



BURDEN OF GALL STONE DISEASE IN PATIENTS REFERRED FOR ULTRASOUND STUDY

Radiodiagnosis

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ABSTRACT

Gallbladder disease includes acute and chronic cholecystitis, solitary and multiple gallstones, gall bladder polyps, cholesterosis, common bile duct stones and biliary obstruction. The aim of our present study is to estimate the burden of Gall bladder diseases and other risk factors as detected on sonography of abdomen using data of Non-ANC (non-antenatal) ultrasound cases in our Hospital situated in Srinagar city of Garhwal region of North Indian state of Uttarakhand.

Materials and Methodology This descriptive retrospective study, conducted between March to September 2016, were retrospectively assessed. Descriptive analysis was done. Proportions were given wherever necessary. Test of significance was used with significance at p value <0.05.

Results : The present study included 88 non antenatal ultrasound patients. The age group less than 30 years constituted to 6.8% and more than 60 years constituted 23.8% of the study subjects, respectively. The study had 83% females. The most common department of referral was surgery. The only gall bladder pathology was found in 51(57.9%) of the patients. 42.0% patients presented with multiple findings on the ultrasound. The most common finding on ultrasound was gall bladder calculi, (40.2%) of the total, chronic cholecystitis (10.9%) and common bile duct calculi (6.3%).

Conclusion: Ultrasound study of patients was used in our study to assess gallstone burden; and also assessing burden gall bladder diseases related to gallstones in our surrounding hilly population.

KEYWORDS

Gall bladder, stone, ultrasound, radiology

Introduction:-

Ultrasound is a non-invasive, specific and quick screening technique with high sensitivity and specificity for detection of gallstones. GBD surveyed includes acute and chronic cholecystitis, solitary and multiple gallstones, gall bladder polyps, GBC, cholesterosis, CBD (common bile duct) stones and biliary obstruction.^{1,2,4}

The aim of our present study is to estimate the burden of Gall bladder diseases and other risk factors as detected on sonography of abdomen using data of Non-ANC (non-antenatal) ultrasound cases in our Hospital situated in Srinagar city of Garhwal region of North Indian state of Uttarakhand. It is a retrospective hospital based study of cases done over a period of six months (March 2016 to August 2016). Relevant clinical history, past history, locality details, any past surgical history, occupational history, tobacco, alcohol habits, dietary habits and all the other relevant hospital based details were recorded. Symptoms ascertained for Gall bladder disease (GBD) were jaundice, right upper quadrant abdominal pain, gases, vomiting, acidity, loss of appetite, loss of weight, bloating sensation in abdomen, pain upper abdomen after fatty or oily foods.^{1,2,4}

Materials and Methodology

This descriptive retrospective study was conducted at the Department of Radiology, Medical College Hospital, VCSG Government Medical Sciences and Research Institute, Uttarakhand, which is tertiary care teaching hospital in Northern India. Medical records of all non antenatal ultrasound cases registered between March to September 2016, were retrospectively assessed. Patient data at the time of diagnosis were retrieved onto a predesigned proforma, which concerned the following variables at the time of registration: age, sex, referral department and clinical features. Data was entered in Microsoft excel spreadsheet and analysed with SPSS version 20.0 (Chicago, IL, USA). Descriptive analysis was done. Proportions were given wherever necessary. Test of significance was used with significance at p value <0.05.

Results

The present study included 88 non antenatal ultrasound patients. The patients were categorized into three age groups. The majority of the patients 61(69.3%) belonged to age group 30-60 years. The age group less than 30 years constituted to 6.8% and more than 60 years constituted 23.8% of the study subjects, respectively. The study had 15 (17.0%) males and 73 (83%) females, respectively. The maximum

patients presented in the month of august with 17(19.3%). The distribution of presentation across the months was not found to be statistically significant among different age group. The most common department of referral was surgery, i.e., 65 (73.8%) patients. There was no statistically significant difference between department of referral and various age groups (Table 1).

