Int J Cur Biomed Phar Res. 2011; 1(2): 11 – 14.

Contents lists available at CurrentSciDirect Publications

International Journal of Current Biomedical and Pharmaceutical Research

Journal homepage: www.currentscidirect.com

Original article

Cholecystitis and an enzyme study

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ARTICLE INFO

Keywords:
Function
Enzyme markers
Clinical evaluation
Gall bladder

ABSTRACT

Cholecystitis is inflammation of the gallbladder that develops in short time usually when gallstone obstructs the cystic duct. Patients over the passage of time land to chronic cholecystitis. They have an abnormal liver function test with clinical features suggestive of gall bladder disease. Therefore, systematic step by step reviews of various investigations are important in diagnosis of gall bladder disease. The first step includes clinical evaluation of the patient followed by estimation of enzyme markers.. The seriousness of disease can be estimated from combined information of clinical examination & specialized biochemical tests. Specialized enzymatic markers are helpful for proper follow-up as delay can be devastating. It can form a platform for malignant & cirrhotic changes of liver: Present study has been undertaken to avoid dreads by simple clinical enzyme study. Serum levels of 5'NT/ALP/AST/ALT/Bilirubin were estimated in sixty cases of clinically diagnosed cholecystitis against forty normal individuals. Purpose was to single out a parameter which is most significant & may help as an endoscope to Surgeon for timely intervention. The study delineates5'NT to be superior to ALP due to its specificity &. Sensitivity. While elevated AST & ALT levels signify extent of hepatic cell damage, 5"NT specifically signifies the bile duct obstruction or cholestasis as well as hepatic cell damage.

1. Introduction

Cholecystitis is inflammation of the gallbladder that develops over hours, usually because a gallstone obstructs the cystic duct if it develops slowly over time it is called chronic cholecystitis Symptoms include right upper quadrant pain and tenderness, sometimes accompanied by fever, chills, nausea, and vomiting [1-4].

Acute cholecystitis is the most common complication of cholelithiasis. Conversely, ≥ 95% of patients with acute cholecystitis have cholelithiasis. When a stone becomes impacted in the cystic duct and persistently obstructs it, acute inflammation results. Bile stasis triggers release of enzymes (e.g., serum 5'NT, ALP, AST, ALT along with serum bilirubin Level. The gallstones blocks fluid from passing out of the gallbladder. This results in an irritated and swollen gallbladder. Infection or trauma can also cause cholecystitis. Casual treatment can lead to malignant or cirrhotic changes.Relevent cirrhosis here is biliary cirrhosis which more often can be complication of biliary stones [5-9].

2.Materials & method

Present study included a total of one hundred cases. Forty cases comprised forty healthy subjects of either sex ranging between 20—65 years of age establishing the normal serum values of 5'nucleotidase (5'NT),Alkaline phosphatase (ALP),aspartate aminotransferase (AST),alanine aminotransferase (ALT),& serum bilirubin. Controls included attendants of patients without any evidence of hepatobiliary disease so as to equlibriate the socioeconomic status & age. They were examined thoroughly & any hepatobiliary disorder, pregnancy & other related factors leading to alteration in 5'NT, ALP, AST,ALT were ruled out.

For the tests, Sixty cases comprising of clinically diagnosed cholecystitis were either admitted to Rajindra Hospital, Patiala or attending the the outdoor of the hospital were taken as study group. A detailed history was taken & examined completely .All this was recorded on special proformas.

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Following Investigations were carried out

1. The vandan Bergh Reaction & serum bilirubin was estimated by Malloy & Evelyn(1937)
2. Vandan Bergh reaction---it consists of two parts, the direct & in direct reactions. the latter serves as a quantitative estimation of the serum bilirubin.
3. ALP by kind & king (1954)
4. AST by Reitman & Frankel (1954)
5. ALT by Reitman & Frankel (1954)
6. 5' Nucleotidase by Method of Campbell (1962)

Biochemical makers comprise major blood tests while a higher than normal white blood cell count may indicate that there is an infection. In those cases Higher levels of 5'NT, ALP, AST/ALT & bilirubin, help to make a diagnosis.

