



ORIGINAL RESEARCH PAPER

General Medicine

THYROID DYSFUNCTION IN COVID-19 INFECTION-AN OBSERVATIONAL CROSS-SECTIONAL STUDY

KEY WORDS: COVID-19, cytokine storm, thyroid function test

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ABSTRACT

Background And Aim:Thyroid gland expresses ACE-2 receptors. It is thus a potential target for involvement by the COVID-19 virus. Also, the cytokine storm and various drugs used in the treatment for covid-19 can affect the thyroid function tests. We studied the proportion of patients with thyroid function abnormalities in hospitalized patients with COVID-19 infection. **Materials And Methods:** We conducted an observational, cross-sectional study of thyroid function tests in 271 hospitalized COVID-19 patients with varying severity before the initiation of treatment with steroids and anti-coagulation from November 2020 till June 2021. Serum fT4, fT3, TSH, anti-TPO and anti-thyroid antibodies were measured. **Results:** Of the 271 COVID -19 patients recruited in the study, 27 were asymptomatic whereas 158, 39 and 47 were in mild, moderate and severe category respectively (MOHFW criteria). The mean age was 49 ±17 years, 64.9% were male. Abnormal thyroid function test was present in 37.2% (101/271) patients. Low fT3, low fT4 and low TSH were present in 21.03%, 15.9% and 4.5%, respectively. Mean fT3 and fT3/fT4 ratio decreased with increasing severity of COVID-19 illness (p=0.000).

INTRODUCTION

A novel coronavirus known as severe acute respiratory syndrome coronavirus-2 (SARS-COV-2) is responsible for the coronavirus 19 (COVID-19) global pandemic that began in late 2019. COVID-19 infection can range from a very mild or asymptomatic presentation to critical illness and death. In some patients, infection with COVID-19 may cause a hypersensitive immune reaction and widespread inflammation known as a “cytokine storm”. Thyroid gland is the largest endocrine gland in the body which can get directly affected during systemic illnesses including viral infections. The state of sick euthyroid syndrome or low T3 syndrome describes thyroid dysfunction associated with systemic illnesses and is characterized by low T3 levels with normal TSH levels. This results from both central and peripherally mediated processes to decrease the catabolism in the body during an acute illness. It is an adaptive response of the body during acute illness, however, if prolonged becomes pathological. Recent studies have shown an association between low T3 and poorer recovery from acute illness. Subacute thyroiditis is a self-limiting acute inflammatory disease of the thyroid that is accompanied by symptoms such as neck pain, fever and other indicators of thyroid dysfunction. It is often triggered in viral infections During the SARS epidemic in 2002 sick euthyroid state and subacute thyroiditis both were documented. Coronavirus 2 (SARS-CoV-2) can invade the human tissue cells through the cell receptor of angiotensin-converting enzyme 2 (ACE2). Thyroid gland expresses ACE-2 receptors. It is thus a potential target for involvement by the COVID-19 virus. The severity of the disease can affect thyroid glands indirectly. The drugs used for treatment of Covid-19 also has it effect on thyroid function test. Apart from being the metabolic regulator of the body, thyroid gland dysfunction affects innate immunity and may contribute to the pathogenesis of COVID-19. The objectives of this study were to estimate the proportion of thyroid dysfunction in hospitalized patients with COVID-19 infection.

MATERIALS AND METHODS

It is a cross sectional observational study conducted in the department of medicine in a tertiary care centre in south India to assess the proportion of thyroid abnormalities in hospitalized patient with COVID 19 infection during the time of pandemic. After acquiring a clearance from the institutional ethics committee a study cohort of 271 cases of hospitalized covid 19 cases were examined in a period of 8 months from November 2020 to June 2021. Informed consent was obtained from the study population. A detailed history and examination

was conducted in all the patients. The demographic details of the patients were recorded at admission.

Adults with COVID-19 infection diagnosed on RT-PCR on a nasopharyngeal or oropharyngeal swab, and with symptoms of COVID-19 like fever, malaise, myalgia, shortness of breath, difficulty breathing, anosmia, diarrhoea or vomiting were enrolled. Any patient who were started with steroids and anticoagulation was one of the important exclusion criteria. Any patient with pre-existing thyroid disorder (irrespective of medication intake) was excluded.

