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# COMPARISON OF THYROID PROFILE IN CRITICALLY ILL PATIENTS DURING ILLNESS AND POST RECOVERY: A HOSPITAL BASED CROSS SECTIONAL STUDY

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**ABSTRACT**

**Background:** Non thyroidal illness (NTI), arises through diverse alterations in the hypothalamus pituitary- thyroid axis often observed in critically ill patients,. However, the causal relationship between underlying disease and NTI diversity in critically ill patients is poorly understood. **Aims:** To find out the association of thyroid profile in critically ill patients and to compare thyroid profile at the time of critical illness v/s recovery after critical illness. **Material methods:** 100 critically ill patients from ICU of department of medicine Mahatma Gandhi hospital Jaipur were selected as cases and comparison of Thyroid profile during illness and post recovery done. **Results:** Out of 100 cases 63 survived and recovered. In these patients serum TSH levels in survivors during illness was 2.54 + 1.06 µIU/ml and after recovery of these patients it was 2.82 ± 1.07 µIU/ml. This difference was statistically significant (p value <0.001).while mean serum FT3, FT4 levels in survivors during illness and post recovery was statistically non-significant.

**Keywords:** FT3,FT4,TSH, Non thyroidal illness syndrome

## INTRODUCTION

Critical illness can be defined as any life threatening condition requiring the support of failing vital organ functions **(1)**. Critically ill patients in the intensive care unit (ICU) may exhibit profound inflammation, overwhelming fluid overload with renal failure **(5)** and, ultimately, significant malnutrition with sarcopenia **(2)**. There is substantial improvements in the care of critically ill patients over the past many years **(3,4)**, Despite this best possible management of endocrinologic problems in the ICU continues to annoy clinicians. Feedback loop is the mechanism of controlling HPT axis. Hypothalamus releases Thyrotropin-releasing hormone (TRH), which stimulates the secretion thyroid-stimulating hormone (TSH) from anterior pituitary and TSH stimulates the thyroid gland for release of thyroid hormones. The prohormonethyroxine so HPT axis is a setpoint, for those who aim at to determine serum concentrations of thyroid hormones **(6)**. However, many studies **(7)** have shown that these serum concentrations of thyroid hormone can be variable in response to environmental factors like what nutrition person takes and whether there is any inflammatory stimulation present.

In patients with normal thyroid function, profound changes in thyroid hormone metabolism may be occure due to critical illness. These changes have been named "euthyroid sick syndrome"**(8-10)** or "non-thyroidal illness syndrome (NTIS)"**(11)**

## MATERIAL METHODS

Total 100 critically ill patients taken as cases from ICU department of Medicine Mahatma Gandhi Medical College Hospital, Jaipur. This study conducted from period of Jan 2017 to Jan 2018 and

this was hospital based cross sectional study. More than 18 years of age Patients admitted in ICU irrespective of underlying diagnosis were included in this study while patients less than 18 years of age, 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 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 Post streptococcal glomerulonephritis, 7 cases of cerebral malaria, 7 cases of organophosphorus poisoning, 4 cases of guillainbarre syndrome, 8 cases of ischemic stroke were included.

