LETTER TO THE EDITOR

A Review of Endocrine Orchestra in the Times of COVID Pandemic

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Sir,

While the country and world engage the pandemic of novel coronavirus disease-2019 (COVID-19) or severe respiratory syndrome coronavirus 2, it remains vital for our healthcare system to continue caring for all patients while mitigating their exposure to potential sources of infection. I read, with great appreciation, the S. Siddhanta review article "Impact of COVID 19 on Endocrine Organs,"[1] highlighting the effects of SARS-CoV-2 infection on the endocrine system which is our beloved specialty.

The current COVID-19 pandemic is probably the worst the world has ever faced since t1he start of the new millennium. Although the respiratory system is the most prominent target of SARS-CoV-2 (the contagion of COVID-19), extrapulmonary and especially endocrine involvement are emerging rapidly as important contributors of its morbidity and lethality. This article summarizes the impact of SARS-CoV and SARS-CoV-2 on the endocrine system to facilitate our understanding of the nature of coronavirus-associated endocrinopathy. Although new data are rapidly accumulating on this novel infection, many of the endocrine manifestations of COVID-19 remain incompletely elucidated. In the review article,[1] the author adeptly summarizes various endocrine dysfunctions including coronavirus-induced new-onset diabetes mellitus, critical illness-related corticosteroid insufficiency, autoimmune thyroiditis, autoimmune hypophysitis, and reproductive system aberrations so that clinicians armed with such insights can potentially forewarn patients with COVID-19 at the bedside of immediate as well as future consequences.

In a review article, Turnbull et al.[2] clarify the evidence that interleukin (IL)-1, IL-6, and tumor necrosis factor α (TNFα) that are known to be released as a part of the host response to the virus and such other threats to the host defense mechanism, which is often exaggerated in severe SARS-CoV-2 infection, can affect the hypothalamic—pituitary—adrenal axis ultimately culminating into inadequate glucocorticoid stress response in critical illness states. A similar very original article[3] published in 2004 gives a very interesting insight into this theory that a virus probably evades immune system of host by molecular mimicry and if adrenocorticotropic hormone is itself the target, sadly anti-ACTH antibodies lead to a central secondary hypocortisolism. This gives us as clinicians a therapeutic window of opportunity by blocking the mimic strategy of the virus. If we initiate steroids early enough in the disease course, when the viral load is still low, fears of adrenal crises can be tackled.

In a very recent article from China, Wu et al. have shown the potential toxic effects of this virus on our nervous system, including the pituitary.[4] Apart from central hypoadrenalism that can ameliorate with exogenous steroids, another feared field is of central diabetes insipidus, which may compound the ongoing fluid losses in background of fever, delirium, and tachypnea of severe SARS-CoV-2 disease, leading to life-threatening hypernatremia[5] and needs judicious intake of free water and output balance.

Apart from central hypothyroidism secondary to both nonthyroidal illness and autoimmune hypophysitis, there is also evidence of autoimmune damage and apoptosis of both follicular and parafollicular calcitonin-secreting C cells of thyroid,[6] leading to destructive thyroiditis with transient hyperthyroidism followed by hypothyroidism. Furthermore, calcitonin deficiency with hypoparathyroidism may lead to life-threatening cardiac arrhythmia and intensive care unit (ICU) admissions and increase the burden on health infrastructure.[6] Experimental studies in animal models (e.g. foals)[7] have proved beyond doubt that corona and other viruses can cause autoimmune insulitis and precipitate type 1 diabetes mellitus in susceptible hosts, and it is very likely that humans with pre-existing β-cell secretory defect maybe unmasked by similar mechanisms, together with steroid therapy, obesity, and other comorbidities, thus leading on to fatal diabetic ketoacidosis even in ICU setting. Stress hyperglycemia in the setting of an acute infection might trigger secretion of counterregulatory hormones, such as glucocorticoids, glucagon, and catecholamines, all of which cause elevated fasting and postprandial plasma glucose levels, and increase glycemic variability and microvascular and macrovascular complications, thereby resulting in higher mortality in these groups of cases, as shown in a recent study.[8]Angiotensin-converting enzyme 2 (ACE2) is expressed in significant amounts in both the spermatogonia, Sertoli cells, and Leydig cells of the testis, and evidence suggests that transmembrane protease serine 2 (TMPRSS2) is necessary for viral S protein priming, which is concentrated by a significant extent in the spermatogonia and spermatids.[9] Since SARS-CoV-2 utilizes ACE2 as a gateway for cellular entry, the testicular vulnerability to the virus seems a high possibility, leading to mood changes, hyposexuality,

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ejaculatory dysfunction, and post pubertal hypogonadism. Female reproductive system seems to be less affected due to paucity of such similar receptors on ovarian tissue.

The myriad ways in which this virus can produce dysfunction in the rhythm of the endocrine orchestra has perplexed clinicians and dentists time and again. Older studies on past corona epidemics lso collaborate findings with data from this current pandemic, also improve our understanding of the subject, guide our treatment of the disease and its comorbidities, and fight the virus in various novel ways. Though the review done by Siddhanta[1] has some data on experimental and animal models and references to works that are at least a decade old or more, he helps us to justify our actions and puts our concepts in a nutshell, which is a most remarkable task in itself and shines as a bright ray of sunshine amidst the gloom horizon of the COVID-19 pandemic

References

1. Siddhanta S. Impact of COVID-19 Infection On Endocrine Organs. Bengal Physician Jour.2020 May-Aug;7(2);35-38.doi:10.5005/jp-journals-10070-7011.
2. Turnbull AV, Rivier C. Regulation of the HPA axis by cytokines. Brain Behav Immun 1995;9(4):253–275. DOI: 10.1006/brbi.1995.1026. PMID: 8903845.
3. Wheatland R. Molecular mimicry of ACTH in SARS – implications for corticosteroid treatment and prophylaxis. Med Hypotheses 2004;63:855–862. DOI: 10.1016/j.mehy.2004.04.009.
4. Wu Y, Xu X, Chen Z, et al. Nervous system involvement after infection with COVID-19 and other coronaviruses. Brain Behav Immun 2020;87:18–22. DOI: 10.1016/j.bbi.2020.03.031. PMID: 32240762; PMCID: PMC7146689.
5. Kaiser UB, Mirmira RG, Stewart PM. Our response to COVID-19 as endocrinologists and diabetologists. J Clin Endocrinol Metab 2020;105(5):dgaa148. DOI: 10.1210/clinem/dgaa148.
6. Wei L., Sun S, et al. Pathology Of The Thyroid In Severe Acute Respiratory Syndrome.Hum Pathol. 2007;38(1):95-102.doi:10.1016/j.humpath.2006.06.011.
7. Navas de Solis C, Foreman JH. Transient diabetes mellitus in a neonatal thoroughbred foal. J Vet Emerg Crit Care 2010;20:611–615. DOI: 10.1111/j.1476-4431.2010.00588.x.
8. Wang A, Zhao W, Xu Z, et al. Timely blood glucose management for the outbreak of 2019 novel coronavirus disease (COVID-19) is urgently needed. Diabetes Res Clin Pract 2020;162:108118. DOI: 10.1016/j.diabres.2020.108118.
9. Wang Z, Xu X. scRNA-seq profiling of human testes reveals the presence of the ACE2 receptor, a target for SARS-CoV-2 infection in spermatogonia, Leydig and Sertoli cells. Cells 2020;9(4):920. DOI: 10.3390/cells9040920.