The only gall bladder pathology was found in 51(57.9%) of the patients. There were broadly 20 findings on the ultrasound. Of the total 37(42.0%) patients presented with multiple findings on the ultrasound. The most common finding on ultrasound was gall bladder calculi, i.e., 70 (40.2%) of the total. Among other gall bladder ultrasound finding, chronic cholecystitis was more common 19(10.9%). This was followed by common bile duct calculi 11(6.3%). Apart from gall bladder, fatty liver with hepatomegaly accounted for 24 (13.8%) of the ultrasound finding. Renal calculi amounted to 15 (8.6%) of the ultrasound finding. (Table 2)

Pain whole abdomen was the most common presenting complaint in both male and females. Among females more than 60 years, pain whole abdomen 8(38.1%) was the most common presenting complaint on contrary in males more than 60 years pain right upper quadrant 2(9.5%) were the most common.(Table 3)

The 68(93.2%) of females patients had gall bladder disease. All the male patients examined on ultrasound had the gall bladder pathology. All patients less than 30 years examined on ultrasound involved gall bladder. All patients examined on ultrasound in June to July involved gall bladder. one or other part of the mandible in majority 55(79.7%). The gall bladder findings constituted 65 (96.9%) of all study patients referred from department of surgery. There was no statistically significant difference between age, gender, time, and referral department with gall bladder finding on the ultrasound. (Table 4)

Discussion:-

We consider the aetiopathogenesis of gallstone with related biliary complications, with ultrasonographic findings in conditions caused thereby. We can assess the burden of gall bladder diseases related to gallstones based on the ultrasound findings of abdomen in symptomatic as well as asymptomatic (not gallstone related symptoms) cases in our hospital referred from clinical departments, as ultrasonography findings are treated as standard to confirm gallstone diseases as histological confirmation is not possible in gallstone. The

highest incidence of gall bladder cancer (GBC) is seen in Northern India, as it has a specific geographic and ethnic background.² E.g. The highest incidence rates of GBC in the world are 21.5/ 100000 population especially in females in Delhi, then Karachi (13.8/100000) and 12.9/100000 (in Quito, Chile) as compared to other parts of world where incidence of GBC is quite low.² The female to male ratio was between 2 to 3 in these populations.² Gallstones in these cases played a major role in development of GBC, other risk factors being obesity, multiparity and chronic infections of Gall bladder.

GBC is most prevalent in North and Northeastern states of India like Uttar Pradesh, West Bengal, Assam, Bihar and Orissa. It is leading digestive cancer in women in Northern India and is two times higher than males. South Indian population has ten times lower incidence of GBC per 100000 population, according to Cancer registry of ICMR. (1990-96 data).²

The prevalence of Gall bladder diseases like acute cholecystitis, chronic cholecystitis, cholesterosis, impaction of GB stone in neck of Gall bladder etc were more common in symptomatic patients than in asymptomatic ones wherein gallstones were incidentally detected for sonography done for other medical and surgical conditions.^{1,2,3}

Previous studies in Gangetic plains of Uttar Pradesh show drinking water from unsafe sources (having high levels of heavy metal pollutants like chromium, nickel, cadmium, DDT) had higher incidence of Gallstone related diseases.² Chickpea consumption, unsuspected diabetes mellitus, river proximity, also had higher GBD incidence in this study.^{2,4} Genetic influence, multiparity and previous surgeries were significant risk factors in women concerned. Soil having high DDT levels is another risk factor here. Similar reports were given by studies based in Kashmir and rural Bangladesh. GBC is traditionally linked with cholelithiasis, obesity, reproductive factors (multiparity), cholecystitis and specific chemicals.^{1,2,4}

Patients with high risk of biliary complications are:^{1,2,4,5}

- 1) Large gallstone greater than 3 cms in size and gall bladder crammed with multiple gall stones, which carry high risk of GBC.
- 2) Hemolytic anemias with high risk of pigment stones,
- 3) Obesity, metabolic syndrome, dyslipidaemias, diabetes mellitus,
- 4) family history of gallstones,
- 5) Female sex, multiparity,
- 6) Reduced physical activity, sedentary life style.
- 7) High intake of oily foods, fast food,
- 8) Underlying disease conditions like cirrhosis of liver, Crohn's disease, total parenteral nutrition, bariatric surgeries and ileal resection
- 9) Drug intake of oral contraceptive pills, cephalosporins like ceftriaxone, thiazide diuretics, octreotide.

