

How to Cite:

Afridi , M. H., Ullah , A., Ahmad , I., Hasan , S. Z., Nowsherwan, N., & Khan, A. M. (2022). The endocrine system in Covid-19 experiencing monitoring A multi-center study of Pakistan. *International Journal of Health Sciences*, 6(S7), 6666-6672. <https://doi.org/10.53730/ijhs.v6nS7.13773>

The endocrine system in Covid-19 experiencing monitoring A multi-center study of Pakistan

Muhammad Hussain Afridi

Assistant Professor Diabetes And Endocrinology Unit Hayatabad Medical Complex Peshawar, Pakistan

Arif Ullah

Assistant Professor ENT Department, Naseer Teaching Hospital, Peshawar, Pakistan
Corrospoing Authors email: Drmrufub@gmail.com

Ibrar Ahmad

Department Of Endocrinology And Diabetes MTI,LRH Peshawar, Pakistan
Corrospoing Authors email: ibrar2127@hotmail.com

Syed Zafar Hasan

Assistant Professor ENT Department, Dhq Hospital KDA Kohat, Pakistan

Nowsherwan

Prof Of Medicine MTH Peshawar, Pakistan , Pakistan

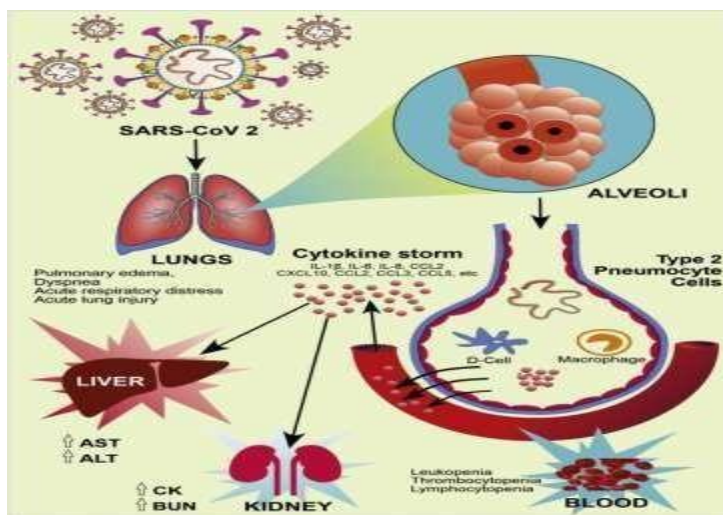
Atta Muhmmand Khan

Associate Prof Of Medicine Mti Lrh Peshawar , Pakistan

Abstract---SARS-CoV-2 (SARS-CoV-2) is a new coronavirus that surfaced in December 2019 and is accountable for a pandemic. A wide range of clinical manifestations, ranging from the absence of symptoms to multisystem organ failure due to hypoxaemic acute respiratory syndrome, are recorded. Coronavirus illness 2019's effect on endocrine glands is not yet clear. To help patients with chronic endocrine illnesses, we may draw on prior research on viruses in the same family to provide treatment options. Treatment for SARS-CoV-2 must not be halted if these patients are infected. Hormone replacement therapy dosages may need to be raised in certain circumstances. Hormonal biological surveillance is required in the event of deteriorating clinical symptoms. This article will assist improve the treatment of chronic endocrine illnesses that might impair thyroid, adrenal, gonad, and pituitary gland activities. Subjects infected with COVID-19 or those in touch with COVID-19-infected individuals might be studied using these ideas.

Keywords---Endocrine System, Covid-19, Experiencing ,Monitoring, A Multi-center study, Pakistan

Figure 01 : Virology, pathogenesis, diagnosis and in-line treatment of COVID-19



Introduction

Newly discovered SARS-CoV-2 is a coronavirus belonging to the Coronaviridae family, which has respiratory tract tropism, and is the cause of coronavirus disease 2019 (COVID-19) pneumonia¹. Data on this novel virus' influence on the endocrine glands is limited to diabetics. Patients with chronic endocrine illnesses may benefit from the information in this article, which summarizes the best practices for treating them².

