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Relationship Between Gallstone Disease and Liver Enzymes

[1]A.B. Olokoba, [1]B.J. Bojuwoye, [1]L.B. Olokoba, [2]K.T., Braimoh,
[2]A.K. Inikori and [3]A.A. Abdulkareem
[1]Department of Medicine, [2]Department of Radiology, [3]Department of Paediatrics,
University of Ilorin, Teaching Hospital, Ilorin, Nigeria

Abstracts: It is known that chronic liver disease is a risk factor for Gallstone disease. Gallstone disease is also known to cause liver disease and a derangement of its enzymes. This study is therefore to examine the relationship between Gallstone disease and liver enzymes. One hundred adult Nigerians (50 males and 50 females) underwent real time ultrasonography to determine the relationship between liver enzymes and Gallstone disease. Demographic characteristics and liver enzymes were determined for each of the participant. Longitudinal and transverse scans of the right upper quadrant was done in both the supine and left lateral positions. The ultrasound examinations were done in the morning following an overnight fast (to prevent Gallbladder contraction) without sedation. Patients with known risk factors for Gallstone disease such as haemolytic disorders like sickle cell disease and pregnancy were excluded from the study. Patients who have had cholecystectomy were also excluded. Ultrasound findings were considered positive for the presence of Gallstone disease only in those in whom reproducible echogenic masses with possible acoustic shadows were seen. Seven percent (4 females and 3 males) had ultrasound evidence of gallstone disease. The mean serum levels of total and conjugated bilirubin were higher in the patients with Gallstone disease than in those without Gallstone disease 22.5±15.9 umol L^{-1} ($p = 0.089$) and 10.1±5.9 umol L^{-1} ($p = 0.166$), respectively. The mean serum Alanine amino-transferase, Aspartate amino-transferase and Alkaline phosphatase levels were also higher in those with Gallstone disease than in those without Gallstone disease 24.0±5.7 iu L^{-1} ($p = 0.113$), 25.0±13.9 iu L^{-1} ($p = 0.322$) and 47.5±47.4 iu L^{-1} ($p = 0.667$), respectively. The mean serum Total protein and Albumin levels were lower in those with Gallstone disease than in those without Gallstone disease 52.5±24.7 g L^{-1} ($p = 0.552$) and 25.5±2.1 g L^{-1} ($p = 0.406$), respectively. The mean serum levels of Bilirubin (total and conjugated), Alanine amino-transferase, Aspartate amino-transferase and Alkaline phosphatase tended to be elevated in individuals with Gallstone disease than in those without Gallstone disease even though the difference is of no statistical significance. The mean serum total protein and Albumin also tended to be lower in individuals with Gallstone disease than in those without Gallstone disease, this also is of no statistical significance.

Key words: Gallstone disease, liver enzymes, relationship

INTRODUCTION

Gallstone Disease (GSD) is one of the most common gastrointestinal diseases seen in clinical practice. Most patients with GSD are asymptomatic (James *et al*., 1996).

The chief constituents of Gallstone (GS) are cholesterol, bilirubin and calcium (Johnston and Kaplan, 1993). Other constituents may include fatty acids, triglycerides, protein and polysaccharide. In the great majority of stones encountered in the western world, the principal constituent is cholesterol, which usually comprises from 70-98% of the dried substance of the stone (Kleeberg, 1953).

The pathogenic mechanism (s) by which GS form is generally agreed to be due to: alteration in the composition of bile, stasis and infection (Robbins, 1994; Paumgartner and Sauerbrugh, 1991).

The risk factors for cholesterol GS are; increasing age, female gender, multi-parity, obesity, rapid weight loss, diet (those high in animal fat), drugs (such as contraceptive pills) and ileal disease or resection. Others are liver cirrhosis, haemoglobinopathy and diabetes mellitus (Parveen and Michael, 1999).

Corresponding Author: A.B. Olokoba, Department of Medicine, University of Ilorin, Teaching Hospital, P.M.B 1459, Ilorin, Kwara State, Nigeria

MATERIALS AND METHODS

The study was a prospective one. The setting of the study was the Medical Out-Patient Department (MOPD) of the University of Ilorin Teaching Hospital (UITH), Ilorin.

Approval for the study, was obtained from the Research and Ethical committee of UITH. Verbal and informed consent was obtained from participants. One hundred adult Nigerians (50 males and 50 females) underwent real time Ultrasonography (USS) using realtime ultrasound scanner from Sony incorporated, Japan (1999) to determine the relationship between liver enzymes and GSD.

Their demographic characteristics and biochemical parameters (including liver enzymes) were recorded and compared.

Subjects were recruited from normal hospital health workers, patients with minor ailments such as malaria fever and Upper Respiratory Tract Infection (URTI).

Only patients with haemoglobin genotype Hb AA were recruited into the study.

The USS examinations were done in the morning following an overnight fast (to prevent Gall bladder contraction) without sedation.

Longitudinal and transverse scans of the RUQ was done in both the supine and left lateral positions.

USS findings were considered positive for the presence of GSD only in those in whom reproducible echogenic masses with possible acoustic shadows were seen.