Computerized tomography (CT) or ultrasound scans -.

HIDA (Hepatobiliary iminodiacetic acid) scan . The instrument, called an endoscope, takes pictures of the digestive tract and/or sends images to a computer monitor.

Percutaneous cholecystostomy is an alternative to 3) . In case, cholecystitis resolves, cholecystectomy may be done $\geq$ 6 wk later. But delayed surgery carries the risk of recurrent biliary complications.

A Liver Biopsy confirms diagnosis in case of cirrhosis

2.1.Tests for cellular injury:

2.1.1. Aminotransferases

AST previously known as serum glutamate oxaloacetate transaminase (SGOT) and the ALT, previously known as serum glutamate pyruvate transaminase (SGPT) are two most widely used sensitive tests of hepatic dysfunction whose specificity increases with the enzyme level . Serum activities in generally healthy individuals are, 5-40 IU/L. These serum activities presumably increase as a result of cellular membrane damage. Serum aminotransferase activities are increased in all types of hepatic injuries, but they provide only a static estimate of the amount of recent damage and no indication of residual functional capacity.

Levels that are 10 times the upper limit of normal (10XULN) reflect primary hepatocellular damage in the form of either acute or chronic forms of hepatitis.

2.1.2.Serum Bilirubin

The normal serum bilirubin concentration is below 25 mmol/dl (1.2 mg/dl). When bilirubin concentration is above 50 mmol/dl (2.5 mg/dl), hyperbilirubinemia can be detected clinically as jaundice. Total bilirubin is determined by a diazoreaction with alcohol. The elevated bilirubin levels along with increased levels of alkaline phosphatase, cholesterol and urinary bilirubin suggests cholestasis, while increased ALT/AST ratio suggests necrosis The degree of increase in serum bilirubin values has prognostic significance in chronic liver injuries, but not in acute injuries.All these investigations were confirmed with fully automated analyzer.

3.Results

The present study was undertaken in forty healthy subjects of either sex ranging between 20—65 years of age establishing the normal serum values of 5'nucleotidase(5'NT),Alkaline phosphatase(ALP),aspartate aminotransferase ,alanineamino transferase,& serum bilirubin. Controls included attendants of patients without any evidence of hepatobiliary disease so as to equlibriate the socioeconomic status & age. Sixty cases comprising of clinically diagnosed cholecystitis were either admitted to Rajindra Hospital, Patiala or attending the outdoor of the hospital were taken as study group. A detailed clinical examination was carried out in all as per plan mentioned in materials & methods. The diagnosis of these patients was based on clinical findings.

Age Incidence : Age of the patient studied in the present series varied from 20—65 years.

The table 1 shows that out of 60 patients suffering from cholecystitis 21 were from the age group between 36—50 years. Sixteen patients were of the age group > 65 years while 13 patients were 50 to 60 yrs. of age. In the control group 50% of the individuals were between 36—50 years & rest 50% in older age group 60 yrs. or above. It is evident from the table 2 that in both groups' males formed major %. Levels of all parameters i.e. of 5'nucleotidase (5'NT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), alanine aminotransferase (ALT) & serum bilirubin were estimated in al control cases.

Table 1. Age wise break up of patients

Age	Number of study group	Percentage	Number of control group	Percentage
36—50	21	34	10	25
50 ---60	13	22	09	24
60—65	16	27	11	26
Above 65	10	17	10	25

Table 2. Analysis of various groups

Category wise	Total	Male Number	Percentage	Feale Number	Percentage
Cholecystitis	60	20	33	40	67
Control	40	18	48	22	52

3.1.Socioeconomic status & Diet

As far as socioeconomic status is concerned, majority of cases were from lower uneducated class & were laborers', farmers or shopkeepers.80% of cases were taking food cooked in vegetable oils & were taking desi ghee.

