



ASSOCIATION OF DYSLIPIDEMIA WITH CHOLELITHIASIS AND EFFECT ON FASTING BLOOD SUGAR AND LIVER ENZYMES: A CLINICO-BIOCHEMICAL PICTURE.

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ABSTRACT

This study was conducted in order to estimate the levels of various lipoproteins in cholelithiasis patients and also to measure the fasting blood sugar levels and liver enzymes in the serum of these patients. Fasting venous blood samples were obtained from symptomatic patients of cholelithiasis prior to their scheduled surgery. For the purpose of this study 98 patients i.e. 38 males and 60 females participated. 73 patients presented with symptomatic gallstone disease and cholecystitis and were in the age group of 29 to 60 years. However, 25 patients were relatively asymptomatic. Prior to the scheduled surgery, overnight fasting venous blood samples were collected with all aseptic precautions from all the participating subjects both males and females. Estimation of the levels of serum lipid profile, fasting blood sugar and liver enzymes was done. Cholelithiasis was associated with abnormalities in serum lipid profile in the study participants to a significant level. Some of these patients had episodes of biliary pancreatitis and presented with derangements in liver enzymes. These abnormal biochemical parameters may be the cause or also the outcome of cholelithiasis. Therefore, such biochemical findings should be taken into consideration while treating gallstone disease patients and patients at higher risk such as diabetics and those with metabolic syndrome.

KEYWORDS : Gallstones, Cholesterol, Cholelithiasis, Metabolic syndrome.

INTRODUCTION:

Cholelithiasis refers to the presence of stones in gall bladder and is the most common surgical gastrointestinal disorders worldwide.¹ Prevalence of cholelithiasis in India varies and is reported to be 2-29% with further significant increase in the recent years.¹³ Northern India has one of the highest reported incidences of gall bladder cancer in the world.¹⁴ Gall stone disease is a recurring hepatobiliary disease resulting from impaired lipid metabolism in our body and is considerable burden to society and health care system.⁹ Patients usually present with nausea, vomiting and severe abdominal pain that radiates to the back and/or right infra-sub scapular region. The pain is so severe that it causes a person to wake up from sleep.⁵ Many theories have been put forward to explain the formation of gall stones. However, pathogenesis of stone formation is not exactly clear.¹

Bile is the only exit source for cholesterol from our body. Therefore, disturbance in the exit mechanism can lead to precipitation of cholesterol. Cholesterol crystals when superadded by other substances like various pigments, mucin, proteins etc. eventually leads to gall stone formation. These are solid lumps of cholesterol, mucin, calcium bilirubinate crystals, and some proteins and may be cholesterol stones, pigmented stones and or mixed stones.^{2,6}

Metabolic abnormalities such as diabetes mellitus, dyslipidemia, obesity, and hyperinsulinemia are linked with cholelithiasis and it is therefore, suggestive of metabolic syndrome.^{1, 9} This may further increases the risk of coronary artery disease and even stroke with the advancing age.^{10, 11} These levels may be brought down by interference at right time either by prescribing lipid lowering drugs or by performing elective cholecystectomy in these patients. Symptomatic patients of gallstone disease may usually have a specific pattern of some biochemical abnormalities like changes in lipid profile and fasting blood sugar levels.¹ The role of serum lipid levels in cholelithiasis is very important and particularly in cholesterol gallstones that present with altered serum lipid profile levels usually hyperlipidemias.⁴ The aetiology of cholelithiasis is multifactorial. Advancing age,

female gender, genetics, obesity, quick weight loss, dietary factors and various drugs are the identified risk factors.³ According to literature metabolic syndrome is a risk factor for cholelithiasis.¹² It has been observed that lower levels of good cholesterol or high-density lipoprotein cholesterol and higher levels of triglycerides and bad cholesterol are associated with gallstone formation.⁸

In case of symptomatic gall stones cholecystectomy is the standard and definitive treatment and may be performed regardless of the type, number, and size of the stones.⁴ This is an effective and safe procedure and can be performed by either open or laparoscopic routes and having lesser mortality as well as intra operative and post operative complications.⁷ For cholesterol gallstones, current medical treatment includes: litholytic therapy and lithotripsy i.e. stone dissolution and stone shattering. Various medicines like oral bile acid litholysis with chenodeoxycholic acid and/or ursodeoxycholic acid have been prescribed for this.⁵

The aim of our study was to evaluate the changes in some serum biochemical parameters such as lipid profile, fasting serum glucose levels and liver enzymes in patients of cholelithiasis.

