–D) Calm breathing (A) with the corresponding flow speeds shown with the color code and arrows (B) and a case of strong blowing (C) with the corresponding velocity field (D). Note the much higher velocities associated with blowing. However, the flows in the two cases are qualitatively similar over a sufficiently long period of a few seconds and exhibit jet-like features. The field of view in all of the images is 1 m. (E) Sketch of blowing out a candle (or not). (F) Sketch of the qualitative contrast between exhalation and inhalation for breathing and speaking.

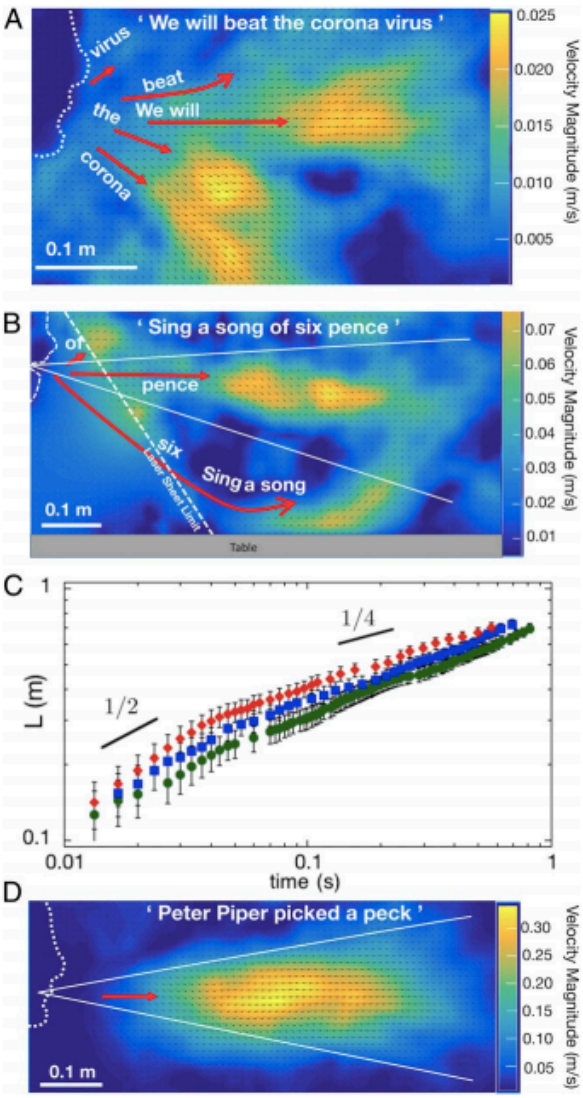


Figure 2. Mean velocity field produced when speaking three different sentences. A color code illustrates the average speeds but note that single images of the magnitude of speeds are not representative of the true instantaneous velocities, which were estimated from Movies S1–S5. (A) "We will beat the corona virus," which is a mixture of vowels, fricatives and plosives. (B) "Sing a song of six pence" (SSSP) (25), mainly composed of the fricative "S" except the last word that starts with "P." (C) The distance traveled by the extremity of the air puff as a function of time when saying "pence" at the end of SSSP for three different runs. (D) "Peter Piper picked a peck" (PPPP) (25), which is mainly composed of many plosives P.

