| JUHL FOR RESEARCE | Original Research Paper | Medicine |
|-----------------------------|---|----------|
| Ar mono | Correlation Between Thyroid Profile and Liver Fur Tests in Liver Disease | nction |
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| | KEYWORDS : | |

INTRODUCTION:

In most chronic illness, defects arise in thyroid hormone metabolism, resulting in the sick euthyroid syndrome. This is characterized by a normal total T4, normal/high free T4, low total T3, low free T3 and an elevated rT3. In the different types of liver disease, similar processes may occur to those seen in the sick euthyroid syndrome, but in addition a number of changes specific to the type or stage of liver disease is also found. Overall, the majority of patients with liver disease are clinically euthyroid, and this can be confirmed with a normal high sensitivity TSH test and a normal free T4. The latter test is routinely performed and obviates the need to take into account the variation in thyroid-binding globulin levels seen in patients with liver disease

SAMPLE SIZE: 60 cases and 30 controls have been taken for the study.

INCLUSION CRITERIA:

1. Patients admitted in medical wards in ASRAM Hospital with diagnosis of acute or chronic liver disease from January 2015 to June 2016 were selected for the study. The first 50 patients admitted during the period with diagnosis of chronic liver disease were studied under the chronic liver disease category. Similarly the first 10 patients with the diagnosis of acute liver disease were studied.

2. Age greater than 18 years.

EXCLUSION CRITERIA: 1.Age less than 18 years. 2.Patients refusing to undergo the study.

RESULTS:

COMPARISION OF THYROID FUNCTION VARIABLES

The comparison between the thyroid function tests of the three groups was carried out using ANOVA test. Among the thyroid function tests TSH and FT4 failed to show any statistically significant difference among them (p value of 0.67 and 0.35 respectively). The most statistically significant difference was in the comparison of TT4 and FT3 (p value -0.0001). The p value for the comparison of TT3 among the three groups was 0.033.

| Thyroid | TSH ¹ | TT4 ² | TT3 ³ | FT4⁴ | FT3⁵ |
|----------|------------------|------------------|------------------|----------|----------|
| variable | Mean-std | Mean-std | Mean-std | Mean-std | Mean-std |
| | dev | dev | dev | dev | dev |
| CLD | 2.3788- | 6.5778 - | 102.64- | 1.1632- | 1.8728- |
| | 4.01 | 1.77 | 38.0 | 0.362 | 0.650 |
| ALD | 1.7330 - | 9.9930- | 108.70 | 1.2720 - | 2.3090- |
| | 1.04 | 2.52 | 35.8 | 0.279 | 0.644 |
| CONTROL | 2.7440- | 7.4693 - | 124.17- | 1.2630- | 2.8850 - |
| | 1.56 | 1.46 | 29.0 | 0.292 | 0.582 |

P value- 0.67 P value- .0001 P value- 0.033 P value- 0.35 P value- .0001

RESULTS:

THE COMPARISION OF LIVER FUNCTION ABNORMALI-TIES

There was no significant difference between the acute and the chronic disease groups in case of total or direct bilirubin. Among the enzymes both AST and ALT differed significantly between the two groups. Serum alkaline phosphatase did not vary significantly between the two groups. Markers of hepatic synthetic function like albumin and prothrombin time varied significantly between the two groups. Among the sonologic parameters liver size did not show any significant difference while the difference in spleen size was significant. The comparison between the various liver function values and the level of significance is given in the table below.

| Liver | function | CLD | ALD | P value | |
|------------------|----------|--------------|--------------|--------------|--|
| variable | | Mean-std dev | Mean-std dev | Mean-std dev | |
| Total bili | rubin | 7.74 -5.69 | 7.78-4.46 | 0.98 | |
| direct bil | irubin | 4.33-3.44 | 4.34- 3.33 | 1.00 | |
| AST | | 125- 89.4 | 317- 219 | .0001 | |
| ALT | | 129- 117 | 326-230 | 0.0002 | |
| ALK PO4 | | 198- 59.8 | 208- 38.1 | 0.62 | |
| Albumin | | 3.30- 0.446 | 3.69- 0.224 | .0001 | |
| Prothrombin time | | 24.1- 6.34 | 16.3- 2.12 | 0.0003 | |
| Liver size | | 11.2-1.86 | 12.2-1.38 | 0.11 | |
| Spleen size | | 10.9- 2.68 | 7.60 - 0.745 | 0.0003 | |

CORRELATION BETWEEN THE THYROID FUNCTION AND LIVER FUNCTION

Correlation between the thyroid function and liver function in CLD

The correlation between various thyroid function variables and liver function variables was calculated using Pierson's coefficient of correlation method. The results are shown in the table below. There was no significant relation between the thyroid function and the level of liver enzymes (AST, ALT). Among the thyroid function tests FT3 showed the highest level of correlation with the liver function indices. TSH did not show any correlation with the liver function indices except total bilirubin. The correlation was significant with a p value of less than 0.05. All other thyroid function indices showed relationships with the liver indices (excluding the enzyme levels) that were significant with

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a p value less than 0.01. Serum albumin showed a significant positive correlation with TT4, TT3, FT4 and FT3. Both prothrombin time and child-Pugh score showed a significant negative correlation with TT4, TT3, FT4 and FT3. The best correlation was between FT3 and Child-Pugh score.