MATERIALS AND METHODS:

This was an analytical study done in patients of cholelithiasis with clinical and imaging features confirming symptomatic cholelithiasis admitted to Department of Surgery, SMHS Hospital, Srinagar from February 2019 to March 2020. Ethical clearance was obtained from the Institutional Ethical Committee. A total number of 98 cholelithiasis patients participated for the purpose of this study. A detailed clinical history and informed consent was taken from each patient. An abdominal ultrasonography is the standard diagnostic test for gallstone detection and was done in all patients.¹⁰

INCLUSION CRITERIA: Known ambulatory cases of cholelithiasis diagnosed by clinical signs symptoms and confirmed by USG.

EXCLUSION CRITERIA: Those patients who had liver cirrhosis, renal failure, alcoholics and Gallbladder cancer were excluded from the study.

Samples collection and Biochemical assay methods:

Fasting venous blood samples were collected from patients before surgery. Blood samples were centrifuged at 3000 rpm for about 5 minutes to obtain serum. Biochemical assay was done at F-block laboratory Department of Biochemistry using, Abbott 4000, automated analyzer. The assay included fasting serum lipid profile levels, fasting blood sugars and liver enzymes.

Study design and Statistical analysis:

This was an analytical study and comparisons were done with respect to gender. Statistical data analysis approaches were done through the Statistical Package for Social Sciences and Excel application was used in order to analyze and assess the results of the study.

Independent t-test was used for analysis and Pearson's correlation coefficient was used for determining the correlations between age and biochemical parameters.

RESULTS:

In our study a total of 98 patients participated. 38 were males and 60 were females.

Table 1: Descriptive Statistics

	Minimum	Maximum	Mean	SD
Age	28	60	43.9	8.4
Total cholesterol	110	278	197.0	43.3
Triglycerides	118	345	190.0	46.9
Very low density lipoprotein	15	86	42.5	17.3
Low density lipoprotein	50	167	110.3	33.7
High density lipoprotein	30	72	44.2	7.2
Sgpt	14	436	105.6	113.6
Sgot	15	483	98.4	104.2
Billirubin	.6	8.6	2.1	2.0
Alkaline phosphatase	98	505	174.6	87.7
Fasting blood sugar	70	150	104.2	13.2

Table 2: Gender difference between biochemical parameters

	Males		Females		t value	p value
	Mean	SD	Mean	SD		
Age	47.8	8.7	41.5	7.2	3.885	<0.001
Total cholesterol	176.4	45.2	210.0	36.8	-4.025	<0.001
Triglycerides	167.5	21.0	204.3	52.9	-4.082	<0.001
Very low density lipoprotein	33.9	14.1	47.9	17.1	-4.214	<0.001
Low density lipoprotein	97.7	31.7	118.3	32.6	-3.074	0.003
High density lipoprotein	44.8	6.1	43.8	7.8	0.663	0.509
SGPT	118.4	105.6	97.4	118.5	0.890	0.376
SGOT	124.6	122.1	81.8	88.1	2.012	0.047
Billirubin	2.3	2.3	1.9	1.8	1.033	0.304
Alkaline phosphatase	192.0	96.4	163.5	80.5	1.580	0.117
Fasting blood sugar	103.7	9.9	104.5	15.0	-0.296	0.768

Table 3: Independent t test

Serum biochemical parameters	Males		Females		Total		p value
	No.	%	No.	%	No.	%	
	Total cholesterol	32	84.2%	18	30.0%	50	
	6	15.8%	42	70.0%	48	49.0%	
Triglycerides	6	15.8%	8	13.3%	14	14.3%	0.735
	32	84.2%	52	86.7%	84	85.7%	
VLDL	20	52.6%	8	13.3%	28	28.6%	<0.001
	18	47.4%	52	86.7%	70	71.4%	