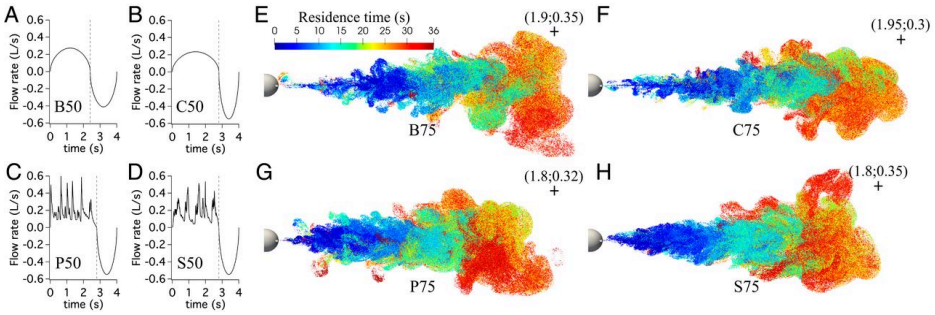


Figure 4. Numerical simulations of periodic breathing versus speaking signals for cycles of 4.0 s. The jets issue from a sphere with an open elliptic orifice of semiaxes 1.0 and 1.5 cm. (A–D) volumetric flow rate signals for cases with 0.5 L per breath (hence the "50" in the labels), where the vertical dashed lines mark the separation between exhalation and inhalation. (A) Case B50 is a breathing-like signal with 2.4 s exhalation and 1.6 s inhalation. (C) Case P50 and (D) case S50 are speaking signals sampled from ref. 25 and recorded during articulation of "Peter Piper picked a peck" and "Sing a song of six pence," respectively, with speaking time of 2.8 s and a 1.2-s inhalation. The P50 and S50 signals have been adjusted to 0.5 L per breath. (B) Case C50 is a calm signal of the same macroscopic characteristics as P50 and S50, but with a smooth signal similar to B50. Three series of simulations have been performed at different volumes per breath, i.e., 0.5, 0.75, and 1.0 L per breath. For the simulation of "Peter Piper picked a peck" for instance, the simulations at 0.75 and 1.0 L per breath are referred to as P75 and P100 and are obtained by multiplying the input flow rate signal of P50 by 1.5 and 2.0, respectively. (E–H) Examples of jets obtained for cases B75, C75, P75, and S75 after nine cycles (36 s), as visualized by perfect tracers issued from the mouth and color coded by their residence time in the computational domain (dark blue tracers were exhaled during the last cycle). The scale is the same for all plots. For each case, a point marked by a "+" is positioned to indicate the axial and radial extent of the jet. The x and y coordinates of the point are reported as (x; y) in E–H. The sphere representing the head is shown to the left in E–H.

PREVENTION IN THE HOSPITAL

EVALUATING LUBRICANT PERFORMANCE TO REDUCE COVID-19 PPE-RELATED SKIN INJURY

Masen MA, Chung A, Dawczyk JU, Dunning Z, Edwards L, Guyott C, Hall TAG, Januszewski RC, Jiang S, Jobanputra RD, Karunaseelan KJ, Kalogeropoulos N, Lima MR, Mancero Castillo CS, Mohammed IK, Murali M, Paszkiewicz FP, Plotczyk M, Pruncu CI, Rodgers E, Russell F, Silversides R, Stoddart JC, Tan Z, Uribe D, Yap KK, Zhou X, Vaidyanathan R.. PLoS One. 2020 Sep 24;15(9):e0239363. doi: 10.1371/journal.pone.0239363. eCollection 2020.
Level of Evidence: 5 - Mechanism-based reasoning

BLUF

Mechanical engineers from Imperial College in London, United Kingdom sought to identify a practical lubricating solution for medical workers required to wear facial personal protective equipment (PPE) for a prolonged period of time by testing 18 commercially available topical products (Table 1) using an in vivo model with a custom-built tribometer to mimic the shear loading force against skin (Figure 2). Authors found longest-lasting reduction of friction in talcum powder, a petrolatum-lanolin mixture, and a coconut oil-cocoa butter-beeswax mixture, suggesting use of these products may reduce dermal injury caused by facial PPE (Figure 4).

ABSTRACT

BACKGROUND: Healthcare workers around the world are experiencing skin injury due to the extended use of personal protective equipment (PPE) during the COVID-19 pandemic. These injuries are the result of high shear stresses acting on the skin, caused by friction with the PPE. This study aims to provide a practical lubricating solution for frontline medical staff working a 4+ hours shift wearing PPE. METHODS: A literature review into skin friction and skin lubrication was conducted to identify products and substances that can reduce friction. We evaluated the lubricating performance of commercially available products in vivo using a custom-built tribometer. FINDINGS: Most lubricants provide a strong initial friction reduction, but only few products provide lubrication that lasts for four hours. The response of skin to friction is a complex interplay between the lubricating properties and durability of the film deposited on the surface and the response of skin to the lubricating substance, which include epidermal absorption, occlusion, and water retention. INTERPRETATION: Talcum powder, a petrolatum-lanolin mixture, and a coconut oil-cocoa butter-beeswax mixture showed excellent long-lasting low friction. Moisturising the skin results in excessive friction, and the use of products that are aimed at 'moisturising without leaving a non-greasy feel' should be prevented. Most investigated dressings also demonstrate excellent performance.