| | ТВ | D B | AST | ALT | ALB | РТ | CPS |
|-----|---------------------|---------------------|--------|--------|---------------------|---------------------|---------------------|
| TSH | +0.304ª | +0.189 | -0.072 | -0.014 | -0.178 | +0.366 ^b | +0.222 |
| TT4 | -0.405 ^b | -0.515⁵ | +0.261 | +0.231 | +0.427 ^b | -0.595 ^b | -0.651 ^b |
| FT4 | -0.446 ^b | -0.432 ^b | +0.137 | +0.132 | +0.412 ^b | -0.564 ^b | -0.481 ^b |
| TT3 | -0.580 ^b | -0.575⁵ | +0.110 | +0.050 | +0.486 ^b | -0.626 ^b | -0.535 ^b |
| FT3 | -0.599 ^b | -0.582 ^b | +0.117 | +0.028 | +0.505 ^b | -0.726 ^b | -0.682 ^b |

correlation significant at 0.05 level (2 tailed)

correlation significant at 0.01 level (2 tailed)

Correlation between the thyroid function and liver function in ALD

The correlation between various thyroid function variables and liver function variables was calculated using Pierson's coefficient of correlation method. The results are shown in the table below.

There was no significant relation between the thyroid function values and the level of liver enzymes (AST, ALT). Among the thyroid function tests FT3 showed significant negative correlation with prothrombin time while the p value for the correlation with other variables did not reach level of significance, probably due to the small number of patients. TSH did not show significant correlation with any of the liver function indices. Total t4 showed a significant positive correlation with total bilirubin and a significant negative correlation with serum albumin levels. Total T3 showed significant negative correlation with AST levels. The level of correlation between other thyroid variables and various liver function values did not reach significant level.

| | ТВ | D B | AST | ALT | ALB | РТ |
|-----|---------|--------|---------------------|--------|---------|---------------------|
| TSH | -0.192 | -0.274 | +0.444 | +0.357 | +0.028 | -0.180 |
| TT4 | +0.857ª | +0.890 | +0.466 | +0.433 | -0.862ª | +0.355 |
| FT4 | +0.408 | +0.438 | -0.214 | -0.108 | -0.222 | +0.171 |
| TT3 | -0.587 | -0.588 | -0.644 ^b | -0.559 | +0.444 | -0.485 |
| FT3 | -0.605 | -0.611 | -0.129 | -0.057 | +0.282 | -0.730 ^b |

correlation significant at the 0.01 level (2 tailed)

correlation significant at the 0.05 level (2 tailed)

Analysis of the difference between the various correlations

The significance of the difference between the various values of correlation was assessed by Z- transformation test. There was no significant difference between the statistically significant correlation values. The data obtained in the analysis is given in the following table.

| CLD | | | | | | | | |
|-------|--------|----|--------|---------|----------|-----------|---------|-------|
| group | | | | | | | | |
| | | | | | | | | P- |
| | type | n | r | z | 1/n-3 | se(z1-z2) | | value |
| DT | frog 2 | 50 | 0.726 | - | 0.021277 | | | |
| r i | liee_5 | 50 | -0.720 | 0.92022 | | | | |
| | tot t2 | 50 | 0.626 | - | 0.021277 | | | |
| | 101_13 | 50 | -0.020 | 0.73481 | 0.021277 | | | |
| | | | | - | 0.042553 | 0.206284 | - | 0.369 |
| | | | | 0.18541 | | | 0.89879 | |
| CD | fron 2 | 50 | 0.692 | - | 0.021277 | | | |
| | liee_5 | 50 | -0.082 | 0.83284 | | | | |
| | tot t2 | 50 | 0.525 | - | 0.021277 | | | |
| | 101_13 | 50 | -0.555 | 0.59712 | 0.021277 | | | |
| | | | | - | 0.042552 | 0.206284 | - | |
| | | | | 0.23572 | 0.042555 | | 1.14269 | |
| ALD | | | | | | | | |
| Group | | | | | | | | |
| DT | frog 3 | 10 | -0.73 | - | 0.142857 | | | |
| | liee_5 | 10 | -0.75 | 0.92873 | | | | |
| | tot_t3 | 10 | -0.485 | -0.5295 | 0.142857 | | | |
| | | | | - | 0 285714 | 0 534522 | - | 0.455 |
| | | | | 0.39923 | 0.203714 | 0.334322 | 0.74688 | 0.4.0 |

DISCUSSION:

On analyzing the thyroid function variables, TSH did not vary significantly between the three groups (p value-0.67). Total T4 was significantly lower in the chronic liver disease group compared to controls and acute liver disease (p value .0001). The total T4 level was significantly elevated in acute liver disease group (p value .0001). This reiterates the fact that total T4 is an acute phase reactant and is elevated in any conditions causing systemic inflammation. Total T4 may emerge as a useful marker to differentiate between acute and chronic liver disease patents as the values go in different directions from normal in these two groups.

On assessing the correlation between thyroid and liver function variables in the chronic liver disease group, TSH showed significant correlation only with total bilirubin (p value of < 0.05). In the acute liver

disease group TSH did not show any significant correlation with any of the liver function variables.

CONCLUSION:

Thyroid indices may be useful in assessing the prognosis of patients with liver disease since they show significant correlation with established markers of liver disease prognosis. In this regard free T3 seems to be the most promising in chronic liver disease patients. In acute liver disease there is nothing much to choose between total T4 and free T3.

Different thyroid function parameters differ significantly between chronic liver disease patients, acute liver disease patients and controls. This can be utilized in differentiating acute liver disease patients from chronic patients. For this total T4 seems to be the most promising followed by free T3 and total T3.

Volume-5, Issue-12, December - 2016 • ISSN No 2277 - 8160

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