



## A CROSS-SECTIONAL STUDY TO FIND OUT ROLE OF USG IN THE EVALUATION OF GALL BLADDER STONE AND ITS COMPLICATIONS IN EASTERN UTTAR PRADESH

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**ABSTRACT** **Introduction:** Gallstone disease is a major public health problem worldwide, particularly in adult population. Incidence of gallstone disease shows considerable geographical and regional variations. In India, the endemic zones for gall bladder disease like Bihar and Uttar Pradesh have one of the lowest GDP and advanced noninvasive imaging infrastructure such as CT and MRI are scarcely available, so, present study is an attempt to fulfill this gap and was planned to evaluate whether USG can be helpful in the early diagnosis of gallbladder stone and its associated complications. **Material and Methods:** This cross-sectional observational study was conducted at Department of Radiodiagnosis, GMC, Azamgarh in patients with suspected gall bladder disease from August 2020 to February 2021. A total of 165 patients were initially included on the basis of signs and symptom of gallbladder stone (such as epigastric pain, upper abdominal pain, and right hypochondrial pain) and underwent USG for preoperative radiological diagnosis. Statistical correlation was calculated using chi-square test and p value <0.05 was considered statistically significant. **Results:** Out of 165 patients included 94 were males and 61 were females. Most of the cases were in the age group of 30-39 (27.87%). Most common presenting symptoms was Right hypochondrial pain accounting 39 (23.63%). Majority of patients was diagnosed with Cholelithiasis 72 (43.63%). Majority of patients had Mixed type gall stone while majority of stone were found in Non-neoplastic lesion. 21.90% Vegetarian had Non- neoplastic lesion while 78.10% Mixed dietary habit had Non- neoplastic lesion. **Conclusion:** The study findings helped to conclude that gall bladder diseases were more common in males. Multiparty and mixed diets are important risk factors for developing gall bladder stones. USG is useful imaging modalities for diagnosing this disease & its skillful use helps in early detection of gall bladder stones and its complications. Early diagnosis and identification of high-risk cases is important to offer a potential cure for patients. Large-scale study is recommended to validate the findings of the present study.

**KEYWORDS :** Gall Bladder, Lesion, Stones, Histopathology, Pain

### INTRODUCTION

Gallstone disease is a major public health problem worldwide, particularly in adult population. Incidence of gallstone disease shows considerable geographical and regional variations. Carcinoma of gall bladder is uncommon malignancy having high mortality and low five year survival rates.<sup>1,2</sup> It is the fifth most common cancer of digestive tract and the commonest malignancy of the biliary tract.

Its peak occurrence is in the 5th decade or older and rate of gall bladder diseases are more common among females than males. It is a highly lethal disease and runs a fatal prognosis.<sup>3</sup> The aetiology of carcinoma of the gallbladder remains unknown and the incidence varies greatly in different areas of the world.

The epidemiological studies have suggested a marked variation in overall prevalence between different populations. Generally it can be concluded that majority of the patients belong to Western Caucasian, Hispanic, and Native American populations.<sup>4</sup> The highest incidence of carcinoma of gallbladder is in Chileans, American Indians, and in parts of North India where it accounts for as much as 9.1% of all the biliary tract diseases.<sup>5</sup> In Pakistan, although no authentic cancer registry data available but various published studies report the incidence of Gallbladder cancer higher than the Western data.<sup>6,7</sup>

Gall bladder cancer is more common among north Indian cities and two times higher in women.<sup>8</sup> The incidence of gall bladder carcinoma has great geographic and ethnic variation.<sup>9</sup> In India, gall bladder cancer is rare (1%). Majority of the incidence of gall bladder cancer are from northern (The Gangetic belt) and central parts of the country.<sup>10</sup> Gall bladder disease are more common in the Northern and Northeastern states of Uttar Pradesh, Bihar, Orissa, West Bengal and Assam.<sup>11</sup>

The patients may be asymptomatic or may present may with symptoms and signs (upper quadrant pain, jaundice and weight loss with nausea, vomiting, loss of appetite, fatty food - intolerance, dark urine etc.) mimicking cholecystitis or cholelithiasis.<sup>12</sup> So early diagnosis of carcinoma gallbladder is difficult and rare as there are no specific signs and symptoms. Conventionally, carcinoma gallbladder is diagnosed on the basis of medical history; abdominal examination and using modern imaging techniques like transabdominal ultrasonography and computed tomography of upper abdomen.

The initial & usual imaging evaluation prior to Laproscopic Cholecystectomy (LC) is ultrasonography (USG) of hepatopancreato-biliary region. It offers high sensitivity in primary detection of GB stones with high speed and portability.<sup>13</sup> Though magnetic resonance imaging (MRI) is considered as gold standard for preoperative assessment because of superior soft tissue resolution and better delineation of pathology yet it is often used as a problem-solving tool due to its high cost and limited availability. USG parameters such as wall thickness of the GB, mobility of gallstone, distension and presence of pericholecystic fluid or wall edema are parameters helpful in assessing GB pathologies and are important in management of patient. Hence, preoperative USG scan can help in predicting successful outcome of laparoscopic removal of gallbladder.