	Lubricant	Ingredients as listed on packaging	Commercial name	Manufacturer
Creams and grease-like lubricants	Petrolatum	Petrolatum, bht, tocopheryl acetate	Vaseline	Unilever
	Petrolatum, lanolin	Petrolatum, lanolin, mineral oil, caprylyl glycol, glycine soja oil, parfum, ricinus communis seed oil, salicylic acid, tocopherol, zea mays oil, bht, citral, citronellol, geraniol, limonene, linalool, phenoxyethanol, iron oxides (ci 77491, ci 77492)	Flight Hour Cream	Elizabeth Arden
	Glycerine, water	Aqua, glycerine, propylene glycol, hydroxyethylcellulose, methylparaben, sodium phosphate, disodium phosphate, propylparaben, tetrasodium edta	K-Y Lubricating Jelly Sterile	Reckitt Benckiser
	Silicone	Dimethicone, dimethiconol	Silicone Lube	So Divine
	Paraffinum, zinc oxide	Paraffinum liquidum, zinc oxide, polyethylene, avena sativa kernel flour, sorbitan isostearate	Baby Daily Care Barrier Cream	Aveeno
	Zinc oxide, lanolin	Zinc oxide, benzyl alcohol, benzyl benzoate, benzyl cinnamate, lanolin, purified water, liquid paraffin, paraffin wax, beeswax, microcrystalline wax, sodium benzoate, linalyl acetate, propylene glycol, citric acid, butylated hydroxyanisole, sorbitan sesquioleate, lavender fragrance	Sudocrem	Forest Tosara
Wax-like lubricants	Coconut oil, cocoa butter, beeswax	Cocos nucifera oil, theobroma cacao seed butter, cera alba, tocopherol	Anti-Chafe Salve	Squirrel's Nut Butter
	Caprylic triglyceride, ozokerite wax	Caprylic/capric triglyceride, cetearyl acetate, ozokerite wax, glyceryl behenate, stearyl alcohol, allantoin, cocos nucifera, prunus dulcis oil, tocopherol, glyceryl linoleate & glyceryl linolenate	Face Glide	Body Glide
	Castor seed oil, beeswax, coconut oil, cocoa butter	Ricinus communis seed oil, hydrogenated castor oil, beeswax, cocos nucifera oil, peg/ppg-18/18 dimethicone, theobroma cacao butter, allantoin, citrus paradisi essential oil, citrus medica limonum peel essential oil, citrus aurantiifolia essential oil, litsea cubeba fruit essential oil, citrus reticulata essential oil, citrus aurantium dulcis peel oil	Prosthetic Salve	Resilience
Powders	Talcum powder	Talc, parfum	Baby Powder	Johnson & Johnson
	Corn starch	Zea mays starch, gossypium herbaceum, hydroxyapatite, parfum	Cottontouch powder	Johnson & Johnson
	Zinc oxide	Zinc oxide	Zinc Oxide	BiOrigins
	Titanium dioxide	Titanium dioxide e171	Icing Whitener	Sugarcraft Essentials
	Water, starch, glycerine	Water, potato starch, glycerin, stearic acid, cetyl alcohol, suntflower seed oil, sweet almond oil, propylene glycol, aminomethyl propanol, magnesium aluminum silicate, dimethicone, carbomer imidazolidinyl urea, methylparaben, propylparaben, aloe barbadensis leaf juice, sodium citrate, tocopheryl acetate	Liquid Powder	Resilience
Dressings thin solid	Plastic dressing	Non-specified 'plastic'	ref 45906	Elastoplast
	Fabric dressing	Non-specified 'textile'	ref 02607	Elastoplast
	Silicone foam dressing	Polyurethane foam and polyurethane film	Silicone Adhesive Foam Lite	ActivHeal
	Hydrocolloid dressing	Thin polyurethane film	Comfeel Plus Transparent	Coloplast
	Germolene	Ethyl acetate, alcohol denat, nitrocellulose, ricinus communis, isopropyl alcohol, amyl acetate, isobutyl alcohol, camphor, parfum (includes benzyl alcohol, citronellol)	Liquid Plaster	Germolene
	Cavilon	Hexamethyldisiloxane, isooctane, acrylate terpolymer, polyphenylmethylsiloxane	Cavilon Barrier Film	3M

Table 1. Summary of all lubricating agents tested.

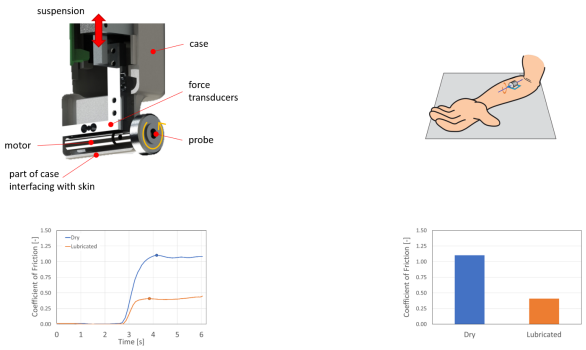


Figure 2. Schematic overview of the measurement protocol. A: Schematic of the interior of the tribometer setup. B: Schematic illustration of the measurement, adapted from Veijgen.16 C: Two typical friction measurements. D: Final processed data.