The severity of COVID infection was assessed using the MOHFW (Ministry of Health and Family Welfare) criteria. A fasting blood sample was collected within first 24 hours of hospitalization. The serum was separated and processed the same day for serum-free thyroxine (fT4), free triiodothyronine (fT3), thyroid-stimulating hormone (TSH). Following thyroid function test samples were collected and sent for Anti-TPO and anti-thyroid antibodies.

Statistical Analysis.

The Analysis Was Done Using Statistical Software Spss Package Version 23. Chi-square Test Is Done To Find The Association Between Two Categorical Variable And Correlation Is Applied To Find The Inverse Relationship Between Two Variables. As Data Wasn't Normally Distributed Comparison Between The Variables Is Done Using Mann-whitney U Test.

RESULTS

Of the 271 COVID -19 patients recruited in the study, 27 were asymptomatic whereas 158, 39 and 47 were in mild, moderate and severe category respectively (MOHFW criteria). The mean age was 49 ±17 years, 64.9% were male, 35.1% were female. Abnormal thyroid function test was present in 37.2% (101/271) patients. Low fT3, low fT4 and low TSH were present in 21.03%, 15.9% and 4.5%, respectively.

Mean fT3 and fT3/fT4 ratio decreased with increasing severity of COVID-19 illness (p=0.000). (Table.1)

CONCLUSION

Abnormality of thyroid function tests are quite common in hospitalized patients with COVID-19. General physicians should be aware of these changes while interpreting thyroid function tests in these cases.

Table: Prevalence of thyroid function abnormality in each class of severity of COVID-19.

Parameter	Asymptomatic (n=27)	Mild (n=158)	Moderate (n=39)	Severe (n=47)	p-value
Ft3 (pg/ml) #	2.94 (0.42)	2.86 (0.44)	2.57 (0.36)	2.14 (0.26)	0.000
Ft4 (ng/dl) #	0.99 (0.17)	1.05 (0.20)	1.14 (0.21)	1.08 (0.26)	0.056
Ft3/Ft4 ratio#	3.08 (0.77)	2.81 (0.57)	2.31 (0.44)	2.09 (0.59)	0.016
TSH (IU/mL) #	2.36 (1.57)	3.04 (9.58)	2.27 (3.44)	2.69 (5.85)	0.098
Abnormal TFT*	11 (40.74)	36 (22.78)	14 (35.90)	40 (85.11)	0.000
Low Ft3*	2 (7.41)	9 (5.70)	8 (20.51)	38 (80.85)	0.000
Low Ft4*	8 (29.63)	22 (13.92)	4 (10.26)	9 (19.15)	0.107
Low TSH*	1 (3.70)	3 (1.91)	1 (2.63)	7 (14.89)	0.016
Autoimmune thyroid disease*	6 (22.22)	36 (22.78)	10 (27.03)	6 (12.77)	0.399

data presented as Mean (±SD) *data presented as frequency (%).

Table 1 Low Ft3 And Ft3/ft4 Ratio Correlate With Disease Severity And Thus Can Be Used As A Prognostic Marker In Covid-19 Illness. The Main Drawback Of The Study Was Lack Of Follow-up Of Patients Detected With Thyroid Abnormality.

REFERENCES

1. Lui DTW, Lee CH, Chow WS, Lee ACH, Tam AR, Fong CHY, et al. Thyroid Dysfunction in Relation to Immune Profile, Disease Status, and Outcome in 191 Patients with COVID-19. *The Journal of Clinical Endocrinology & Metabolism*. 2021;106:e926–35.
2. COVID 19 and Thyroid disease, *Clinical Thyroidology for the Public » October 2020» Vol 13 Issue 10 p.3-5.*
3. Sohaib Ashraf, MBBS, Muhammad Ahmad Imran, MBBS, Shoaib Ashraf, DVM, PhD, Hadiqa-tul Hafsa, MBBS, MPhil, Saffa Khalid, MS, Muhammad Kiwan Akram, BS, MPhil, Muhammad Ghufuran, MBBS, Kamran Khalid Cheema, MBBS, Ali Ahmad, DVM, PhD and Mateen Izhar, MBBS, PhD. COVID-19: A Potential Trigger for Thyroid Dysfunction. *The American Journal of the Medical Sciences*. Volume 362, Issue 3, September 2021, Pages 303-307.