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Original Research Article

THYROID DYSFUNCTION AND MORTALITY IN CRITICALLY ILL PATIENTS IN A TERTIARY CARE HOSPITAL IN JAIPUR, RAJASTHAN INDIA

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ABSTRACT

Background: Person without any history of thyroid illness may have multiple changes in their thyroid hormone levels during critical illness, These changes are termed as euthyroid sick syndrome (ESS). This change correlates with the severity of the illness and its outcomes in critically ill patients. **Aims:** To find out the thyroid profile in critically ill patients and its association of thyroid illness in with ICU mortality. **Material methods:** A total of 100 critically ill patients from ICU were selected as cases and estimation of Thyroid profile done. Study conducted in department of medicine Mahatma Gandhi hospital Jaipur, Rajasthan. Estimation done with Chemiluminescence. **Results:** Out of 100 patients 37 patients expired. Mean FT3,FT4,TSH levels in survivors was 3.08 ± 0.75 pg/ml, 1.22 ± 0.47 ng/dl and 2.54 ± 1.06 µIU/ml respectively and in non survivors group it was 1.95 ± 0.85 pg/ml, 0.92 ± 0.37 ng/dl and 1.38 ± 0.79 µIU/ml respectively. T3, T4, TSH significantly (p value <0.001) low in critically ill patients. **Conclusion:** Euthyroid Sick Syndrome and mortality in ICU patients had significant association.

Keywords: Euthyroid Sick Syndrome, Triiodothyronine , Thyroid stimulating hormone

INTRODUCTION

Thyroid hormones modulates metabolism and the immune system by different mechanisms and maintain body growth. Alteration in circulating hormone levels are a common phenomenon in critical illness**(1)**, These alterations are correlated with the severity and the outcomes of disease in ICUs.**(2,3)** In the 20th century, scientist found that dysfunction of thyroid is associated with the mortality of ICU patients.**(4-6)** These hormonal changes in thyroid levels called as "euthyroid sick syndrome"**(7,8)** or "nonthyroidal illness syndrome" (NTIS)**(9,10)**, This syndrome is characterized by decrease levels of free and total triiodothyronine (T3) and normal or low levels of T4 (thyroxine) and TSH (thyroid-stimulating hormone). However, It is unclear whether thyroid hormone can predict ICU mortality. So we conduct a study in medical ICU patients in Mahatma Gandhi Medical College and Hospital Sitapura, Jaipur to detect if there is any correlation of extent of thyroid dysfunction in ICU mortality on the basis of the thyroid hormone levels (FT3, FT4, TSH).

MATERIAL METHODS

This study was conducted in the Department of Medicine Mahatma Gandhi medical college hospital, Jaipur. This study was hospital based cross sectional study from the period of Jan. 2017 to Jan.2018.Total

100 critically ill patients were included in this study. These patients were in ICU. All 100 patients assessed for thyroid profile. All patients > 18 years admitted in ICU irrespective of underlying diagnosis were included in this study while<18 years patients, known history of thyroid illness, patient on any drug which may alter thyroid function and stable patients who were kept in ICU for observation were excluded from the study.

RESULTS

Table 1: Distribution of patients on the basis of disease

Disorder	No. of cases (n)/%	Disorder	No. of cases (n)
Diabetic Ketoacidosis	10	COPD	14
Dengue/ Haemorrhage	15	Post streptococcal glomerulonephritis	4
Scrub typhus	10	Cerebral Malaria	7
Intracranial haemorrhage	5	OP poisoning	7
Meningitis	10	G B syndrome	4
Mitral Stenosis	6	Ischemic stroke	8

In this study out of 100 patients we found maximum 15 cases of dengue/DHF, 14 cases of COPD, 10 cases of diabetic ketoacidosis, 10 cases of scrub typhus, 10 cases of meningitis, 8 cases of ischemic stroke,7 cases of cerebral malaria, 7 cases of organophosphorus poisoning,6 cases of mitral stenosis, 5 cases of intracranial haemorrhage, 4 cases Post streptococcal glomerulonephritis, 4 cases of guillainbarre syndrome.

Table 2: Patient distribution and age distribution of study

Groups	No. of cases (n)	Age (years)	p-value
Survivors	63	48.65± 7.63	
Non-survivors	37	51.11± 8.71	NS

*P-value as obtained on applying t-Test

Out of 100 patients 37 patients expired while 63 patients recovered. Mean age in survivorswas48.65± 7.63 years and in non survivors group was 51.11± 8.71 years. This difference was statisticallynon significant.

Table 3: Comparison of FT3, FT4, S.TSH levels in the study groups

Variables	Survivors	No survivors	P value
No. of cases	63	37	
FT3	3.08±0.75	1.95±0.85	<0.001
FT4	1.22±0.47	0.92±0.37	<0.001
TSH	2.54±1.06	1.38±0.79	<0.001

Mean FT3 levels in survivorswas3.08± 0.75 pg/mland in non survivors group was 1.95± 0.85 pg/ml. This difference was statistically significant (p value <0.001). Mean FT4 levels in survivorswas1.22± 0.47 ng/dland in non survivors group was 0.92± 0.37 ng/dl. This difference was statistically significant (p value <0.001). Mean TSH levels in survivorswas2.54± 1.06 µIU/mland in non survivors group was 1.38± 0.79µIU/ml. This difference was statistically significant (p-value <0.001).