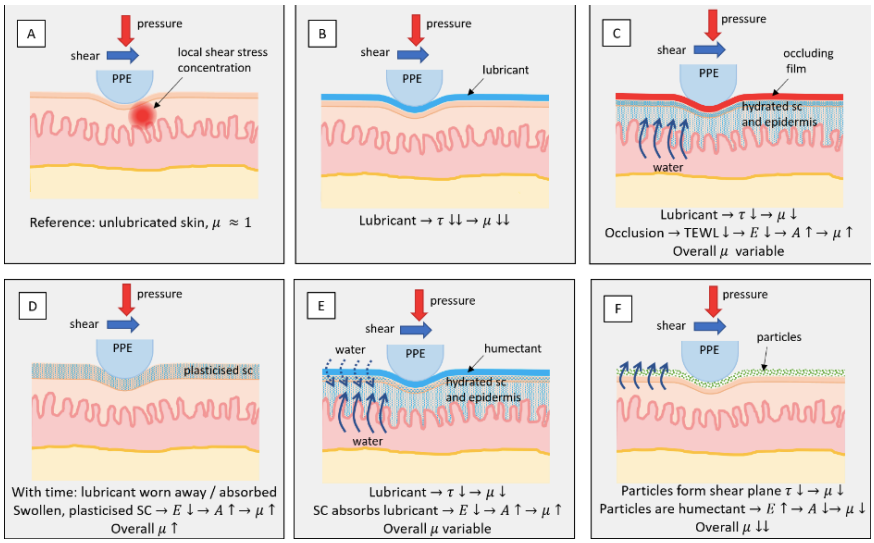


Figure 4. Mechanisms involved in lubricating the skin. A: In the unlubricated situation the friction mainly arises mainly from lipids on the skin surface. The exact value varies strongly between people, but in general the coefficient of friction is close to 1. B: Lubricants are highly effective at reducing the shear strength of the interface, resulting in much reduced friction. C: If the lubricating substance occludes the skin, transepidermal water loss is prevented. This hydrates the epidermis from the inside, reducing the stiffness and increasing the contact area thus increasing the coefficient of friction. D: The lubricant may not persist due to absorption, evaporation and/or wear. Lubricant absorbed into the stratum corneum still affects swelling and stiffness, causing the friction to increase. E: The lubricant may absorb into the skin, swelling and plasticising the stratum corneum (SC). This will reduce the stiffness and increase the contact area. The coefficient of friction will increase with time. F: Particulates may reduce the coefficient of friction: a lamellar structure provides low shear strength whilst round particles act as rollers. Some particles absorb moisture, increasing the stiffness of the stratum corneum. The combination of these effects may lead to a strong reduction of the coefficient of friction.

COMPARISON OF THE DIAGNOSTIC PERFORMANCE WITH WHOLE BLOOD AND PLASMA OF FOUR RAPID ANTIBODY TESTS FOR SARS-COV-2

Decru B, Van Elslande J, Weemaes M, Houben E, Empsen I, André E, Van Ranst M, Lagrou K, Vermeersch P.. Clin Chem Lab Med. 2020 Sep 25;58(10):e197-e199. doi: 10.1515/cclm-2020-0817.
Level of Evidence: 2 - Individual cross sectional studies with consistently applied reference standard and blinding

BLUF

Clinical researchers from University Hospital Leuven, Belgium compared diagnostic performance of four lateral flow assays (LFAs; MultiG single lane, MutliG dual lane, Orientgene, and Surescreen). They defined a group of SARS-CoV-2 RT-PCR negative patients (n=39) and a group of SARS-CoV-2 RT-PCR positive patients (n=26) to evaluate for detection of immunoglobulin G (IgG) alone, immunoglobulin M (IgM) alone, and combined IgG and IgM in two groups. The results revealed high sensitivities (>94.0%) and specificities (>97.4%) for IgG alone in all four LFAs (Table 1), suggesting potential for any of these diagnostic modalities as a rapid point of care test for anti-SARS-CoV-2 IgG antibodies.

FIGURES

	IgM			IgG			IgM/IgG		
	Blood	Plasma	Agreement	Blood	Plasma	Agreement	Blood	Plasma	Agreement
COVID-19									
MultiG1	17/33	15/33	87.9%	32/33[a]	32/33[a]	100%	32/33	32/33	100%
Orientgene	28/33	26/33	94.0%	31/33[a]	31/33[a]	100%	32/33	32/33	100%
MultiG2	15/33	9/33	75.8%	32/33[a]	32/33[a]	100%	32/33	32/33	100%
SureScreen	29/33	30/33	97.0%	31/33[a]	32/33[a]	97.0%	32/33	32/33	100%
Controls									
MultiG1	2/39	1/39	92.3%	0/39	0/39	100%	2/39	1/39	92.3%
Orientgene	0/39	0/39	100%	1/39[b]	1/39[b]	100%	1/39	1/39	100%
MultiG2	0/39	0/39	100%	1/39[b]	0/39	97.4%	1/39	0/39	97.4%
SureScreen	0/39	0/39	100%	0/39	0/39	100%	0/39	0/39	100%

[a]One sample of a patient was negative with all the tests and negative with the Abbott Architect IgG assay. This sample was drawn 33 days after the positive PCR result. The patient had fever of unknown origin. He had no respiratory symptoms, but CT scan was compatible with COVID-19.
[b]A single patient.