Patients with known risk factors for GSD such as patients with haemolytic disorders like sickle cell disease and pregnant women were excluded from the study. Patients who have had cholecystectomy were also excluded.

Biochemical tests were performed using 10 mL of blood in bottles containing Lithium heparin. Such tests included serum Bilirubin (total and conjugated), Alkaline Phosphatase (ALP), Alanine amino-Transferase (ALT), Aspartate amino-Transferase (AST), serum Total protein and Albumin.

Statistical analysis: The data obtained were entered into a computer and analysed using Epi- info version 6.1 statistical software.

RESULTS

At the conclusion of the study, one hundred patients completed the study. They were all native Nigerians and all had Hb AA genotype.

Their ages ranged from 25-75 years with a mean of 49.0±12.5 years.

Seventy-nine percent of the patients fell within the age group 40-69 years.

Four patients (57.1%) in the study group with GS were in the age group 40-59 years. The peak incidence (57.1%) was also in the age group 40-59 years i.e., 5th and 6th decades, with a steady decline towards the 8th decade i.e., 70-79 years (Table 1).

In the study group, three of the patients with gallstones were males (42.9%), while four (57.1%) were females giving a male to female ratio of 1:1.3. This difference is not statistically significant, p = 0.198.

Relationship between gallstones and laboratory values: The mean serum levels of total and conjugated Bilirubin were higher in the patients with GS than in those without GS 22.5±15.9 umol L^{-1} (p = 0.089) and 10.1±5.9 umol L^{-1} (p = 0.166), respectively. The differences were not statistically significant. The mean serum ALT, AST and ALP levels were also, higher in the patients with GS than in those without GS 24.0±5.7 iu L^{-1} (p = 0.113), 25.0±13.9 iu L^{-1} (p = 0.322) and 47.5±37.4 iu L^{-1} (p = 0.677), respectively. These differences were not statistically significant (Table 2).

The mean serum total protein and albumin levels were lower in the patients with GS than in those without GS 52.5±24.7 g L^{-1} (p = 0.552) and 25.5±2.1g L^{-1} (p = 0.406), respectively. The differences were also not statistically significant (Table 2).

Table 1: Age distribution of patients with gallstones

Age group (Years)	Subjects N	GS	GS (%)
20-29	1	0	0
30-39	12	1	14.35
40-49	26	2	28.6
50-59	28	2	28.6
60-69	25	1	14.3
70-79	8	1	14.3
Total	100	7	100

N = Number of patients, GS = Number of patients with Gallstones, GS (%) = Percentage of patients with Gallstones

Table 2: Relationship between gallstones and laboratory values

Parameters	Subjects with GS	Subjects with NGS	p-value
Total bilirubin (umol L^{-1})	22.5±15.9	12.6±5.20	0.089 (ns)
Conjugated bilirubin (umol L^{-1})	10.1±5.90	6.1±3.30	0.166 (ns)
ALT (iu L^{-1})	24.0±5.70	9.0±12.8	0.113 (ns)
AST (iu L^{-1})	25.0±13.9	13.4±18.0	0.322 (ns)
ALP (iu L^{-1})	47.5±37.4	39.5±24.5	0.677 (ns)
Total protein (g L^{-1})	52.5±24.7	65.2±10.0	0.552 (ns)
Albumin (g L^{-1})	25.5±2.10	30.6±5.40	0.406 (ns)

GS = Gallstones, NGS = No Gallstones

DISCUSSION

Literature review has shown that the prevalence of cholelithiasis is very low in most parts of Africa compared to the Western nations (Parveen and Michael, 1999; Fletcher, 1982; Da Rocha-Afodu and Adesola, 1971; Akute and Adekunle, 1984; Parnis, 1964). Gallstones are present in 10-20% of the population in Western countries, but the exact prevalence is unknown (Parveen and Michael, 1999). This is much higher than the 0.18-0.8% reported for the general population in Nigeria (Da Rocha-Afodu and Adesola, 1971; Parnis, 1964).

Two (28.6%) out of the 7 patients who had GS were symptomatic (i.e., history of right hypochondrial pain). Five (71.4%) of the patients with GS were asymptomatic. This is in agreement with the findings of Da Rocha-Afodu and Adesola (1971). One of the two patients with symptomatic GS was found to have chronic liver disease (i.e., HBsAg positivity, past history of jaundice and a shrunken liver). This finding is also in agreement with findings, which have shown that chronic liver disease is a risk factor for GSD (James *et al*., 1996; Parveen and Michael, 1999; Braunwald *et al*., 2001; Buchner and Sonnenberg, 2002; Castellano, 1995).

This study, did not establish a significant association between serum bilirubin (total and conjugated), transaminases (ALT and AST) and alkaline phosphatase on one hand and GS on the other.

To the best knowledge of the authors, there are no known local studies comparing the relationship between gallstones and liver enzymes. This study is therefore a pioneer one and it is intended to establish a baseline.

CONCLUSION

The mean serum levels of bilirubin (total and conjugated), ALT, AST and ALP tended to be elevated in individuals with GSD than in those without GSD.

The mean serum total protein and albumin also tended to be lower in individuals with GSD than in those without GSD.

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