ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 03 | March - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THYROID FUNCTION ABNORMALITIES IN COVID-19 PATIENTS.

Internal Medicine

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ABSTRACT

COVID-19 has a great physical and psychological impact on each group of society, including the deterioration in physical health, unapproachable health care facilities, psychological upset, stress, anxiety, depression, etc. The initiated immune response by COVID-19 leads to overt thyroid dysfunction by interfering the desiodases and thyroid transport proteins. The T3 level is inversely proportional to IL-6 with a modest decrease of TSH and T4. This cross - sectional, observational study was aimed to evaluate the thyroid profile abnormalities in patients with COVID-19 pneumonia and to find out its relation to the severity of disease. A total of 100 COVID-19 patients were involved in the study. A detailed history was collected. Thyroid function test, including TSH, TT3 and TT4, Procalcitonin and IL-6 were done for all the patients. The majority (36%) of the patients were in the age group of 48 to 57 years of age and male female ratio in COVID-19 group was 1.17:1. A significant correlation was found between thyroid alteration with severity of disease. It was concluded that among patients diagnosed with COVID-19 had significant thyroid alterations.

KEYWORDS

COVID-19, Thyroid function, Alterations and Severity,

INTRODUCTION

The prevailing global pandemic COVID-19 is being faced the unprecedented challenge in the world and it distorted every aspect of human life. COVID-19 results in million deaths across the globe and in late December 2019, it became a global public health emergency.[1]

It was observed that the longer duration of lockdown measures has physical and psychological impact on each group of society, include deterioration in physical health, unapproachable health care facilities, psychological upset, stress, anxiety, depression, etc.

The initiated immune response by COVID-19 leads to overt thyroid dysfunction by interfering the desiodases and thyroid transport proteins. The T3 level is inversely proportional to IL-6 with a modest decrease of TSH and T4.[2]

It was found that during the COVID-19 pneumonia, thyrotoxicosis was caused secondary to graves thyroiditis or subacute inflammatory thyroiditis.[3]

There are the evidences of association of SARS-CoV-1 and now SARS-CoV-2 with abnormal thyroid function, the finding stated that lower serum TSH and total T3 levels were found among patients admitted with COVID-19.

COVID-19 usually affect the lower respiratory tract, but various studies has stated that it also affect throughout the body including endocrine system due to damage to the glands by invasion of virus. It is found that patients with healthy thyroid had some thyroid dysfunctions after COVID-19 exposure.[4]

The infection is spreaded by binding of the viral spike protein to angiotensin-converting enzyme 2 (ACE2) receptors and activated the viral spike protein. ACE2 combined with transmembrane protease serine 2 (TMPRESS2) to infect the cell and there is higher levels of ACE2 and TMPRSS2 expression in the thyroid gland which leads to thyroid abnormalities by altering the T3 , T4 and TSH among COVID-19 patients.[5]

T3 is an important pro-inflammatory regulator in immune response during infections which interfere with furin expression in the lungs.[6]

The exposure of COVID-19 results in severe damage to the parafollicular cells and follicular epithelial cells, and destruction of epithelial cells, which leads to follicular cell dysfunction.[7]

Thus, the present study was undertaken to evaluate the thyroid function abnormalities among COVID-19 patients.

AIMS AND OBJECTIVES

To evaluate thyroid profile abnormalities in patients with COVID-19 pneumonia and its relation to the severity of disease.

MATERIAL AND METHODS

This cross sectional, observational study was conducted in ---------- over the period of four month (May 2021 to August 2021) after obtaining ethical permission from the organization.

A total of 100 patients included in the study after taking informed consent from them.

Inclusion Criteria

- 18 years of age patients.
- Patients admitted with COVID-19 pneumonia.

Exclusion Criteria

- Pregnant females.
- Patients with underlying thyroid abnormalities.

A detailed history was collected. All the patients were categorized into mild, moderate, severe and critical on the basis of clinical manifestations. Thyroid function test, including TSH, TT3 and TT4, Procalcitonin and IL-6 were done for all. All the findings were compared between two groups.

Data was collected with the help of a record sheet which contains the test values of and other details of all the patients. Data was tabulated, organized, analyzed and interpreted in both descriptive and inferential statistics i.e. frequency and percentage distribution, by using statistical package for social science software (SPSS), version 22.0.Chi -square test was used to check the relationship between thyroid profile abnormalities and severity of COVID-19.

OBSERVATIONS AND RESULTS

A total of 100 patients were involved in the study.

Table 1. Age Distribution

Age range	Number	(%)
18-27	7	7
28-37	16	16
38-47	24	24
48-57	36	36
58-67	9	9
>67	8	8

Table 1 showed that the majority (36%) of the patients were in the age group of 48 to 57 years of age.