In our country, gallbladder carcinoma is not uncommon. Ultrasonography is an important diagnostic tools available in our country to evaluate the hepatobiliary system. By utilization of these advanced imaging modalities, carcinoma gallbladder can be detected early when these tumors are still localized. Thus survival time of the patients can be increased by early removal of tumors. To the best of our knowledge, not much more of published data is available in this country in the field of radiologic evaluation (USG) of carcinoma gallbladder.

The main aim of this study was to assess preoperative USG imaging of Gall bladder stone while secondary aim was to assess its reliability in predicting chances of its complications. Incidentally, in India, the endemic zones for gall bladder disease, i.e., Western Bihar and Eastern Uttar Pradesh have one of the lowest GDP and advanced noninvasive imaging infrastructure such as computed tomography (CT) and MRI are scarcely available, hence, convinced with the recent reports showing the usefulness of high resolution USG in the diagnosis and differentiation of gall-bladder stone & its complication, the present study is an attempt to fulfill this gap and was planned with an eye to evaluate whether USG can be helpful in the early diagnosis of gallbladder stone and its associated complications.

### MATERIAL & METHODS

This cross-sectional observational study was conducted at Department of Radiodiagnosis, GMC, Azamgarh in patients with suspected gall bladder disease referred to our department for USG evaluation and

who met the inclusion criteria were included in the study over a period of 6 months from August 2020 to February 2021. A total of 165 patients were initially included on the basis of signs and symptom of gallbladder stone (such as epigastric pain, upper abdominal pain, jaundice, itching, weight loss and right hypochondrial pain) and underwent USG for preoperative radiological diagnosis, its extension and operability.

**Inclusion Criteria**

1. All those Patients who were willing to give signed written informed consent form were included.
2. All patients with Gall bladder stone on USG were included in the study.

**Exclusion Criteria**

1. Patients who were not willing to sign the inform consent were excluded.
2. Patients who had undergone partial cholecystectomy in the past.
3. Debilitated patients were excluded from the study.

All the patients were subsequently subjected to USG evaluation. USG examination was performed using Voluson-P8 USG machine (GE Healthcare) by a clinically experienced radiologist performing sonographic examination. All sonographic examinations were performed independently. During examination, an intercostal/subcostal scan was performed using both low frequency (1.5–4.5 MHz) and high frequency (5–7 MHz) transducer using real-time, spatial compound imaging techniques, and speckle reduction techniques as well as with and without harmonic imaging as per technique. Image analysis was performed and analysis was based on the formal reports focusing on the presence of GB stone and the stage of the GB cancer. Presence of mass-occupying lesion nearly filling or replacing the lumen, often directly invading the surrounding liver parenchyma, focal or diffuse asymmetric wall thickening were considered to be suggestive of gall-bladder carcinoma.<sup>14,15</sup>

The USG scan was performed by a clinically experienced radiologist to reach at a conclusion. The person who analyzed the images was blinded to the USG and histopathological results. The final diagnosis was made on the basis of correlation of histopathological/USG findings. The diagnostic efficacy of USG was calculated against final diagnosis in terms of sensitivity, specificity, positive and negative predictive values, and overall accuracy.

Surgeries were done by senior experienced surgeons. After surgeries, specimens were sent immediately to the hospital diagnostic laboratory for histopathology to detect the gall bladder carcinoma. The information obtained was collected via self-made proforma. The USG diagnosis & histopathology revealed 35 with carcinoma of gall bladder and the rest with inflammatory lesion, acute & chronic cholecystitis etc.

**Statistical Analysis**

Descriptive statistical analysis has been carried out in the present study. Results on categorical measurements are presented in number (%). Chi-square test has been used to find the significance of study parameters on categorical scale between two or more groups. P value <0.05 were considered statistically significant.

Following result was obtained during the study period.

- During the study Period, a total of 155 Patients underwent abdominal USG to find out gall stone and it was observed that 94 (60.64%) were Male whereas 61 (39.35%) Patients were female. Similarly, out of 155 Patients, it was observed that at majority of Patients were in the Age group of 30-39 (29.67%) followed by Age group of 40-49 (20%) while Patients with age group of >80 was minimum (1.29%), as represented in Table no 1. In our study at government hospital  $\chi^2$  was 4.35, d.f was 5 and p value was 0.5954, which indicates that there was no association between age group and gender.