Table 1. Positive results for IgM and IgG and agreement between whole blood and plasma for the four LFA.

ONE-STEP QUANTITATIVE RT-PCR ASSAY WITH ARMORED RNA CONTROLS FOR DETECTION OF SARS-COV-2

Goncharova EA, Dedkov VG, Dolgova AS, Kassirov IS, Safonova MV, Voytsekhovskaya Y, Totolian AA.. J Med Virol. 2020 Sep 23. doi: 10.1002/jmv.26540. Online ahead of print.
Level of Evidence: 3 - Individual cross sectional studies with consistently applied reference standard and blinding

BLUF

Russian researchers assessed a rapid one-step real time polymerase chain reaction with reverse transcription (RT-qPCR assay) called COVID-19 Amp as a potential novel diagnostic tool. They tested 109 nasopharyngeal swab samples using both COVID-19 Amp and World Health Organization (WHO)-based assay and found COVID-19 Amp accurately detected SARS-CoV-2 in more samples than the WHO-based assay (confirmation testing via Vector-PCRrv-2019-nCoV-RG assay in discordant samples). Authors propose COVID-19 Amp as a potential diagnostic tool with high sensitivity and specificity, suggesting a tool with greater SARS-CoV-2 detection accuracy may be crucial as COVID-19 cases continue to rise.

ABSTRACT

COVID-19 has become pandemic since March, 11, 2020. Thus, development and integration in clinics of fast and sensitive diagnostic tools is essential. The aim of the study was a development and evaluation of a one-step RT-qPCR assay (COVID-19 Amp) for SARS-CoV-2 detection with an armored positive control and internal controls constructed from synthetic MS2-phage-based RNA particles. The COVID-19 Amp assay limit of detection was 103 copies/ml, the analytical specificity was 100%. 109 biological samples were examined using COVID-19 Amp and WHO-based assay. Discordance in 9 samples was observed (negative by the WHO-based assay) and discordant samples were retested as positive according to the results obtained from the Vector-PCRrv-2019-nCoV-RG assay. The developed COVID-19 Amp assay has high sensitivity and specificity, includes virus particles-based controls, provides the direct definition of SARS-CoV-2 RdRp gene partial sequence, and is suitable for any hospital and laboratory equipped for RT-qPCR. This article is protected by copyright. All rights reserved.

RETHINKING COVID-19 TEST SENSITIVITY - A STRATEGY FOR CONTAINMENT

Mina MJ, Parker R, Larremore DB.. N Engl J Med. 2020 Sep 30. doi: 10.1056/NEJMp2025631. Online ahead of print.
Level of Evidence: 5 - Mechanism-based reasoning

BLUF

A perspective article written by Harvard School of Public Health and University of Colorado, Boulder highlights that individuals with COVID-19 infection detected via routine surveillance using low-frequency high-analytic sensitivity (benchmark PCR) tests are likely outside of the transmissible infectious period (See Figure) by the time the results are received, thus allowing for viral spread before the person is aware they are infected. This article proposes a shift in COVID-19 testing to a low analytic sensitivity test which has quick point-of-care results, inexpensive mass-production, and the ability to be performed frequently, such as rapid lateral-flow antigen tests which can detect the virus in the transmissible stage of infection, even if asymptomatic, allowing for identification, isolation, and filtration of people who could spread infection.

FIGURES

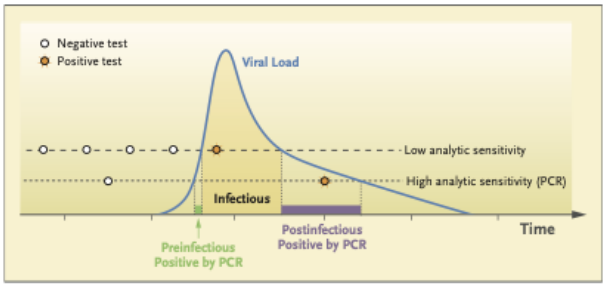


Figure 1. High-Frequency Testing with Low Analytic Sensitivity versus Low-Frequency Testing with High Analytic Sensitivity. A person's infection trajectory (blue line) is shown in the context of two surveillance regimens (circles) with different analytic sensitivity. The low-analytic-sensitivity assay is administered fre- quently and the high-analytic-sensitivity assay infrequently. Both testing regimens detect the infec- tion (orange circles), but only the high-frequency test detects it during the transmission window (shading), in spite of its lower analytic sensitivity, which makes it a more effective filter. The win- dow during which polymerase chain reaction (PCR) detects infections before infectivity (green) is short, whereas the corresponding postinfectious but PCR-detectable window (purple) is long.

