



A Case Report of COVID-19 in Yemen: Detailed Clinical Observations

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Authors' contributions

This work was carried out in collaboration among all authors. Authors KMA and SMA wrote the first draft of the manuscript. Authors YA and LI managed the literature searches and reviewed the manuscript. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Coronavirus (COVID-19) is an infectious disease caused by a newly discovered coronavirus. We reported a 59-year-old Yemeni physician who was treated at home with complaints of COVID-19 symptoms. After receiving the treatment according to the COVID-19 guidelines established in Yemen, the patient made a slow recovery from 8 May 2020 to 28 May 2020. In conclusion, COVID-19 has a complicated clinical course and poor prognosis. Nevertheless, early aggressive treatment

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with an appropriate protocol could improve patient outcomes. However, in COVID-19, the thyroid gland plays a role in the immune system and medical professionals should consider assessing the thyroid gland in COVID-19 cases.

Keywords: Coronavirus; thyroid; gland; Yemen.

1. INTRODUCTION

The disease caused by the novel coronavirus was first identified in Wuhan, China at the end of November 2019 [1,2]. In Yemen, the first confirmed case relating to the COVID-19 pandemic was announced on 10 April 2020 with an occurrence in Hadhramaut. Organizations called the news a "devastating blow" and a "nightmare scenario" given the country's already dire humanitarian situation. Yemen is seen to be extremely vulnerable to the outbreak due to the Yemeni Civil War, exacerbated by the ongoing famine, cholera outbreaks, and military blockade by Saudi Arabia and its allies [3]. The number of cases gradually increased in May and June 2020, and became approximately 500 cases. The virus is transmitted through direct contact with respiratory droplets of an infected person (generated through coughing and sneezing), or touching surfaces contaminated with the virus. The virus may survive on surfaces for several hours, but a disinfectant can destroy it. The symptoms include fever, cough, inability to smell or taste anything, sneezing, runny nose, diarrhoea and sore throat. In more severe cases, the infection may cause breathing difficulties. These symptoms are similar to flu (influenza) or a common cold. Thus, testing is required to confirm whether someone has COVID-19 [1,2]. To date, there are no anti-viral drugs approved for the treatment of COVID-19. In this article, we

reviewed a coronavirus case of a physician who is residing in Yemen and review the role of the thyroid gland in the immune system with relation to COVID-19.

2. CASE PRESENTATION

AM, a 59-year-old physician, was infected by COVID-19 in the capital of Yemen, Sana'a. He developed mild symptoms of COVID-19 on 8 May 2020. Unfortunately, his symptoms deteriorated over time. There was no record on his vital signs. However, his oxygen saturation was 82%. His past medical history is unknown. He is married and lives with his family. He works as a physician in one of the public hospitals in Sana'a. He does not smoke nor drink alcohol. He was not allergic to any medications. The patient started his treatment at home under the supervision of another physician from 8 May 2020 to 28 May 2020. On 20 May 2020, the laboratory results showed an increase in CRP and serum creatinine and a decrease in WBC and lymphocyte. On 26 May 2020, the laboratory results slightly improved with a WBC of 5000/ μ L, lymphocyte of 15%, serum creatinine of 0.7mg/dL and CRP of 82 mg/L. His oxygen saturation remained at 82%.

His home medications are shown in Table 1. In addition to the medications, he took some herbal medicines, as shown in Table 2.

Table 1. Medications

No.	Drugs	Dose	Frequency
1	Hydroxychloroquine	200 mg	2 tablets BD then 1 tablet OD for 5 days
2	Azithromycin	500 mg	1 tablet OD for 7 days
3	Moxifloxacin	400 mg	1 tablet OD for 5 days
4	Vitamin C	1 g	1 tablet BD
5	Zinc	20 mg	1 tablet BD
6	Vitamin D3 IM	600,000 IU	OD
7	Vitamin A and E	200mcg	1 tablet OD
8	Paracetamol	500 mg	1 tablet TID
9	Hydrocortisone IV	100 mg	OD
10	Enoxaparin sodium IV	60 mg	OD
11	Oxygen		PRN

Table 2. Herbal medicines

No.	Description
1	1 teaspoon of black seed earring OD
2	2 mL of black seed oil BD
3	1 teaspoon of turmeric mixed with warm milk BD
4	1 tablespoon of ginger powder and honey mixed with 1200 mL of warm water, drink it through Out the day

3. DISCUSSION

AM patient infected with COVID-19 virus has symptoms appeared such as decreased oxygen consumption, coagulation change, low activity, infection, decrease heart rate, and decreased appetite. According to these symptoms, the doctor's decided to follow the protocol established in Yemen to treat the patient as COVID-19 infection. However, the matter is related to the immune system changed.