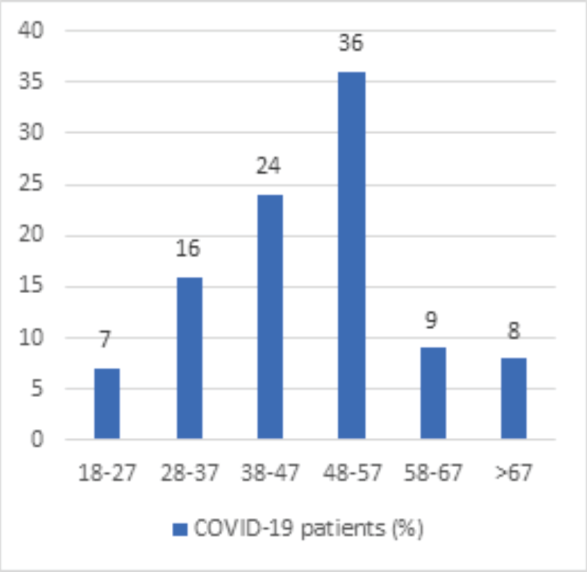

Figure 1. Age Distribution

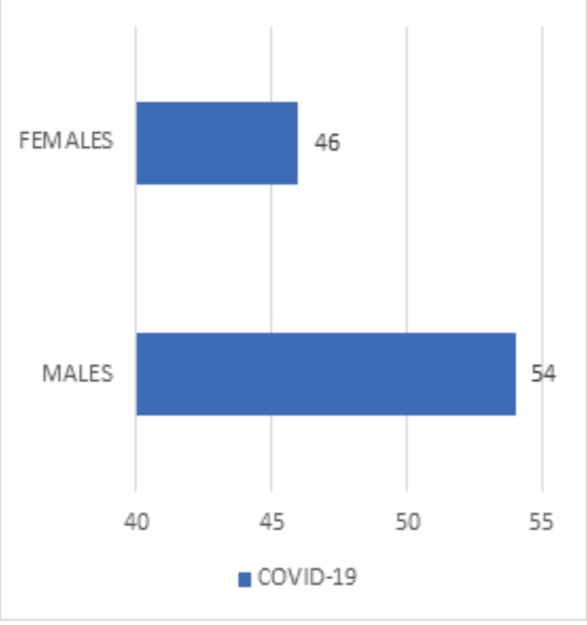

Figure 2. Gender Distribution

Figure 2 depicted the gender distribution. The male female ratio in COVID-19 group was 1.17:1.

Table 2: Thyroid Profile

Parameters	Mean ±SD
TSH (mIU/l)	0.52±0.13
TT4 (mcg/dl)	7.24±0.9
TT3 (ng/dl)	98.67±19.24

Table 2, showing the thyroid profile of patients. The mean TSH level was 0.52±0.13mIU/l, mean TT4 level was 7.24±0.9ng/dl and mean TT3 level was 98.67±19.24 mcg/dl.

Table 3: Severity of COVID-19

Severity of disease	Number	%
Mild	29	29
Moderate	64	64
Severe	5	5
Critical	2	2

It was found that the majority (64%) of the COVID-19 patients had moderate stage of disease, followed by mild (29%), severe (5%) and critical (2%) as shown in table 3.

Table 4: Comparison Of Thyroid Findings With Severity Of Covid-19

Parameters	Mild (29)	Moderate (64)	Severe (5)	Critical (2)	P
TSH (mIU/l)	0.92± 0.93	1.52± 0.01	0.91± 0.3	0.62± 0.84	0.03*
Tt4 (mcg/dl)	5.24± 0.9	7.2± 0.2	6.9± 0.99	5.65± 0.32	0.015 *
Tt3 (ng/dl)	93.67± 21.29	89.5 2±18.13	98.27± 23.04	89.43± 19.31	0.04*

Table 4, showed the comparison of thyroid findings with severity of COVID-19. It was observed that observed that there was significant relationship between thyroid alteration with severity of disease (P<0.05).

Table 5: IL-6 level and Procalcitonin

Parameters	Mean ±SD
IL-6 level (pg/ml)	72.28±41.93
Procalcitonin (ng/ml)	0.35 ± 0.05

Table 5, represent the mean value of procalcitonin and IL-6 level. The mean IL-6 level was 72.28±41.93pg/ml and mean procalcitonin level was 0.35 ± 0.05 ng/ml.

Discussion

The data was analysed and discussed with previous literature.

The majority (36%) of the patients were in the age group of 48 to 57 years of age and male female ratio in COVID-19 group was 1.17:1. The present study is correlated with the study conducted by Wang W et al., (2020) found that the mean age of the study participants was 57.3 ± 14.5 years and majority (63%) of the study was males. Similarly, Malik Jet al., (2021) observed that the mean age of the patients was 51 ± 19.30 years and 64.6% were males followed by 35.4% females.[8,9]

The mean TSH level was 0.52±0.13mIU/l, mean TT3 level was 1.24±0.9 ng/dl and mean TT4 level was 98.67±19.24 mcg/dl. The majority (64%) of the COVID-19 patients had moderate stage of disease, followed by mild (29%), severe (5%) and critical (2%). The mean IL-6 level was 72.28±41.93pg/ml and mean procalcitonin level was 0.35 ± 0.05 ng/ml.The present study further observed that there was significant correlation between thyroid alteration with severity of disease (P<0.05).Similarly, Malik et al., (2021) reported the mean IL6 level was 76.10±82.35, mean procalcitonin level was 0.36 ± 0.52 ng/ml, mean TSH was 1.48±2.47mIU/l, mean TT3 level was 74.62±33.71 ng/dl and mean TT4 level was 6.67±2.74 mcg/dl. In another study conducted by Wang W et al., mean TSH was 0.62±0.62 mIU/l, mean TT3 level was 1.02±0.32 nmol/l and mean TT4 level was 99.04±25.96 nmol/l and there was a significant association between thyroid abnormalities and COVID-19 (P<0.001).[8,9]

Various studies in the literature suggested that thyroid function among severe acute respiratory syndrome (SARS) patients were significantly altered (Decreased T3 and T4) and affected more than 8,000 patients in Asia region during 2002-2003 (WHO). Similarly, COVID-19 may also influence the function of thyroid. A study conducted by Brancatella A, et al. (2020) reported the subacute thyroiditis after SARS-COVID-2 infection.[9,10]

CONCLUSION

The present study concluded that among patients diagnosed with COVID-19 had significant thyroid alterations.

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