Sex distribution of diseased & control cases

Table 3. depicts average value of 5'nucleotidase 5'NT, Alkaline phosphatase (ALP),aspartate aminotransferase (AST),alanine aminotransferase (ALT),& serum bilirubin were estimated in all control group ,

Table 3. Analysis of various biochemical parameters in control group

Group	Range	Mean+ S.D
5'NT IU/L	2—8	5.00±1.69
ALP K A U/100 ml.	3—10	6.42±2.19
AST IU/L	4—12	7.55±2.37
ALT IU/L	5---12	9.15±2.42
Bilirubin Level in Serum	0.4—0.8	0.57± 0.66

Table 4. Stastical analysis of serum 5'NT,ALP,AST,ALT,Bilirubin in Control & Study

Group	Number of patients	5"NT (IU/L) Mean ± S D Range	ALP (KA Units /100ml	AST IU/ L+ S.D Range	ALT IU/ L+ S.D Range	Serum bilirubin ±S.D Range	Significance
Control(40)		5.0 ±1.69	12±2.19±2.19	7.55±2.37	9.15±2.42	0.57± 0.66	'p'
Cholecystitis with cholelithiasis	27	17.03±11.59; (14—22)	18.03±8.50 (18—26)	18.03±8.50 (11—23)	37.12±7.39 (11---55)	2.4—2.8 (1.2—3.1)	p < 0.01
Acute cholecystitis	22	7.23±1.2 IU/L	11.19±2.3	13.54±1.3	20±3.43	p < 0.01mg/100	p < 0.01
Chronic cholecystitis	10	9.34±4.65 IU/L	12.23±4.54 KA U/100ml	18.48±4.56	14.76±5.8	1.0—1.2 mg/ 100 (±0.23).	p < 0.01
Study group	60	12±2.3 IU/L	14±2.2 KA U/100ml	10.76±4.87	19.87±+5.9	2.98±0.59 mg/100.	p < 0.01

3.2.Jaundice

Twenty seven cases showed jaundice as clinical finding. All these cases were having cholecystitis with cholelithiasis. Twenty three cases came with chronic cholecystitis & ten cases of chronic cholecystitis.

3.3.5' NT

In all cases of cholecystitis with cholelithiasis 5' NT was raised significantly (t=7.91) with average level being 17.03±11.59 IU/L as compared to control group having range of 2—8 IU/L (5.00±1.69). In cases of jaundice it was highly raised to be 27.12±7.34. In them p < 0.01.In cases of chronic cholecystitis it was 9.34±4.65 IU/L. In cases of acute cholecystitis it was 7.23±1.2. In all patients of study group it was 12±2.3 IU/L.

3.4.ALP

In all cases of cholecystitis with cholelithiasis ALP was raised significantly (t=8.31) with average level being 18.03±8.50 KA Units/100 ml as compared to control group having range of 7—9 IU/L (6.40+1.69). In cases of jaundice it was highly raised to be 27.12±7.34 KA U/100ml. In them p < 0.01. .In cases of chronic cholecystitis it was 12.23±4.54 KA U/100ml.In cases of acute cholecystitis it was 11.19±2.3 In all patients of study group it was 14±2.2 KA U/100ml.

3.5.Serum Bilirubin

In all cases of cholecystitis with cholelithiasis Serum Bilirubin was raised significantly (t=8.76) with average level being 2.4—2.8 mg/100 ml as compared to control group having range of 0.4—0.8 mg/100 (±0.96). In cases of jaundice it was highly raised to be 6.65±7.76. In them p < 0.01. .In cases of chronic cholecystitis it was 1.0—1.2 mg/100 (±0.23).In cases of acute cholecystitis it was 0.9±1.1 It all patients of study group it was 2.98±0.59 mg/100.