The question here is elsewhere in the human body that was unbalanced and led to a change in the immune system and the metabolic process in the body can be the answer yes. We are therefore looking for a role for the thyroid gland in the immune system and the metabolic process, do the thyroid gland has a role to play in affecting these symptoms. The question here arises as to who is more susceptible to complications of the COVID-19 virus, a person with hypothyroidism or hyperthyroidism.

However, a person with hypothyroidism has decreased thymic activity, causes spleen and lymph nodes involution and thus, represses both cell-mediated and humoral immune responses [4]. Back to the above case of AM patient, the cause of high CRP may be due to clotting of the high platelet production. Many physicians still ignore the existing relationship between thyroid hormones and the coagulation system.

Besides, a lack of oxygen consumption is observed in COVID-19 patients as a result of hypothyroidism or hyperthyroidism. The thyroid hormone of T3 and T4 affect Neutrophils, Natural Killer Cells, Monocytes-Macrophages, and Dendritic Cells and all those have closed relation with oxygen consumption if thyroid gland disorder happened [5]. For several factors, therefore, the medical staff should be considered as assessing the thyroid gland in COVID-19 cases.

Moreover, evidence supports the contribution of thyroid hormones to the modulation of immune

activities. Cytokine synthesis in monocytes, macrophages, leukocytes, natural killer cells and lymphocytes are altered under hypo-and hyperthyroid conditions [6]. A study reported by Paolo De *et al* 2011 indicated the inflammatory response exerted by macrophages was stimulated during the hypothyroid condition and inhibited in the course of hyperthyroidism [6]. Some studies reported and interestingly, supplementation of T4 to rats and mice in bacterial infectious models enhanced animal survival and attenuated septicemia and inflammatory response [7,8]. It has been proposed that thyroid hormones are involved in maintaining immune system homeostasis in response to environmental changes or stress-mediated immunosuppression [9].

Also, the presence of thyroid hormone (T3) has been reported in immune cells such as monocytes, granulocytes, natural killer cells, mast cells, and lymphocytes [10-13]. The level of thyroid hormone in these cells was decreased by treatment with thiamazole, an antithyroid drug, or increased in cells obtained from animals treated with thyrotropic hormone (TSH) [10].

Furthermore, it is announced globally that most of the infected by COVID-19 were among patients whose weight may be high or tend to be obese, and this may be due to the causes of the thyroid gland failure (hypothyroidism), in some patients whose weight is greater than normal. According to common perception, hypothyroidism is held responsible for obesity [14].

Besides, we note through statistics globally that the infections have been less susceptible to infection in the COVID-19 among the smokers and the reason is the presence of nicotine in tobacco since smoking is a risk factor for hyperthyroidism and health [15,16], but the primary role in nicotine and its effect in increasing the thyroid gland for the secretion hormone thyroid [15].

AM patient has used some medicinal herbs such as ginger, turmeric, honey, and black seed in

order to improve his health and may have a role in improving his medical condition. Herbs like ginger, turmeric, cinnamon, and cilantro are good, warming herbs that will help rev up the metabolism, which is important for people with low thyroid function [17].

AM patient may not have hypothyroidism, but at the time of infection with the virus, how was the condition of the gland. The secretions of the thyroid gland change in its secretions during the twenty-four hour, even during the examination of the hormone of the thyroid gland depends on the time of taking the sample [18].

However, the relationship between thyroid hormones and immunity is relatively large, and due to lack of evidence and research link between the thyroid gland disorder and the COVID-19, we make some suggestions on how COVID-19 patients should be treated. Based on the case discussed, we suggest the following treatment to speed the recovery.

- a. Essential drugs that can be taken when infected with COVID-19 are:
 1. Levothyroxine. Its role is to improve the immune system and metabolic process. This may suppress the activity of the virus.
 2. Dexamethasone. Its role is to relieve the infection caused by the virus.
 3. Benzathine penicillin. Its role is to inhibit any bacterial infection. Patients who are allergic to penicillin may take azithromycin. Giving antibiotics does not mean suppressing the virus, but it is rather suppressing any bacterial infection that may occur during the COVID-19.
- b. Non-essential drugs that can be taken to improve the immune system include vitamin D, in addition to fluids.

3.1 For Speed Recovery of the Mild Illness

1. Levothyroxine 50µg PO OD on day 1; 25µg PO OD on days 2 and 3.
2. Dexamethasone 0.5 mg PO OD for 3 days.
3. Benzathine penicillin 1.2 million units IM for one injection only.
4. If the patient is allergic to β-Lactam, replace with azithromycin 500 mg PO OD for 5 days.

3.2 For Speed Recovery of the Moderate Illness

1. Levothyroxine 50µg PO OD on day 1, 25µg PO OD on days 2–5.
2. Dexamethasone 0.5 mg PO OD for 3 days.
3. Benzathine penicillin 1.2 million units IM for one injection only.
4. If the patient is allergic to β-Lactam, replace with azithromycin 500 mg PO OD for 7 days.