LDL	18	47.4%	16	26.7%	34	34.7%	0.036
	20	52.6%	44	73.3%	64	65.3%	
HDL	36	94.7%	58	96.7%	94	95.9%	0.638
	2	5.3%	2	3.3%	4	4.1%	
SGPT	12	31.6%	30	50.0%	42	42.9%	0.073
	26	68.4%	30	50.0%	56	57.1%	
SGOT	4	10.5%	4	6.7%	8	8.2%	0.497
	34	89.5%	56	93.3%	90	91.8%	
Billirubin	16	42.1%	36	60.0%	52	53.1%	0.084
	22	57.9%	24	40.0%	46	46.9%	
Alkaline phosphatase	12	31.6%	26	43.3%	38	38.8%	0.245
	26	68.4%	34	56.7%	60	61.2%	
Fasting blood sugar	26	68.4%	42	70.0%	68	69.4%	0.869
	12	31.6%	18	30.0%	30	30.6%	

Table 4: Correlation between age and lipid profile

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		Total cholesterol	Triglycerides	Vldl	Ldl	Hdl
Age	R	-0.378	-0.387	-0.282	-0.359	0.083
	p value	<0.001	<0.001	0.005	<0.001	0.414
	No.	98	98	98	98	98

Table 5: Correlation between age and liver function test

		SGPT	SGOT	Billirubin	Alkaline phosphatase
Age	R	-0.188	-0.047	-0.186	-0.089
	p value	0.064	0.648	0.067	0.381
	No.	98	98	98	98

Table 6: Correlation between age and fasting blood sugar

		Fasting blood sugar
Age	R	-0.139
	p value	0.172
	No.	98

r = Pearson's correlation coefficient

DISCUSSION:

Patients with symptomatic gallstones had a history of pain mainly in the epigastrium radiating to right upper quadrant. Most of the patients had episodes of recurrent symptoms lasting for usually 30 minutes or more. Murphy's sign was present in maximum patients who presented with acute symptoms of cholecystitis. The clinical history was correlated with abdominal ultrasound findings. According to the present study it has been observed that patients of cholelithiasis are more prone to develop hyperlipidemias. There was a statistically significant p value of (<0.001) for cholesterol, triglycerides and VLDL levels as shown in Table 2 of results when comparison was made between males and females. Mean cholesterol, triglyceride and VLDL levels were significantly lower in males as compared to females. According to Table 3, total cholesterol and VLDL present a statistically significant difference of (<0.001). The prevalence of cholelithiasis is more in females compared to males. Most of the patients of cholelithiasis tend to have dyslipidemias and deranged lipid profiles. Some recent studies showed that cholelithiasis patients had higher levels of triglycerides, hypercholesterolemia and decreased HDL cholesterol levels.¹² Due to defects in the secretory mechanism of bile there is precipitation of bile salts and cholesterol that eventually lead to gall stone formation.

CONCLUSION:

Positive association between various biochemical parameters and cholelithiasis and its complications has been shown in several studies. Detection of deranged metabolic profiles like elevated lipoprotein levels, liver enzymes, blood sugars etc. may help in earlier prediction of risk of cholelithiasis and cholelithiasis induced biliary pancreatitis. Screening the patients with metabolic derangements that can be the possible causes of cholelithiasis is paramount in developing strategies against cholelithiasis and in early prevention of

other complications like biliary pancreatitis induced secondarily by cholelithiasis. It will also facilitate the exploration of aetio-pathogenesis in context with metabolic derangements as there exists a lack in literature of such reports. Clinico-biochemical picture showing signs and symptoms of cholelithiasis and biochemically having dyslipidemias, deranged blood sugars and liver enzymes may prove to be unhealthy in these patients. If left untreated this may lead to development of coronary artery disease and stroke within some span of time.^{10,11} Interventions like healthy life style, exercise, healthy diet and lipid lowering drugs may prove beneficial. Some patients also benefit from cholecystectomy procedures that help them to normalise the levels of lipoproteins as well as liver enzymes.

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