Evaluation of Serum Hepatocellular Enzymes In Nigerian with Goitre

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Abstract

Objective: The determination of serum gammaglutamyl transferase (GGT), alkaline phosphatase (ALP), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) in patient with goitre in Owerri, Imo state Nigeria were investigated.

Material & Methods: Thirty confirmed patients with goitre age 50 to 70 years with the following thyroid index (Total T4 > 140.65±7.28nmol/l, Total T3 > 2.43±0.96nmol/l, Free T4 < 50.24±9.11nmol/l and TSH > 4.12±1.00nmol/l) were selected for the study. Thirty normal subjects free from goiter age 50 to 70 years were used as control. Patients with complications such as cardiovascular disease, hypertension and diabetes were excluded.

Results: The level of serum gammaglutamyl transferase in goitre subjects was significantly higher (50.32 ±4.27 iu/l) when compared with control (17.50±3.94 iu/l) at P< 0.05. In the same vein the level of alkaline phosphatase was significantly higher (110.9m/l±12.92 iu/l) when compared with the control (56.3±12.06 iu/l) P<0.05. The levels of AST and ALT in goitre and control were not significant when compared with the control.

Conclusion: This observation shows that gammaglutamyl transferase and alkaline phosphatase are frequently increased in goitre. Hence, they are possibly thyroid dependent enzymes.

Key Words: Gammaglutamyl transferase; alkaline phosphatase; aspartateaminotransferase; alanine aminotransferase; thyroid hormones

1. Introduction

Goitre is a swelling in the thyroid gland which can lead to a swelling in the neck.1 It is also called bronchocele. In Latin, Goitre is referred to as Gutteria. Goitre usually occurs when the thyroid gland is not functioning properly. It is classified into diffuse goitre which is goitre that has spread through all of the thyroid. While toxic goitre is goitre with hyperthyroidism. This is most commonly associated with Graves disease. On the other hand, non -toxic goitre is associated with normal or low thyroid levels and is caused by lithium or certain autoimmune diseases.2

However, the most common cause of goitre world wide is deficiency of iodine. Iodine is necessary for the synthesis of the thyroid hormones; thyroxine (T4) and triiodine thyronine (T3). Iodine deficiency makes the thyroid gland unable to produce its hormones because the mature hormone molecule requires atoms to be attached. When level of thyroid hormones fall, thyrotropin releasing hormone (TRH) is produced by the hypothalamus. TRH then prompts the pituitary gland to make thyrotropin or thyroid stimulating hormone (TSH) which stimulates the thyroid glands production of T4 and T3. It also causes the thyroid gland to grow in size by increasing cell division.3

Factors contributing to the resurgence of goitre in developing countries include insufficient iodine in the diet, high consumption of certain foods that neutralizes iodine such as cabbage,broccoli and cauliflower. Other foods like Soy may also induce goitre. Certain drugs such as lithium and phenylnbetazone can be risk factors. It is of important to note that some serohepatocellular enzymes are affected in goitre patients. Gamma glutamyl transferase is one of the hepatocellular enzyme. It catalyses the transfer of amino acid or
peptide. This enzyme sometimes is referred to as transpeptidase but is more appropriately included in the amino acid transferase group. It specifically catalyze the transfer of a gamma glutamyl group to another acceptor. 4 High concentrations of GGT are found in renal prostatic, pancreatic and hepatobiliary tissue. This could be as a result of its involvement, in amino acid transport and glutathione metabolism. Elevated serum levels of GGT are also found in alcoholics and patients receiving certain drugs. Such as phenytoin or Phenobarbital. This is probably the result of microsomal induction of enzyme activities prostatic adenocarcinoma may be associated with increased serum levels. 5

Alkaline phosphatase (ALP) refers to a group of phosphomonoesterases that hydrolyze phosphate esters with optimum in vitro activity at pH of 10. some human tissues like kidney, liver, bone intestine and placenta contain ALP. The majority of elevated ALP are associated with the liver or bone. In addition to the causes of goitre there are many other less common causes or infection in the thyroid; and some are due to tumors. 6 However; much work has not been done on some hepatocellular enzymes in goiter. Hence, it is the purpose of this study to provide the information on the level of the GGT, ALP, AST and ALT in patients with goiter in Owerri, Nigeria.