CLINICAL VALUE ANTI-SARS-COV-2 SERUM IGA TITRATION IN PATIENTS WITH COVID-19

Lippi G, Mattiuzzi C.. J Med Virol. 2020 Sep 23. doi: 10.1002/jmv.26539. Online ahead of print.
Level of Evidence: Other - Review / Literature Review

BLUF

A review by biomedical researchers from Italy highlights the importance of anti-SARS-CoV-2 IgA titers in COVID-19 patients, citing a convergence of evidence from recent publications suggesting a significant correlation between anti-SARS-CoV-2 IgA and respiratory/oxygenation indices in COVID-19 patients and neutralizing antibodies. Studies have identified the diagnostic and prognostic role of IgA, as IgA titers were two-fold higher than anti-SARS-CoV-2 IgG after symptom onset, in addition to higher IgA titers appearing in severe COVID-19 disease. The authors believe IgA titration in COVID-19 patients can be used to enhance diagnostic accuracy, mirror development of humoral immunity, and determine prognosis.

SUMMARY

The following represents publications cited in this review:
- Xue et al. demonstrated a significant correlation between anti-SARS-CoV-2 IgA and respiratory/ oxygenation indices in COVID-19 patients.
- Prognostic role is highlighted by Hunag et al., suggesting serum IgA appears prior to anti-SARS-CoV-2 IgG, and higher IgA titers are observed in patients with severe COVID-19 disease.
- Tang et al. demonstrated a significant correlation coefficient (0.54 - 0.69) between anti-SARS-CoV-2 IgA and neutralizing antibodies.
- Infatino et al. highlighted the diagnostic role that anti-SARS-CoV-2 IgA was two-fold higher than IgG against the virus 9 days after symptom onset.
- Sterlin et al. demonstrated anti-SARS-CoV-2 IgA against receptor-binding domain (RBD) and viral nucleocapsid protein were comparable to anti-SARS-CoV-2 IgG, in addition to being consistently higher than anti-SARS-CoV-2 IgM, suggesting the role of IgA in early neutralizing immunity against the virus.

ABSTRACT

Immunoglobulins A (IgA) represent the major antibody class that offers humoral protection against microbial pathogens at surface of respiratory, genitourinary and gastrointestinal mucosae. This article is protected by copyright. All rights reserved.

DEVELOPMENTS IN TREATMENTS

INHIBITORY ACTIVITIES OF MARINE SULFATED POLYSACCHARIDES AGAINST SARS-COV-2

Song S, Peng H, Wang Q, Liu Z, Dong X, Wen C, Ai C, Zhang Y, Wang Z, Zhu B.. Food Funct. 2020 Sep 23;11(9):7415-7420. doi: 10.1039/d0fo02017f.

Level of Evidence: 5 - Mechanism-based reasoning

BLUF

Researchers from multiple universities in China, including Dalian Polytechnic University, identified three marine sulfated polysaccharides - a sea cucumber sulfated polysaccharide (SCSP), a fucoidan from brown algae, and an iota-carrageenan from red algae - that exhibited anti-SARS-CoV-2 activity at concentrations of 3.90-500 μg mL-1 (Figure 2). Of these 3, SCSP showed the strongest activity (IC50=9.1microgram mL^-1) and exhibited SARS-CoV-2 S-glycoprotein binding via pseudovirus testing, inhibiting viral cell entry (Figure 3, Figure 5). These results suggest that marine sulfated polysaccharides, specifically SCSP, have potential for future therapies COVID-19.

ABSTRACT

Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread around the world at an unprecedented rate. In the present study, 4 marine sulfated polysaccharides were screened for their inhibitory activity against SARS-CoV-2, including sea cucumber sulfated polysaccharide (SCSP), fucoidan from brown algae, iota-carrageenan from red algae, and chondroitin sulfate C from sharks (CS). Of them, SCSP, fucoidan, and carrageenan showed significant antiviral activities at concentrations of 3.90-500 mug mL-1. SCSP exhibited the strongest inhibitory activity with IC50 of 9.10 mug mL-1. Furthermore, a test using pseudotype virus with S glycoprotein confirmed that SCSP could bind to the S glycoprotein to prevent SARS-CoV-2 host cell entry. The three antiviral polysaccharides could be employed to treat and prevent COVID-19.

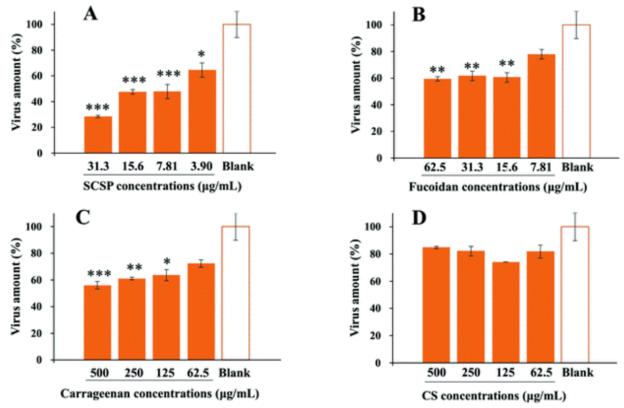


Fig. 2 Inhibitory activities of sea cucumber sulfated polysaccharide (SCSP, A), fucoidan (B), iota-carrageenan (C), and chondroitin sulfate C (CS, D) against SARS-CoV-2.

