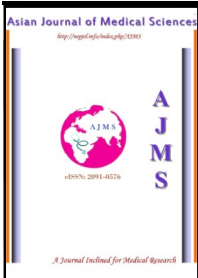


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Evaluation of Serum Hepatocellular Enzymes In Nigerian with Goitre

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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 ± 7.28 nmol/l, Total T₃ > 2.43 ± 0.96 nmol/l, Free T₄ < 50.24 ± 9.11 nmol/l and TSH > 4.12 ± 1.00 nmol/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 (110.9 m/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; aspartate aminotransferase; 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 phenylbetazone 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

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peptide. This enzyme sometimes is referred to as transpeptidase but is more appropriately included in the amino acid transferase group. It specifically catalyzes 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 bijoux bottle. The serum obtained 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 1 : Mean value of serum GGT,ALP,AST and ALT levels in goitre patients and control group.

Parameters	Control Group	Goitre Patients
GGT(iu/l)	17.50 ± 3.94	50.32 ± 4.27*
ALP(iu/l)	56.30 ± 12.06	110.9 ± 12.92*
AST(iu/l)	18.71 ± 1.13	19.36 ± 2.18
ALT(iu/l)	16.48 ± 3.11	16.95 ± 2.93

*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), Aspartate 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

1. Huang MJ and Liaw YF. Clinical associations between thyroid and liver diseases. *J. Gastroenterol Hepatol* 1995;10:344-50 <http://dx.doi.org/10.1111/j.1440-1746.1995.tb01106.x> PMID:7548816
2. Bellassoued M, Minif Kaffel N, Rekik N, Rebai T, Tahrin N, Krichen MS and Abid M. Thyrotoxicosis hepatitis: a case report. *Ann Endocrinol* 2001; 62 (3):235-8
3. Huang MI, Li KL, Wei JS, Wu SS, Fan KD and Liaw YF. Sequential liver and bone biochemical changes in hyperthyroidism. *Am. J. Gastroenterol* 1994; 89 (7):1071-6
4. Ruppin DC, Frdman MI and Lunzer MR: Value of serum gamma glutamyltransferase in hepatobiliary disease. *MJA* .1982;1:421-4.
5. Benvenga S, Melluso R, Vermiglio F and Trimarch F. Gamma glutamyl transferase peptidase and alkaline phosphatase serum activities: Their relation to the outcome of Graves disease. *Enzyme* 1995; 34(2):64-70. PMID:2867896
6. Biscoveanu M and Hasinski S. Abnormal results of liver function test in patients with Grave's disease. *Endocr Pract.*2000; 6:367-369 PMID:11141587
7. Reitman S and Frankel S. Transaminases. *American journal of clinical pathology* 1957; 28:56 PMID:13458125
8. King EJ and King PR. Estimation of plasma phosphatase by determination of hydrolysed phenol with amino antipyrone *J. Chem. Path* 1954;7:322-6
9. Vasudevan DM and Sreekumari S. (2010) *Thyroid Hormones In: Textbook of Biochemistry for Medical Student.* Jaypee Brothers Medical Ltd New Delhi page 394-9
10. Malik R and Hodgson H. The relationship between thyroid gland and liver *QJM* 2002; 95:559-69 <http://dx.doi.org/10.1093/qjmed/95.9.559> PMID:12205333
11. Kubota S, Amino N, Matsumoto Y, Ikeda N Morita S, Kudo T, Ohye H, Nishihara E, Ito M, Fukata S and Miyauchi A. Serial changes in liver function tests in patients with thyrotoxicosis induced by Graves disease and painless thyroiditis. 2008; 18 (3): 283-7
12. Abel Gadir WS and Adam SE. Development of goitre and enterohepatonephropathy in Nubia Goat Fed with pearl millet. *Vet J* 1999; 157(2) 178-85. <http://dx.doi.org/10.1053/tvj.1998.0244>
13. Giannini EG, Testa R and Savarino V. Liver enzyme alteration:A guide to clinicians. *MAJ* 2005; 172(3): 367-79.
14. Choudhary AM and Roberts I. Thyroid storm presenting with Liver failure. *J.Clin. Gastroenterol* 1999;29:318-21 <http://dx.doi.org/10.1097/00004836-199912000-00004> PMID:10599633
15. Thompson P Jr, Strum D, Boehm T and Wartofsky L. Abnormalities of liver functions in thyrotoxicosis. *Mil Med* 1978;143:548-51 PMID:99696