3.6.AST

In all cases of cholecystitis with cholelithiasis AST was raised significantly (t=8.56) with average level being 18.03±8.50 IU/L as compared to control group having range of 6--9 IU/L (26.40±1.69). In cases of jaundice it was highly raised to be 27.12±7.34 IU/L . In them p < 0.01. .In cases of chronic cholecystitis it was 18.48±4.56. In cases of acute cholecystitis it was 13.54±1.3In all patients of study group it was 10.76±4.87 IU/L.

3.7.ALT

In all cases of cholecystitis with cholelithiasis ALT was raised significantly (t=8.81) with average level being 19.87±5.9IU/L as compared to control group having range of 6--9 IU/L (26.40±1.69). In cases of jaundice it was highly raised to be 37.12±7.39 . In them p < 0.01. In cases of chronic cholecystitis it was 20±3.43. In all cases of acute cholecystitis it was 20±3.43. In all patients of chronic cholecystitis it was 14.76±5.8 IU/L.

4.Discussion

5'NT determination has an important place for differential diagnosis of jaundice in cases of cholecystitis. It is more significate as compared to ALP. It also has a special place as a general liver function test.However, while generally cases have been reported in which a raised ALP of hepatic origin has been accompanied by a normal 5'NT & conversely in which serum 5'NT has been increased in the presence of normal ALP.5'NT determination is valuable in its own right since the result doesn't closely mirror ALP [6-13]. Both ALP &5'NT are thought to measure same parameter of liver dysfunction & are used interchangeably. But both must first be split from membrane to which they are bound. It is possible that this splitting or solublization is mediated by bile salts. The fact that variation in ALP & 5'NT frequently run parallel to each other in patients with liver disease probably reflect their identical location in within the hepatocytes but is not due to patho-physiological response to CBD obstruction [14,15]. Both are found primarily in the bile canaliculi & both bound to lipid membrane. Both must first be split from their lipid membrane. It is possible that this splitting is due to bile salts concentration. Since mechanism of serum elevation of both enzymes are similar but not identical, one can predict the difference in two ,not being parallel, they cannot be used interchangeability. 5'NT may be used to distinguish liver disease from bone disease. This is unaltered in pregnancy. This is again of use in bony disease. In the study group majority of females were in their fifties [15-17]. This is important as incidence of female in that age group is most vulnerable to disease of study. This is in context to Fat Fertile Female of forty. Out of all the assessed parameters, 5'NT came out to be most significant. Values of ALP, AST, ALT& bilirubin were also raised but they don't have any correlation with 5'NT except ALP which has a positive correlation Rise of aminotransferase was also raised in the cases which probably may be due to hepatocellular damage. 5'NT levels are very useful in CBD obstruction. Rise in bilirubin levels is due to stone in the CBD which was confirmed to be stones in the bile duct with the help of ultrasonography & CT scan. In these cases rise in ALP may be due to obstruction only. Damage in hepatic cells causes rise in AST, ALT. So rise in 5'NT may be due to intrahepatic cholestasis & necrosis of liver cells [18]. Myth that Fat, Fertile Female of Forty has not been able to confirm as majority of patients & control was male. But when taken into broader aspect this was ascertained that this is not

5.Conclusion

This is concluded that enzyme 5'NT levels in hepatobiliary diseases contribute as an encouraging boost to the diagnosis of cholecystitis if juxtaposed along with other lab. & clinical data. 95% of cholecystitis cases are followed by gallstones which are formed by cholesterol and bilirubin (pigment) in bile, also referred to as biliary sludge. The study delineates5'NT to be superior to ALP due to its specificity &. Sensitivity. While elevated AST &ALT levels signify extent of hepatic cell damage, 5”NT specifically signifies the bile duct obstruction or cholestasis as well as hepatic cell damage.

Acknowledgements

I am highly indebted to the staff & my colleagues who helped me to accomplish my project. More so the patients deserve the credit for their cooperation without any hitch. Then I will be lacking if I don't give credit to the post graduates who were always ready for accomplishing this manuscript. Dr. KMDS Panag extended a helping hand to me.

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