Thyroid Diseases Require Endocrine Monitoring

Since SARS-CoV-2 is a newly discovered virus, little information has been gathered on the virus' impact on people with thyroid disorders. Patients with a chronic thyroid condition, however, should be aware that thyroid hormones govern both normal metabolic and brain function. Inflammatory mediators are produced as a result of viral infection, which is one of the most common environmental triggers for autoimmune disease.² SARS CoV-1 data may be used for extrapolation. 3-5 SARS-CoV-1 has previously been related to follicular cell dysfunction, including the breakdown of the follicular epithelium, the exfoliation of epithelial cells into the follicle, and the expansion of fibrosis after the acute phase. Even if certain discrepancies continue, the harm caused by SARS CoV-2 is anticipated to be comparable to that caused by SARS CoV-1. Reduced deiodinase enzyme activity is associated with alterations in thyroid hormone binding, cellular absorption, and reduced T4-to-triiodothyronine (T3) conversion during acute

sickness. Peripheral tissues are also shown to have a higher activity of the endocrine hormone iodothyronine D3. 6 Patients with persistent hypothyroidism who are suspected, infected, or recently cured with COVID-19 may need to increase the prescription of levothyroxine and monitor thyroid hormone levels. Proposals for treating patients with hypothyroidism and hyperthyroidism have been issued by scientific societies³⁻⁴. Unless neutropenia (neutrophil count of $1.0 \times 10^9/L$) is evident, COVID-19 individuals with hyperthyroidism must take antithyroid medications (ATDs). ATDs need a check on the white cell count in patients with symptoms such as fever or those that point to neutropenia. ATDs should not be stopped because of lymphopenia⁵. Thyroid eye disease patients treated with immunosuppressive steroids or thyroid eye disease immunosuppressive medications are highly sensitive to the severe form of COVID-19. They must abide by the restrictions, but they must not halt their care. As regular thyrotoxicosis biochemical monitoring might be Consider the "block and replace regimen" advocated by the Society for Endocrinology⁶.

Radioiodine therapy for hyperthyroidism or thyroid cancer

must be postponed during the epidemic of COVID-19. There is no evidence to suggest that delaying therapy for thyroid cancer would affect the prognosis; high-risk patients should receive thyroid stimulating hormone that is well-restrained and clinically tolerated (TSH).

Monitoring of Parathyroid Diseases

Previous SARS-CoV S-mediated fusion seems to need calcium.⁹ Patients with parathyroid abnormalities should be closely monitored. Subjects with hypoparathyroidism, according to the endocrine societies, have no increased risk of contracting COVID-19⁷. In order to maintain stable calcium levels, which may be compromised by SARS-CoV-2, they recommend routine blood testing to monitor calcium levels. To prevent an emergency hypocalcaemia, it is recommended that calcium levels be kept slightly higher than normal. No evidence has been found that primary hyperparathyroidism increases the likelihood of infection with coronavirus. Calcium levels may be affected by the amounts of phosphate, magnesium, and vitamin D⁸.

Renal Damage Caused By Covid-19

Due to the renal damage caused by COVID-19 and the uncertain influence on parafollicular thyroid cells and calcitonin levels, calcium levels should be monitored in both acute and recovered COVID-19 patients. There should be a search for any recurrence of the clinical symptoms of hypocalcaemia and hypercalcaemia such as cramping, tingling and numbness, which may be caused by both conditions⁹.

Alertness of the Adrenals' Endocrine System

People who have had primary or secondary adrenal insufficiency or who are infected with the virus may have signs of severe adrenal insufficiency or an

adrenal crisis. Diarrhea, vomiting, stomach discomfort, and hypotension at rest are all symptoms of severe primary adrenal insufficiency. Hyponatraemia, hyperkalaemia, hypoglycemia, anaemia, eosinophilia, lymphocytosis, and alterations in blood count are among the laboratory findings. Treatment with intravenous hydrocortisone in the hospital Hydrocortisone 200 mg/24 hours and sufficient fluid resuscitation, along with 100-100 mg/m² for children, must be administered as an immediate 100-mg dosage¹⁰. Fludrocortisone will not be needed in this case since hydrocortisone dosages over 50 mg daily would have adequate effect on mineralocorticoid receptors. But it should be begun after the total daily hydrocortisone dosage falls below 50mg/24h. 12 Corticosteroid Deficiency in COVID-19 as a Result of Critical Illness As a result of the HPA axis being activated by acute stress during critical illness, more cortisol is secreted. Critical illness-related corticosteroid insufficiency (CIRCI) may arise with SARS-CoV-2 infection if this pathway is compromised in critically sick individuals. In koalas with relict adrenal glands, this affects the acute stress response, which is akin to the "Koala Stress Syndrome" that occurs¹¹. A longer stay in the intensive care unit and an increased risk of mortality are all linked to CIRCI. Hyperkalemia, hyponatraemia, normal anion gap metabolic acidosis and low blood glucose are common symptoms in patients with dementia. 13 The absence of a cortisol response to cosyntropin injection or measurement of a random plasma cortisol level below 10 ng/dl (275 nmol/l) are used to make the diagnosis.