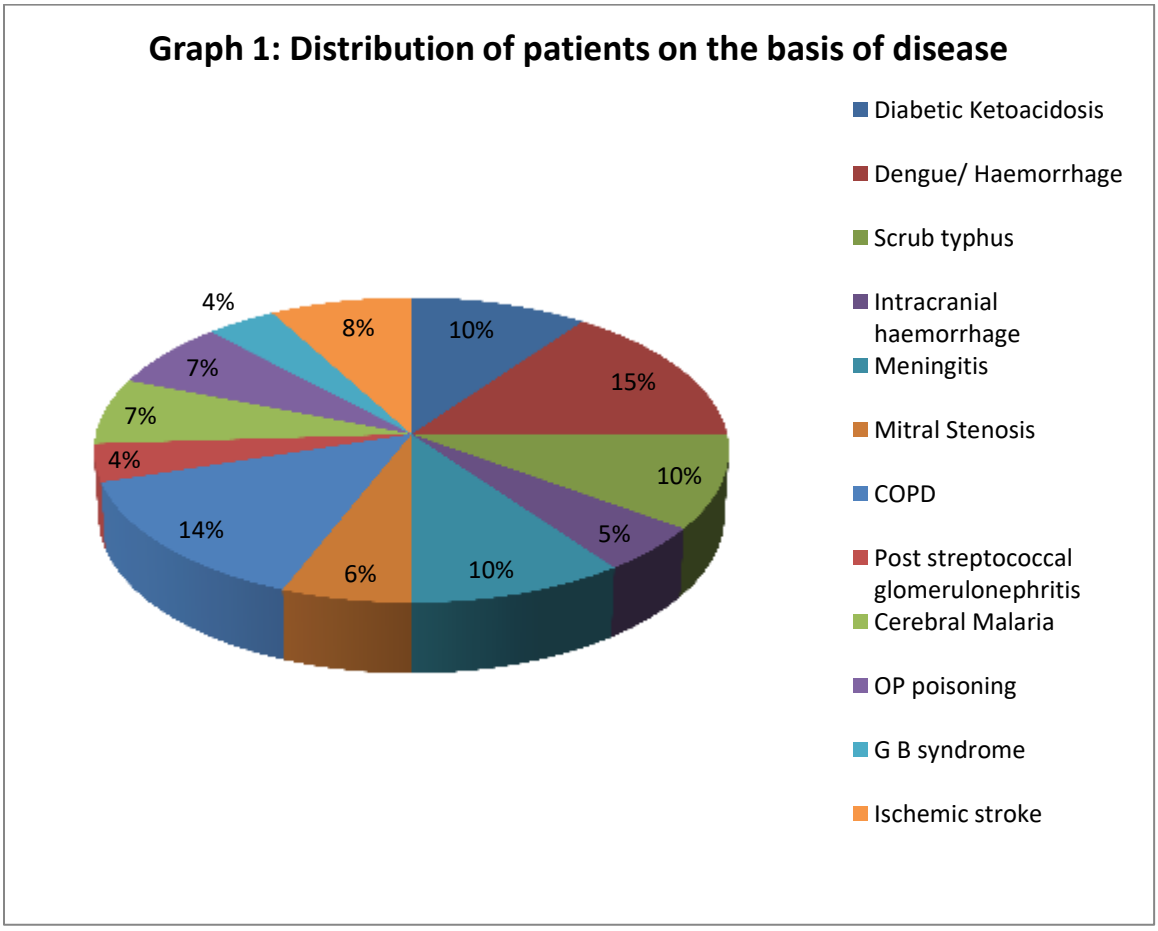


**Table 2: Distribution of patients on the basis of disease**

| Groups | Survivors | Non survivors | Total |
|---|---|---|---|
| **No. of cases (n)** | 63 | 37 | 100 |

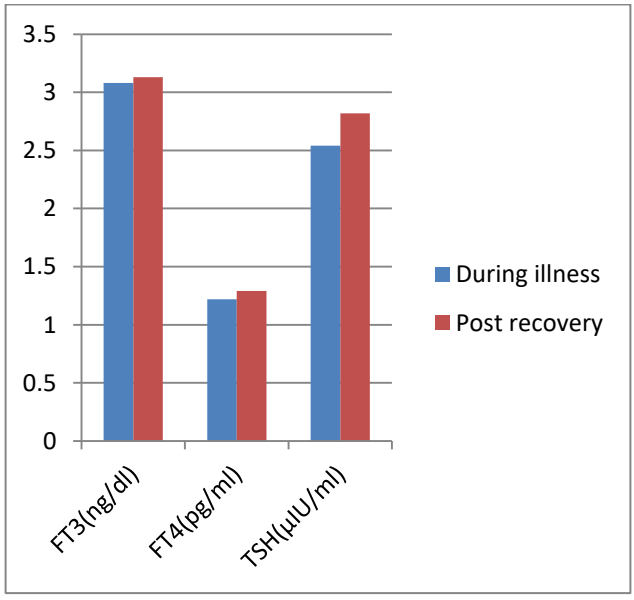
Total 100 cases were included in this study and in these cases 63 survived and 37 expired.