2. Material and Methods
2.1. Subject
Thirty confirmed patients with goitre age 50 to 70 years with the following thyroid index (Total T4 > 4.12 ± 7.28nmol/l, Total T3 >2.43 ± 0.96nmol/l, free T4 <50.24 ± 9.11nmol/l and TSH > 4.12 ± 1.00nmol/l) were selected for the study. Patients with complications such as cardiovascular disease, hypertension and diabetes were excluded from this study. Thirty healthy subjects free from goitre age 50 to 70 years were used as control.

2.2. Blood Sample
In all subjects, 5ml of fasting venous blood was collected into non-anticoagulated tubes between 8.00am and 10.00 am. The samples were spun in a wisterfuge (Model 684) Centrifuge at 1000g for 10 minutes and serum collected into a clean dry bijou bottle. The serum obtain was used for the estimation of Alanine aminotransferase, Aspartate aminotransferase, Alkaline phosphatase and Gamma glutamyl transferase within 24 hours of collection.

3.3. Biochemical Assay/Analysis
The serum AST and ALT were assayed by the method of Reitman and Frankel7: ALP was determined by the method of king and king8. While the Gamma glutamyl transferase was assayed using Randox Reagent Kit.

3.4. Statistical Analysis
The results were expressed as mean ± standard deviation. The statistical evaluation of data was performed by student t-test. Significant levels were considered at P<0.05

3. Results
Table 1 shows the mean serum concentration of GGT, ALP, AST and ALT of the control and goitre subjects.

The serum activities of GGT and ALP in goitre subjects were significantly increased when compared with control (P< 0.05). The levels of AST and ALT in goitre subjects were not significant when compared with the control (P>0.05).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control Group</th>
<th>Goitre Patients</th>
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<tbody>
<tr>
<td>GGT (iu/l)</td>
<td>17.50 ± 3.94</td>
<td>50.32 ± 4.27*</td>
</tr>
<tr>
<td>ALP (iu/l)</td>
<td>56.30 ± 12.06</td>
<td>110.9 ± 12.92*</td>
</tr>
<tr>
<td>AST (iu/l)</td>
<td>18.71 ± 1.13</td>
<td>19.36 ± 2.18</td>
</tr>
<tr>
<td>ALT (iu/l)</td>
<td>16.48 ± 3.11</td>
<td>16.95 ± 2.93</td>
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*Significantly different from control (P<0.05)

4. Discussion
Diseases of the thyroid are the most common afflictions involving the endocrine systems. Goitre which is the enlargement of thyroid gland is the commonest type of thyroid disease9. Goitre may or may not be associated with abnormal function. 10 Hence some of the hepatocellular enzymes are affected.

In this study, Gamma glutamyl transferase (GGT), Alkaline phosphatase (ALP), Asparatate aminotransferase (AST) and Alanine amino transferase (ALT) levels were investigated in goitre. The results obtained showed that GGT level was elevated in goitre patients when compared with the control. This could be probably due to increase in thyroid stimulating hormone tumours. GGT is clinically important because of its sensitivity to detect alcohol abuse. It is increased in alcoholics even when other liver functions are within normal limits.11-12 Hence its increase in goitre patients may pose diagnostic confusion.
In the same vein, alkaline phosphatase which is mainly produced by osteoblasts of bone is elevated in goitre subjects when compared with the control. This elevation or increase in ALP may be linked to increased in binding protein, Thyroid Stimulating Hormone secretion tumors as well as receptor defect. This is in line with the work of Giannini et al.\(^{13}\)

Furthermore, it was observed that the AST and ALT activities were not significantly increased when compared with the control. AST and ALT are used as markers in the hepatic diagnosis.\(^{14-15}\) Hence, the non-significantly increase of AST and ALT support the non-impairment of the liver. This may be probably that AST and ALT are not specific to the goitre marker.

5. Conclusion
The results obtained suggest that goitre is often associated with abnormal hepatocellular enzymes particularly alkaline phosphatase elevation and thus may pose diagnostic confusion. The increase of bone isoenzyme accounts for the elevations in total ALP levels.

6. References