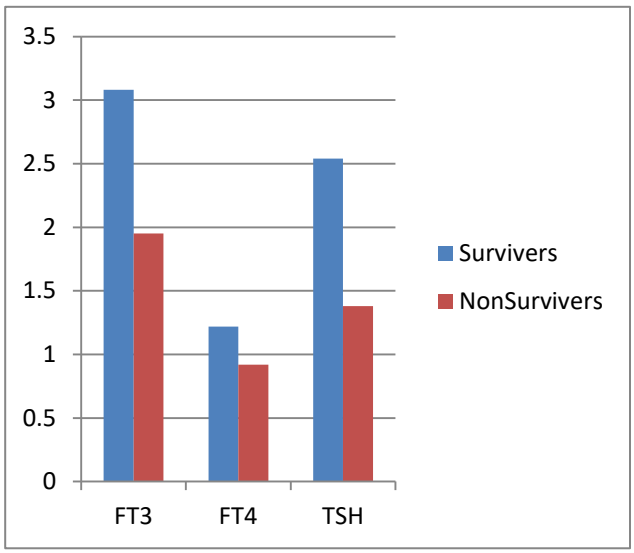

Table 3: Comparison of FT3, FT4, S.TSH levels in the study groups

DISCUSSION

Total 100 patients were included in this study. In this study we include 10 cases of diabetic ketoacidosis, 15 cases of dengue/DHF, 10 cases of scrub typhus, 5 cases of intracranial haemorrhage, 10 cases of meningitis, 6 cases of mitral stenosis, 14 cases of COPD, 4 cases of Post streptococcal glomerulonephritis, 7 cases of cerebral malaria, 7 cases of organophosphorus poisoning, 4 cases of guillainbarre syndrome, 8 cases of ischemic stroke. Out of 100 patients 37 died due to critical illness while 63 patients survived. Mean age in survivors was 48.65 ± 7.63 years and in non survivors was 51.11 ± 8.71years. This difference was statistically non-significant. So it shows Survivors and non survivors were comparable and age matched.

In this study we found lower levels of FT3 in non survivors1.95 ± 0.85 pg/ml in comparison to survivors3.08 ± 0.75 pg/ml this difference was statistically significant (p value<0.001). These results correlates with study conducted by Feilong Wang et al**(11)** in 2012 which showed statistically significant difference (p value <.0001) between survivors and non survivors. Another study conducted by A. Pal et al**(12)** in 2017 found low mean value of FT3 in Non survivors 1.56 ± 0.77pg/ml than survivors 2.31 ± 0.65pg/mlthis difference was statistically significant (p <0.001). Another similar study conducted by Mohamed Hosny et al**(13)** in 2015 found low mean FT3 1.9 ± 0.89pg/ml in Non survivors than survivors 2.9 ± 1.03 pg/ml this difference was statistically significant (p <0.001).

In our study we found lower levels of FT4 levels in non survivors0.92 ± 0.37 ng/dl in comparison to survivors 1.22 ± 0.47 ng/dl this difference was statistically significant (p value<0.001) Results of our study correlates with study conducted by Feilong Wang et al **(11)** in 2012 which showed statistically significant difference (p value <.0008) in level of TT4 between survivors and non survivors. Another similar study is conducted by Priyadarsini Bose et al**(14)** in 2017 found statistically significant difference between T T4 levels of survivors and non survivors (p value <0.001)

In this study we found lower levels of TSH levels in non survivors1.38 ± 0.79 µIU/ml in comparison to survivors2.54 ± 1.06 µIU/ml this difference was statistically significant (p value<0.001) Results of our study correlates with study conducted by Feilong Wang et al**(11)** in 2012 which showed statistically significant difference (p-value=0.0022) between survivors and non survivors. A similar study is conducted by Priyadarsini Bose et al **(14)** in 2017 found statistically significant difference between TSH levels of survivors and non survivors (p value <0.001) A contrast Study conducted by Jyoti Chandrashekar Suvarna et al**(15)** in 2009 found mean TSH (4.1 ± 2.9) in Non survivors and (2.7 ± 4.7) in survivors this difference was statistically non-significant (p =.0359).

Possible explanation of theses significant decrease may be (a) abnormal TRH and TSH secretion; (b) defective deiodinase activity; (c) thyroid hormone binding protein (thyroglobulin, albumin and transthyretin) and transporter (e.g. MCT8) defects; and (d) altered nuclear thyroid hormone receptor activity. Although the exact mechanisms causing these changes are unknown, cytokines such as IL-1, IL-6, and TNF-α may be responsible in some types of NTIS **(16)**.

Another proposed mechanism is that in nonthyroidal illness syndrome changes in thyroid hormonal levels in acute and chronic illness may be caused by the inhibition of enzyme 5-deiodinase by various mechanisms which catalyze T4 to T3 conversion**(17,18)**. In acute illness, changes usually seen are low T3 with increased T4 and rT3. Whereas in chronic phase of illness, low levels of T3, T4, and TSH are seen. **(19,20)** To date, it is not clear whether these changes are normal adaptive response to stress or pathological requiring treatment.

CONCLUSION

To conclude, the present study gives us an idea that the derangement in level of Serum FT3, FT4, TSH may affect the survival of patient of critical illness and it is needed to be studied further. Considering all that we can say Thyroid profile can be used in predicting the morality in ICU patients. Serial

monitoring of thyroid profile will increase the sensitivity in predicting the outcome.

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