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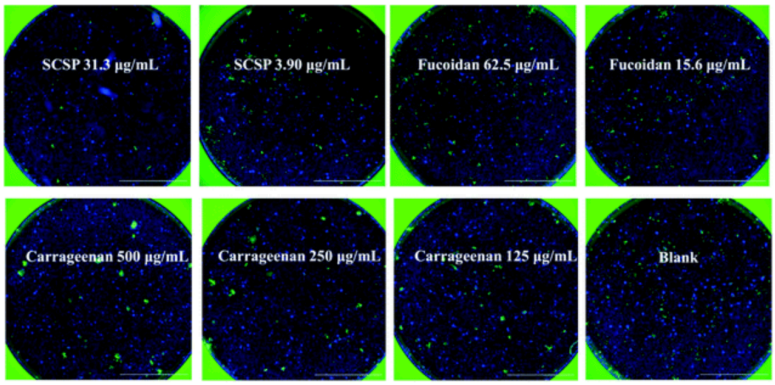

Fig. 3 Representative images of immunofluorescent assay of sea cucumber sulfated polysaccharide (SCSP), fucoidan, carrageenan and chondroitin sulfate C (CS) against SARS-CoV-2. Indirect immunofluorescent assay with the antibody against SARS-CoV-2 nucleocapsid protein (in green) and DAPI staining for the DNA of the live Vero E6 cells (in blue) were performed.

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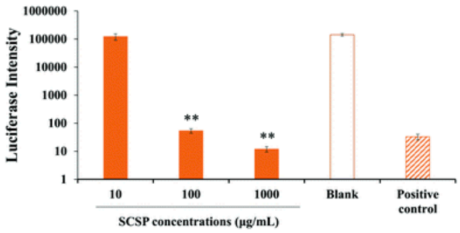

Fig. 5 Inhibitory activities of sea cucumber sulfated polysaccharide (SCSP) against pseudotype virus with the spike glycoprotein.

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DEXAMETHASONE, PRO-RESOLVING LIPID MEDIATORS AND RESOLUTION OF INFLAMMATION IN COVID-19

Andreakos E, Papadaki M, Serhan CN.. Allergy. 2020 Sep 21. doi: 10.1111/all.14595. Online ahead of print.
Level of Evidence: Other - Expert Opinion

BLUF

A professional opinion piece by an international group of laboratory biology experts explains that dexamethasone can reduce inflammation by inducing the D-series proresolving lipid mediator pathway (Figure 1). The authors suggest that this lipid mediator pathway may be an overlooked mediator of the benefits derived from dexamethasone in COVID-19 patients, a claim that is supported by another study which demonstrates that an imbalance of lipid mediators in severe COVID-19 is associated with higher rates of mortality. While the immediate applicability of this information is limited, studies on the direct modulation of these pathways could lead to relevant clinical interventions.

ABSTRACT

Coronavirus disease-19 (COVID-19) is a new disease caused by SARS-CoV-2. Since the beginning of 2020, it has become one of the main challenges of our times, causing a high incidence of severe pneumonia, acute respiratory distress syndrome (ARDS), multiorgan failure and death1 . At the root of COVID-19 lies the sudden development of 'cytokine storms', hyper-inflammatory responses involving the release of pro-inflammatory cytokines (e.g., TNF, IL-6, IL-1, IL-8, and MCP-1) that impair the gas exchange function of the lung and lead in select patients, mostly with underlying comorbidities, to multiorgan failure and death.

