# Evaluation of Thyroid Function Tests in Children with Chronic Liver Diseases

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**Introduction:** Thyroid hormone metabolism may be impaired in chronic liver diseases and subclinical hypothyroidism or euthyroid sick syndrome may occur. Thyroid dysfunction has been shown in 5% to 20% of patients with primary biliary cirrhosis and chronic active hepatitis.

**Backgrounds /Aims:** Studies related to changes in thyroid hormone metabolism in the course of chronic liver diseases have been conducted mostly in adults. In this study, we aimed to investigate the thyroid dysfunction in childhood chronic liver diseases.

**Methods**: Between 2005 and 2018, 960 chronic liver disease patient file that followed in our gastroenterology department are reviewed. Among all study subjects, 107 (53 female, 54 male) patients aged between 1 month and 18 age who were diagnosed as chronic liver disease and had thyroid function tests during diagnosis in their file, were enrolled in the study group. Anthropometric characteristics, laboratory data (ALT, AST, ALP GGT, total bilirubin, direct bilirubin, indirect bilirubin, albumin, total protein), and thyroid function test values were obtained from patient files..

## Results

- ✓ Of the 107 patients, 96 (89.7%) had normal thyroid function test and 7 (6.5%) had subclinical hypothyroidism and four (3.7%) had euthyroid sick syndrome.
- ✓ Of the 7 patients with subclinical hypothyroidism, one (14.2%) had glycogen storage diasease, one (14.2%) had biliary atresia, one (14.2%) had undiagnosed cholestatic liver disease, one (14.2%) had Alagille syndrome, one (14.2%) had idiopatic hepatitis, one (14.2%) had progressive familial intrahepatic cholestasis (PFIC) and one (14.2%) had congenital hepatic fibrosis . **(Table 1)**
- ✓ Spearman correlation analysis showed a negative correlation between free T3 and direct bilirubin (r = -0,329, p = 0,027) . **(Table 2)**

## Discussion

- ✓ JAG1 gene defect may be responsible hypothyroidism in Alagille syndrome.
- ✓ In experimental studies have shown that the synthesis and release of T4 and T3 are adversely affected by elevated proinflammatory cytokine concentrations. Thyroid dysfunction may be associated with increased cytokine concentrations in cirrhosis.
- ✓ Growth retardation mostly seen in patients with glycogen storage diseases may be result of subclinical hypothyroidism.

| Age | Diagnosis | Thyroid disorders | TSH | Free T4 | Free T3 |
|---|---|---|---|---|---|
| 2 months | Biliary atresia | SCH* | 22.80 | 1.13 | 1.67 |
| 17 years | PFIC | SCH | 4.55 | 1.10 | 1.99 |
| 1 year | Cholestatic liver disease | SCH | 7.70 | 1.04 | 3,95 |
| 13 years | Congenital hepatic fibrosis | SCH | 5.03 | 1.11 | 3.12 |
| 1 year | Idiopatic hepatitis | SCH | 6.40 | 1.10 | 3,65 |
| 1.5 years | Glycogen storage disease | SCH | 11.87 | 0.93 | 3,56 |
| 2 months | Alagille syndrome | SCH | 18.80 | 0.96 | 3,21 |
| 10 years | Congenital hepatic fibrosis | ESS** | 0.19 | 0.79 | 1.78 |
| 1.5 months | Cholestatic liver disease | ESS | 0.17 | 0.94 | 1.17 |
| 8 years | Cryptogenic cirrhosis | ESS | 0.23 | 0.85 | 1.20 |
| 1.5 months | Cholestatic liver disease | ESS | 0.09 | 1.13 | 0.90 |

**SCH: subclinical hypothyroidism, **ESS: euthyroid sick syndrome*

**Table 1.** Age, Free T3, free T4 and TSH levels of patients with thyroid dysfunctions.

| | | TSH | free T3 | free T4 |
|---|---|---|---|---|
| **AST** | r* | -0.093 | 0.012 | -0.053 |
| | p | 0.340 | 0.936 | 0.586 |
| **ALT** | r* | -0.081 | 0.083 | -0.078 |
| | p | 0.406 | 0.590 | 0.423 |
| **GGT** | r* | 0.115 | 0.088 | 0.016 |
| | p | 0.239 | 0.565 | 0.869 |
| **ALP** | r* | -0.023 | -0.46 | 0.105 |
| | p | 0.811 | 0.765 | 0.280 |
| **Total Bilirubin** | r* | -0.017 | -0.159 | 0.040 |
| | p | 0.858 | 0.297 | 0.684 |
| **Direct Bilirubin** | r* | -0.102 | -0.329 | 0.051 |
| | p | 0.298 | **0.027** | 0.601 |
| **Indirect Bilirubin** | r* | 0.070 | 0.043 | 0.012 |
| | p | 0.476 | 0.779 | 0.902 |
| **Total protein** | r* | -0.098 | 0.188 | -0.273 |
| | p | 0.319 | 0.221 | 0.005 |

**Table 2**. Correlation coefficients between thyroid function tests and liver function tests

## Conclusion

- Euthyroid sick syndrome or subclinical hypothyroidism can be seen frequently in children with chronic liver diseases.
- Thyroid function tests should be evaluated in these cases at the diagnosis and monitoring.
- This study is the first to show a negative correlation between free T3 levels and direct bilirubin, suggesting the association between the disease severity and the thyroid function test.

***References:***
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