Depending on the reaction, a course of IV hydrocortisone at a modest dosage (400 mg/day) is suggested¹². Current WHO recommendations urge against using corticosteroids when COVID-19 is detected because of prior SARS outbreaks in which steroid therapy resulted in severe consequences (released January 28, 2020). Corticosteroids were associated with an increased need for mechanical breathing, vasopressors, and renal replacement therapy. Medical Monitoring for Cushing's Syndrome

The diagnosis and surgical treatment of patients with Cushing syndrome (CS) may be delayed. Medically-managed patients should avoid medication interruptions. The prognosis for patients with CS and COVID-19 is unknown at this time, however there are many possible explanations for their poor prognosis.

Diabetes and hypertension are related with poor prognosis in COVID-19, regardless of age, resulting in an increased mortality risk. Moreover, Glucocorticoid excess has been shown to induce prothrombotic states that lead to a bad prognosis in individuals with cardiovascular disease. It also decreases the activity of natural killer cells and alters the function of white blood cells, resulting in a lower ratio of CD4 to CD8 lymphocytes and an increased vulnerability to infection¹³. As a result of this, patients with CS

should be given rigorous instructions on how to avoid infection. Patients with CS who have been infected with COVID-19 should have their blood pressure and glucose monitored on a regular basis.

Monitoring of Gonads' Endocrine Functions

Germ cell death, spermatozoa dysfunction, and testes infiltrated by mostly

lymphocytes and macrophages have been reported as symptoms of SARS-CoV-1.5 During the COVID-19 crisis, the Society of Endocrinology has released a guide on androgen replacement. 7 Men with androgen deficiency who are receiving testosterone replacement injections must, per their advice, continue the medication indefinitely. Intramuscular testosterone preparations may be temporarily replaced with an empirical dosage of a testosterone-based gel for those who are already using them. As soon as your next testosterone injection was due, you may begin using the testosterone gel. Once non-urgent services are restored, the intramuscular preparation may be resumed. Studying afflicted and healed men and women's gonadal functioning following the severe crisis would be intriguing. Preventive measures to prevent pituitary disease This comprises all clinical diseases that affect the pituitary gland's capacity to produce hormones, whether it be a partial or total failure of the gland's ability. In most cases, the goal of treatment is to replace the HPA axis target hormone. As a result of generating hypophysitis or influencing the hypothalamus directly, SARS-CoV-1 has been shown to produce central hypothyroidism or secondary adrenal insufficiency. 16 We cannot rule out the possibility that SARS-Cov-2 has an effect on the HPA axis.

COVID-19 sufferers have reported instances of anosmia and ageusia, both of which are connected to a primary cause that cannot be disregarded. To avoid hypo- or hypernatremia, fluid and electrolyte levels must be closely managed. The pathophysiology of COVID-19 may possibly be influenced by changes in the dopamine synthase pathways. 17 Replacement dosages of several deficient hormones are given to patients with pituitary dysfunction. Regularly treated patients with pituitary insufficiency need no further therapy. care paid to the details¹⁴.

Both primary and secondary hypothyroidism in COVID-19 infected individuals should be treated with levothyroxine at the same dosage or higher, depending on the clinical situation.

07 Like COVID-19, the development of a high temperature, exhaustion, cough, shortness of breath, nausea, and diarrhoea in individuals with secondary adrenal insufficiency necessitates increased hydrocortisone dosage (twice the normal amount). 7 If the patient's condition worsens, they should seek immediate emergency medical attention and be admitted. The treatment for patients with secondary adrenal insufficiency will be the same as for those with primary adrenal insufficiency.

Replacement of DDAVP for Electrolyte Imbalance

Individuals with cranial diabetes insipidus need therapy with desmopressin in a small percentage of patients (DDAVP). In the event of an altered state of consciousness, DDAVP may be administered intravenously or intramuscularly (IM or IV). 18 Owing to high temperature and tachypnoea, as well as gastrointestinal losses such as vomiting and diarrhoea, electrolyte imbalances may arise in the case of COVID-19. This is due to the inability to take appropriate fluids due to decreased awareness.