3.3 For Speed Recovery of the Severe Illness

1. Levothyroxine 50µg PO OD for 5 days.
2. Dexamethasone 0.5 mg PO OD for 3 days.
3. Benzathine penicillin 1.2 million units IM to be injected in each buttock. This should be administered to adults who have detectable drug levels for ≥14 days.
4. If the patient is allergic to β-Lactam, replace with azithromycin 500 mg PO OD for 10–14 days.

Note: oxygen inhalation can be administered to the patient on days 1 and 2. The patient will recover after his/her metabolic process and immune system improve.

4. CONCLUSION

There is a relationship between COVID-19 and thyroid gland. Even though COVID-19 appears to have a complicated clinical course and poor prognosis, early aggressive treatment with an appropriate protocol could improve patient outcomes.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Paula Odriozola-González, Álvaro Planchuelo-Gómez, María Jesús Iruetia, Rodrigo de Luis-García. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, 2020; 290:1-9.
2. Shrikrushna Subhash Unhale, Quazi Bilal Ansar, Shubham Sanap, Suraj Thakre, Shreya Wadkar, Rohit Bairagi, Prof. Suraj Sagrula and Prof. Dr. K. R. Biyani. A Review on Corona Virus (COVID-19). *WJPLS2020*;6(4):109-115.
3. Shaker, Naseh (25 March 2020). "WHO warns Yemen of pending 'explosion' of COVID-19 cases". *Al-Monitor*. Archived from the original on 25 March 2020. Retrieved 26 March 2020. From Available:<https://www.al-monitor.com/pulse/originals/2020/03/yemen-women-face-masks-coronavirus-houthi-measures.html>.
4. Corina Lichiardopol, Maria Moța. The Thyroid and Autoimmunity. *Journal of Internal Medicine*. 2009;47(3):207–215.
5. María del Mar Montesinos and Claudia Gabriela Pellizas. Thyroid Hormone Action on Innate Immunity. *Frontiers in Endocrinology*. 2019;10:1-9.
6. Paolo De Vito, Sandra Incerpi, Jens Z. Pedersen, Paolo Luly, Faith B. Davis, and Paul J. Davis. Thyroid Hormones as Modulators of Immune Activities at the Cellular Level. *Thyroid: official journal of the American Thyroid Association*. 2011; 21(8):879-90.
7. Chen Y, Sjolinder M, Wang X, Altenbacher G, Hagner M, Berglund P, et al. Thyroid hormone enhances nitric oxide-mediated bacterial clearance and promotes survival after meningococcal infection. *Public Library of Science*. 2012;7:e41445.
8. Little JS. Effect of thyroid hormone on survival after bacterial infection. *Endocrinology*. 1985;117:1431–5.
9. Hodkinson CF, Simpson EE, Beattie JH, O'Connor JM, Campbell DJ, Strain JJ, Wallace JM. Preliminary evidence of immune function modulation by thyroid hormones in healthy man and woman aged 55–70 years. *Journal of Endocrinology*. 2009;202:55–63.
10. Haddad JJ, Saade' NE, Safieh-Garabedian B. Cytokines and neuro-immune-endocrine interactions: a role for the hypothalamic-pituitary adrenal revolving axis. *Journal of Neuroimmunology*. 2002;133:1–19.
11. M. A. Iddah and B. N. Macharia. Autoimmune Thyroid Disorders. *ISRN Endocrinol*; 2013.
12. John R. Klein. The Immune System as a Regulator of Thyroid Hormone Activity. *Experimental Biology and Medicine* 2006; 231(3): 229–236.
13. Anne H van der Spek, Eric Fliers and Anita Boelen. Thyroid hormone metabolism in innate immune cells. *Journal of Endocrinology* 2017; 232: R67–R81.
14. Debmalya Sanyal and Moutusi Raychaudhuri. Hypothyroidism and obesity: An intriguing link. *Indian Journal of Endocrinology and Metabolism*. 2016;20(4) 554–557.
15. L. Bartalena, E. Martino, C. Marcocci et al., "More on smoking habits and Graves' ophthalmopathy," *Journal of Endocrinological Investigation*. 1989;12 (10):733–737.
16. Yatan Pal Singh Balhara, Koushik Sinha Deb. Impact of tobacco on thyroid function. *Thyroid Research and Practice*. 2014;11 (1):6-16.
17. Christa Sinadinos, Clinical Herbalist. Herbal Therapeutic Treatments for Hypothyroidism.
18. Tina Kaczor, ND, Fabno. Thyroid-stimulating Hormone Fluctuates with Time of Day. *Natural Medicine Journal*. 2012; 4(12).

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