In western world, cholesterol stones are quite common whereas in eastern countries there is high incidence of pigment stones containing calcium palmitate and bilirubinate, fatty acid soaps, calcium stearate, mucinous glycoproteins).^{1,5} In some Asian countries, parasitic infestations of liver, biliary tract (like *Clonorchis sinensis*, *Fasciola hepatica*, and *Opisthorchis species*) lead to formation of gallstones in radicles (hepatolithiasis and choledocholithiasis).¹ They also lead to conditions like Oriental cholangiohepatitis, biliary obstruction, with recurrent cholangitis, dilatation and strictures of biliary radicles, especially in China and Taiwan.¹

In developed society, gallstone affect 10 to 15 % of population, with relatively low mortality rate as low as 0.6%.^{1,2,4,5} With increasing incidence of gallstones, there is trend of increase in gallstone related pancreatitis, with resultant increase in prophylactic laparoscopic cholecystectomies in east as well as western countries.¹ Most gallstones are clinically silent, an incidental sonographic finding usually seen during abdominal sonographies done for other reasons. Cholelithiasis is most likely a polygenetic disease entity with increasing incidence of gallstones, with increasing age, especially common after 40 years where the frequency is 4-10 times more common than younger population.¹ Female gender, fertility, obesity, increasing age (fat, fertile, female of forty years- a clinical paradigm for gallstone related diseases). In females, sex hormones, parity, OC pill use, estrogen replacement therapy, pregnancy all contribute to bile stasis and impaired gall bladder emptying.¹ This leads to gallstone formation. So also high HDL-cholesterol, metabolic syndrome,

obesity, add up to increased gallstone risk.^{1,2,4,5}

Abdominal or trunkal obesity with high body mass index > 32 kg.m², with dyslipidaemias, high BP, high fasting glucose, high blood triglyceride levels, with reduced HDL levels all contribute to gall stone formation and GBC.^{1,2,4,5} Diet consumption of high fat content like chickpeas, legumes, cheese, butter and ghee with high calorie intake also contribute to gallstone formation. Other rare diseases like Chronic hepatitis, liver cirrhosis, sickle cell anemias, spinal cord injury, IBS all lead to GB stasis and sludge (microlithiasis) formation.¹ There is increasing risk of cholelithiasis, in pediatric age group due to chronic hemolytic anemias, obesity, OC pill use, female child, obesity in adolescence, drug intake like cephalosporins, history of cardiac surgery and cystic fibrosis.^{1,5}

GBC develops in gallstone patients due to GB inflammation, superimposed chronic infection like *Salmonella typhi*, increased duration of gallstones, large sized gallstones, high cholesterol stones, porcelain gall bladder, primary sclerosing cholangitis, and congenital biliary anomalies with some genetic factors. Gallstones also lead to GB polyp formation with increased chances of dysplasia leading to malignant transformation. Such patients having smoking and alcohol habits also contribute to increased GBC incidence.¹

Our study is first of its kind assessing gallstone and related disorders in Uttarakhand state (Garhwal hilly terrain) assessing records of 1077 non-ANC cases of Ultrasound over a period of six months in year 2016, which revealed total 88 cases of gallstones; making prevalence of total 12.23%, quite high as compared to overall prevalence of 10 % in other parts of country. Previous studies in North India showed 6.20% prevalence of GBD in persons who underwent USG (4.45% in males, 7.37 % in females). The prevalence of gallstones was 1.99% in males and 5.59 % in females. Male patients having GBD in our study were 15; and 68 females had GBD diseases. Majority of patients (about 77) belonged to age group above 30 years. Out of 68 female patients, 5 cases were below 30 years age group whereas 51 females had gallstones with presenting age group of 30-60 years and 17 females were belonged to age above 60 years. Out of total 88 cases, there were 6 post-cholecystectomy who were referred for persistent RUQ pain abdomen to rule out residual GB fossa disease if any or any common bile duct (CBD) stone.^{1,2,4,5}

In other GBD related studies, females older than 40 years had higher risk of Gall bladder diseases and gallstones, but in our study many women (about 18 cases of females) presenting with gallstone disease were below 40 years, with presentation of gallstones as early as 18 years, 25 years. As mentioned earlier, in most of previous studies, ultrasonography findings were treated as standard as histological confirmation was not possible.^{1,2,4,5} So ultrasound study of patients was used in our study to assess gallstone burden; and also assessing burden gall bladder diseases related to gallstones in our surrounding hilly population.

Table 1: Demographic details of the study patients (n=88)

Subtype	<30 yr		30-60 yr		>60 yr		Total	P value
Gender	n	%	n	%	n	%	N	
Female	5	6.8	51	69.9	17	23.3	73	0.962
Male	1	6.7	10	66.7	4	26.7	15	
Month of Diagnosis								
March	0	0	9	75.0	3	25.0	12	0.680
April	0	0	10	71.4	4	28.6	14	
May	1	6.7	10	66.7	4	26.7	15	
June	2	14.3	8	57.1	4	28.6	14	
July	0	0	7	70.0	3	30.0	10	
August	3	17.6	12	70.6	2	11.8	17	
September	0	0	5	83.3	1	16.7	6	
Referral Department								
Medicine	0	0	5	62.5	3	37.5	8	0.759
Surgery	5	7.7	46	70.8	14	21.5	65	
Emergency	1	12.5	4	50.0	3	37.5	8	
Gynecology	0	0	2	66.7	1	33.3	3	
Others	0	0	4	100.0	0	0	7	