Hypokalemia in COVID-19-infected patients may be explained by the SARS-CoV-2

destruction of Angiotensin-converting enzyme 2 and the subsequent dysregulation of the renin-angiotensin system. The endocrine system may be affected by the novel SARS-CoV2 infection in a variety of ways, and the scientific evidence is now being analysed. It is essential to keep a close eye on both the underlying disorders as well as any new ones that may arise.

Conclusion

The endocrine system may be affected in a variety of ways by the novel SARS-CoV2 infection, and the scientific evidence is still being evaluated. It is essential to keep a close eye on both the underlying disorders as well as any new ones that may arise.

References

1. Nataf S. An alteration of the dopamine synthetic pathway is possibly involved in the pathophysiology of COVID-19. *J Med Virol* 2020;1-2. doi: 10.1002/jmv.25826
2. Aranda G, Lopez C, Fernandez-Ruiz R, Esteban Y, Garcia-Eguren G, Mora M, et al. Circulatory immune cells in Cushing syndrome: bystanders or active contributors to atherometabolic injury? A study of adhesion and activation of cell surface markers. *Int J Endocrinol* 2017;2017:2912763. doi: 10.1155/2017/2912763.
3. Guo Y, Korteweg C, McNutt MA, Gu J. Pathogenetic mechanisms of severe acute respiratory syndrome. *Virus Res* 2008;133:4-12. doi: 10.1016/j.virusres.2007.01.022.
4. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020;395:507-13.
5. Gu J, Gong E, Zhang B, Zheng J, Gao Z, Zhong Y, et al. Multiple organ infection and the pathogenesis of SARS. *J Exp Med* 2005;202:415-24. doi: 10.1084/jem.20050828.
6. Wei L, Sun S, Xu CH, Zhang J, Xu Y, Zhu H, Peh SC, Korteweg C, McNutt MA, Gu J. Pathology of the thyroid in severe acute respiratory syndrome. *Hum Pathol* 2007;38:95-102. doi:10.1016/j.humpath.2006.06.011
7. COVID-19 resources for managing endocrine conditions [Internet] Society for Endocrinology [cited 2020 Apr 10]. Available from: <https://www.endocrinology.org/clinical-practice/covid-19-resources-for-managing-endocrine-conditions>
8. Thyroid Cancer Forum UK, Society for Endocrinology, British Thyroid Association. Thyroid cancer and coronavirus (COVID-19) [Internet]. British Thyroid Foundation. [cited 2020 Apr 10]. Available from: <https://www.btf-thyroid.org/thyroid-cancer-and-coronavirus>
9. Lai AL, Millet JK, Daniel S, Freed JH, Whittaker GR. The SARS-CoV fusion peptide forms an extended bipartite fusion platform that perturbs membrane order in a calcium-dependent manner. *J Mol Biol* 2017;429:3875-92. doi: 10.1016/j.jmb.2017.10.017
10. Bornstein SR, Allolio B, Arlt W, Barthel A, Don-Wauchope A, Hammer GD, et al. Diagnosis and treatment of primary adrenal insufficiency: an Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab* 2016;101:364-

89. doi: 10.1210/jc.2015-1710.
11. Alexandraki KI, Grossman A. Management of hypopituitarism. *J Clin Med* 2019;8:2153. doi:10.3390/jcm8122153.
 12. Arlt W; Society for Endocrinology Clinical Committee. Society For Endocrinology Endocrine Emergency Guidance: emergency management of acute adrenal insufficiency (adrenal crisis) in adultpatients. *Endocr Connect* 2016;5:G1-G3. doi: 10.1530/EC-16-0054
 13. Marik PE, Levitov A. The "koala stress syndrome" and adrenal responsiveness in the critically ill. *Intensive Care Med* 2010;36:1805-6. doi: 10.1007/s00134-010-1974-6
 14. Annane D, Pastores SM, Rochweg B, Arlt W, Balk RA, Beishuizen A, et al. Guidelines for the diagnosis and management of critical illness-related corticosteroid insufficiency (CIRCI) in critically illpatients (Part I): Society of Critical Care Medicine (SCCM) and European Society of Intensive Care Medicine (ESICM) 2017. *Intensive Care Med* 2017;43:1751-63. doi: 10.1007/s00134-017- 4919-5.