**Table 3: Comparison of S. FT3,FT4&TSH levels in the survivor group**

| Variables | During Illness | Post Recovery | P value |
|---|---|---|---|
| **FT3 (ng/dL)** | 3.08±0.75 | 3.13±0.83 | NS |
| **FT4 (pg/ml)** | 1.22±0.47 | 1.29±0.54 | NS |
| **TSH (µIU/ml)** | 2.54±1.06 | 2.82±1.07 | <0.001 |

In our study mean Serum FT3,FT4 levels in survivors during illness was3.08 + 0.75 pg/mL and 1.22 + 0.47 ng/dL respectively while post recovery of these patients it was 3.13± 0.83 pg/mL and 1.29± 0.54 ng/dL. This difference was statistically non-significant.

In this study mean Serum TSH levels in survivors during illness was2.54 + 1.06 µIU/ml and after recovery of these patients it was 2.82± 1.07 µIU/ml. This difference was statistically significant (p value <0.001).




**Graph 2: Comparison of S. FT3,FT4&TSH levels in the survivor group**

## DISCUSSION

In this study total 100 patients included. We included 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 cases 37 died due to critical illness while 63 patients survived and recovered. Mean age of survivors was 48.65 ± 7.63 years and in non survivors group was 51.11 ± 8.71 years.

In this study we found that mean Serum FT3 levels in survivors during illness was 3.08 + 0.75 pg/mL and after recovery of these patients was 3.13 ± 0.83 pg/mL. It shows that after recovery FT3 levels increases but this increase levels were statistically non-significant. Contrast results were found in study conducted by GARY P. ZALOGA et al(13) in 1984 which shows that after 4 week of cardiac surgery TT3 levels increases 124.6 ± 6.1ng/dl in comparison to 1 day after post-surgery (51.1 ± 4.1 ng/dl) and this difference was statistically significant(p value< 0.005). Another study conducted by Jyoti Chandra shekar Suvarna et al**(12)** in 2009 found significant improvement in TT3 levels after recovery in comparison to critically ill patients(p value <<0.001).

In this study we found that that mean Serum FT4 levels in survivors during illness was 1.22 + 0.47 ng/dL and after recovery of these patients was 1.29 ± 0.54 ng/dL. It shows that after recovery FT4 levels increases but this increase levels were statistically non-significant. Contrast results were found in study conducted by GARY P. ZALOGA et al(13) in 1984 which shows that after 4 week of cardiac surgery TT4 levels increases (6.43 ± 0.6µg/dl) in comparison to 1 day after post-surgery (6.82 ± 0.5 µg/dl) and this difference was statistically significant(p value< 0.005). A study conducted by Jyoti Chandra shekar Suvarna et al**(12)** in 2009 found significant improvement in TT3 levels after recovery in comparison to critically ill patients(p value <<0.007).

In this study we found that mean Serum TSH levels in survivors during illness was 2.54 + 1.06 µIU/ml and after recovery of these patients was 2.82 ± 1.07 µIU/ml. It shows that after recovery TSH levels increases and may come to normal levels and this

increment was statistically significant (p value <0.001). Our results correlates with study conducted by GARY P. ZALOGA et al(13) in 1984 which shows that after 4 week of cardiac surgery TSH levels increases 2.1 ± 0.3µIU/ml in comparison to 1 day after post-surgery (1.6 ± 0.53µIU/ml) and this difference was statistically significant(p value< 0.005). Another study conducted by Jyoti Chandra shekar Suvarna et al**(12)** in 2009 found significant improvement in TSH levels after recovery in comparison to critically ill patients(p value <0.009).

In this study we took the second sample in survivors when they recovered from illness and this time of taking sample was in between 4 to 6 weeks and again this recovery time is not affected by protein levels because we estimate FT3, FT4, TSH levels. We found when patients recover from the disease levels of TSH reaches to normal while it does not occur with FT4 and FT3. It shows as lowering of TSH is bad prognostic marker in critical illness it recovers first when patients get recover from the disease.

The biochemical changes started to happen in first 24 hours of illness in Non-Thyroid Illness Syndrome **(14)**. The most common abnormality is a low levels of free T3 and increase levels of metabolically inactive residue of reverse T3. Patients are often significantly ill with a poor prognosis when fT4 also becomes reduced. According to Warner MHet al**(14)** (2010) in 50% patients TSH may low or within the reference range. However, during recovery in most of the cases TSH is elevated.

## 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. So Thyroid profile can be used as an independent factor in predicting the outcome of the patients.

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