Table 2: Details of findings on ultrasound among study patients (n =174) Multiple diagnosis

S.no	Organ	Findings	Total number of cases	Percent
1	Gall Bladder	Gall Bladder malignancy	1	0.6
		Emphysematous cholecystitis (acute)	1	0.6
		Chronic cholecystitis with Cholelithiasis	19	10.9
		Acute calculus Cholecystitis	4	2.3
		Gall Bladder removed	5	2.9
		Common Bile duct Calculi	11	6.3
		Gall Bladder Calculi	70	40.2
		Common Bile duct and Gall Bladder Calculi	0	0.0
		Gall Bladder Cholesterolosis with Rokitansky-Aschoff sinuses	2	1.1
		Bile leak with Gall Bladder wall discontinuity	1	0.6
		Choledochal cystic dilation of Common Bile duct	1	0.6
		Obstructive Intrahepatic Bile Duct dilatation	5	2.9
2	Liver	Fatty Liver with hepatomegaly	24	13.8
		Congestion of Liver	2	1.1
		Liver cirrhosis	2	1.1
3	Genitourinary	cancer cervix	2	1.1
		Ovarian Malignancy	1	0.6
		Neurogenic Bladder with cystitis	1	0.6
		hypoplastic kidney	1	0.6
		Renal Calculus	15	8.6
4	Spleen	Splenomegaly	6	3.4

Figure 1: Distribution of studied patients by demographic and clinical factors. (n=88)

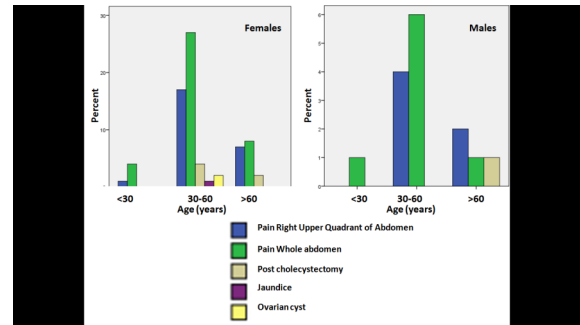
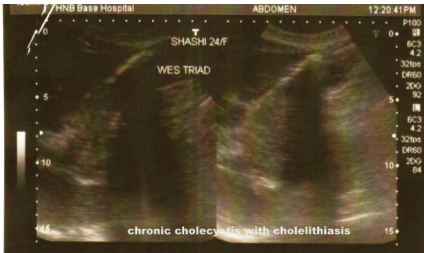


Table 3: Distribution of Gall Bladder disease by demographic and clinical factors of the studied patients. (n=88)

Variable	Category	Gall Bladder Disease				Total	p value
		Present		Absent			
		n	%	n	%	n	
Sex	Female	68	93.2%	5	6.8%	73	0.297
	Male	15	100.0%	0	0.0%	15	
Age (years)		6	100	0	0	6	0.786
	<30						
	30-60	57	93.4%	4	6.6%	61	
	>60	20	95.2%	1	4.8%	21	

Month	March	10	83.3%	2	16.7%	12	0.359
	April	13	92.9%	1	7.1%	14	
	May	14	93.3%	1	6.7%	15	
	June	14	100.0%	0	0.0%	14	
	July	10	100.0%	0	0.0%	10	
	August	17	100.0%	0	0.0%	17	
	September	5	83.3%	1	16.7%	6	
Refferal Department	Medicine	7	87.5%	1	12.5%	8	0.151
	Surgery	63	96.9%	2	3.1%	65	
	Emergency	7	87.5%	1	12.5%	8	
	Gynecology	2	66.7%	1	33.3%	3	
	Others	4	100.0%	0	0.0%	4	
History	Pain Right Upper Quadrant of Abdomen	30	96.8%	1	3.2%	31	0.084
	Pain Whole abdomen	44	93.6%	3	6.4%	47	
	Post cholecystectomy	6	100.0%	0	0.0%	6	
	Jaundice	2	100.0%	0	0.0%	2	
	Ovarian cyst	1	50.0%	1	50.0%	2	
	Total	83	94.3%	5	5.7%	88	

Figure 2: Ultrasonic image of patient showing chronic cholecystitis with cholelithiasis



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