FIGURES

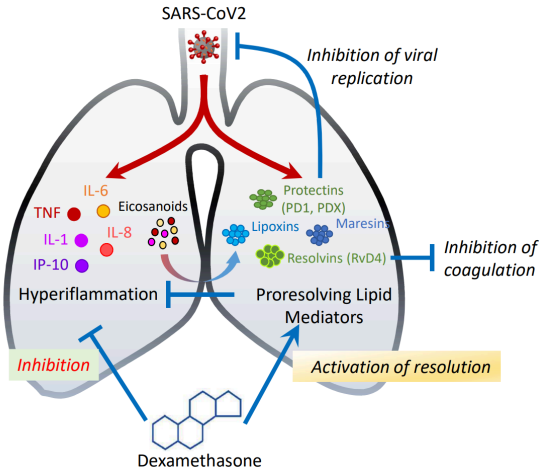

Figure 1. Hypothetical model of dexamethasone mode of action involving inhibition of the cytokine storm and induction of proresolving lipids such as Protectin D1 (PD1) and Resolvin D4. SARS-CoV2 infection triggers hyperinflammation characterized by a 'cytokine storm' involving TNF, IL-1, IL-6, IL-8 and MCP-1 production and release of eicosanoids. Proresolving meditators including protectins, resolvins and maresins are also induced as an effort of our organism to counterbalance the immune response. These act to reduce inflammation and promote its resolution but may also help resolve coagulation and block viral replication. Strengthening this response through the temporal administration of dexamethasone, triggering conventional anti-inflammatory effects as well as production of D-series protectins, could result in notable benefit in patients.

THE IMPACT OF THE COVID-19 PANDEMIC ON THE PERINATAL MENTAL HEALTH OF WOMEN

Farrell T, Reagu S, Mohan S, Elmidany R, Qaddoura F, Ahmed EE, Corbett G, Lindow S, Abuyaqoub SM, Alabdulla MA.. J Perinat Med. 2020 Sep 25:/j/jpme.ahead-of-print/jpm-2020-0415/jpm-2020-0415.xml. doi: 10.1515/jpm-2020-0415. Online ahead of print.
Level of Evidence: 3 - Local non-random sample

BLUF

A cross-sectional study of perinatal patients (n=288; Table 1) between June and July 2020 by physicians from Qatar and Ireland found higher rates of anxiety (34.4%) and depression (39.2%) compared to pre-COVID-19 scores (3.1% for both conditions combined) as measured by the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS; Figure 1), while postnatal groups scored higher than antenatal groups overall ($p<0.0001$). Authors suggest perinatal patients, postnatal patients in particular, may experience increased mental health challenges as a result of the COVID-19 pandemic.

ABSTRACT

Short Communications The physical health impact of the coronavirus disease infection (COVID-19) has received attention worldwide; however, data around the psychological impact of the pandemic is still emerging and little has been reported on psychological effects among vulnerable groups. This study was undertaken with the aim of studying the impact of the COVID-19 pandemic and related restrictions on perinatal mental health among women in Qatar. Objectives and Methods A cross-sectional survey of women accessing maternity services in Qatar was carried out during the months of June and July 2020 at the local peak of the pandemic. Background data including relevant demographic details, pregnancy and mental health history, concerns, as well as helpful stress-reducing factors reported by women was collected. Depression and anxiety symptomatology was studied using the Patient Health Questionnaire Anxiety-Depression Scale (PHQ-ADS). Results The survey results revealed a high prevalence of anxiety and Depressive symptomatology (34.4 and 39.2% respectively), based on PHQ-ADS scoring. These rates appeared much higher than the reported pre-pandemic prevalence and were not affected by occupation, previous mental health problems or pregnancy complications. Women's most commonly reported concerns as well as coping factors are discussed. Conclusions Results indicate a marked increase in anxiety and depressive symptoms during the COVID-19 pandemic, among pregnant and puerperal individuals, who constitute a vulnerable group with respect to mental health morbidity. These findings can be used to inform public health interventions, among which, consideration should be given to routine mental health screening of vulnerable groups during major health crises.

	288 respondents
Mean (SD) Age (Y)	30.5 (5.3)
Mean (SD) Gestation (Weeks)	26.1 (14.3)
Mean (SD) Number children	1.7 (1.7)
Country of origin	
Qatari origin	53 (18.4%)
Philippines origin	33 (11.5%)
Indian origin	42 (14.6%)
Other origin	160 (55.6%)
Education	
School education	59 (20.9%)
College education	62 (21.5%)
University education	149 (51.7%)

Table 1. General background, concerns, and coping strategies of the 288 patients studied.

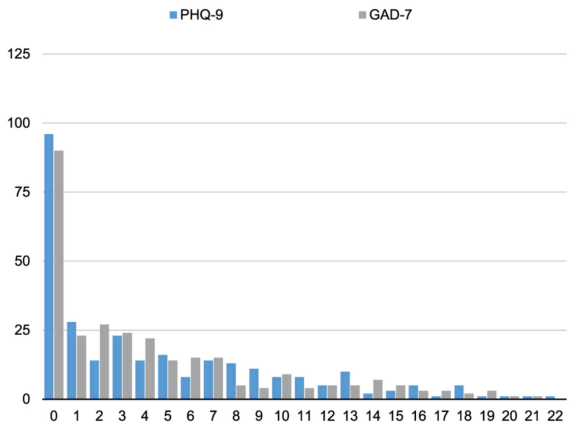

Figure 1. The responses of 287 women to the GAD-7 anxiety score and 288 women to the PHQ-9 depression score

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