**Table 1: Gender wise Age group distribution of Patients with Gall stone (n=155)**

GOVERNMENT HOSPITAL			
Age group(years)	Patients		Total (%)
	Male (%) (n=94)	Female (%) (n=61)	
<20	03 (3.19)	02 (3.27)	05 (3.22)

20-29	19 (20.21)	10 (16.39)	29 (18.70)
30-39	31 (32.97)	15 (24.59)	46 (29.67)
40-49	20 (21.27)	11 (18.03)	31 (20)
50-59	17 (18.08)	10 (16.39)	27 (17.41)
60-69	09 (9.57)	09 (14.75)	18 (11.61)
70-79	04 (4.25)	03 (4.91)	07 (4.51)
>80	01(1.06)	01 (1.63)	02 (1.29)
Total	94 (100)	61 (100)	165 (100)
Grand Total (%)	60.64	39.35	100
$\chi^2= 4.35$ d.f=5 p= 0.5954 (Mean $\pm$ SD: 42.12 $\pm$ 18.12)			

- During the study Period on analyzing cases according to the presenting symptoms Gender wise it was observed that, most common presenting symptoms was Right hypochondrial pain accounting 39 (25.16%) followed by Epigastric pain 28 (18.06%), Dyspepsia 21 (13.54%) while least presenting symptoms was Jaundice 06 (3.87%) as represented in Table no 2. In our study at government hospital  $\chi^2$  was 2.538, d.f was 1 and p value was 0.695 which indicates that there was no association between age group and gender.

**Table 2: Distribution of cases according to the presenting symptoms (n=155)**

GOVERNMENT HOSPITAL				
S.No	Type of Symptoms	Patients		Total (%) (n=155)
		Male (%) (n=94)	Female (%) (n=61)	
1.	Right hypochondrial pain	24 (25.53)	15 (24.59)	39 (25.16)
2.	Epigastric pain	19 (20.12)	09 (14.75)	28 (18.06)
3.	Dyspepsia	13 (13.82)	08 (13.11)	21 (13.54)
4.	Vomiting	08 (8.51)	09 (14.75)	17 (10.96)
5.	Nausea	11 (11.70)	05 (8.19)	16 (10.32)
6.	Weight loss	08 (8.51)	04 (6.55)	12 (7.74)
8.	Positive Murphy Sign	06 (6.38)	03 (4.91)	09 (5.80)
9.	Jaundice	03 (3.19)	03 (4.91)	06 (3.87)
10.	Others (Itching, Upper abdominal mass)	12 (12.76)	05 (8.19)	17 (10.96)
Grand Total (%)		94 (100)	61 (100)	165 (100)
$\chi^2= 2.538$ d.f=1 p=0.695				

- In our study final diagnosis was established based on histopathology/USG evaluation in study population and it was observed that in majority of patients was diagnosed with Cholelithiasis 72 (46.45%) followed by Benign gall-bladder lesions 35 (22.58%), Acute cholecystitis & Chronic cholecystitis 14 (9.03%) & 09 (5.80%) & Gall-bladder carcinoma 35 (22.58%) of which Stage I was 08 (5.16%), Stage II was 03 (1.93%), Stage III was 17 (10.96%) and stage 4 was 07 (4.51%) as depicted in Table no 3. In our study at government hospital t value was 3.21 and p value was 0.187 which indicates that there was no association between age group and gender.

**Table 3: Final diagnosis (n=155) (Based on histopathology/USG evaluation)**

GOVERNMENT HOSPITAL			
Final diagnosis	Patients		Total (%) (n=155)
	Male (%) (n=94)	Female (%) (n=61)	
Cholelithiasis	53 (56.38)	19 (31.14)	72 (46.45)
Benign gall-bladder lesions	18 (19.14)	17 (27.86)	35 (22.58)
Acute cholecystitis	08 (8.51)	06 (9.83)	14 (9.03)
Chronic cholecystitis	05 (5.31)	04 (6.55)	09 (5.80)
Gall-bladder carcinoma (n=35)			
Stage I	05 (5.31)	03 (4.91)	08 (5.16)
Stage II	1 (1.06)	02 (3.27)	03 (1.93)
Stage III	11 (11.70)	06 (9.83)	17 (10.96)
Stage IV	03 (3.19)	04 (6.55)	07 (4.51)
Total (%)	94 (100)	61 (100)	155 (100)
Grand Total (%)	51.56	48.43	100
t value =3.21 p value=0.187			

- In our study out of 155 patients presenting with different type of stones with gall bladder lesion were analyzed and the study reports revealed that 63 patients had Mixed type gall stone, 31 had combined type gall stone, 34 had pigment type gall stone 27 patients cholesterol type stone while majority of stone were found in Non-neoplastic lesion as depicted in Table no 4.

**Table no 4: Relation of type of stones with gall bladder lesions**

Type of lesions	Mixed (%)	Combined (%)	Pigment (%)	Cholesterol (%)
Non-Neoplastic lesions	39 (61.90)	19 (61.29)	25 (73.52)	12 (44.44)
Pre-Malignant Lesion	05 (7.93)	03 (9.67)	05 (14.70)	12 (44.44)
Malignant	19 (30.15)	09 (29.03)	04 (11.76)	03 (11.11)
Total	63 (100)	31 (100)	34 (100)	27 (100)
* $\chi^2=7.925$ * $p=0.006$ (Highly Significant)				

- In our study on distributing cases of gall bladder lesions according to the diet the study reports revealed that 24.21% Vegetarian had Non-neoplastic lesion while 75.78% Mixed dietary habit had Non-neoplastic lesion. Similarly, 36% Vegetarian had pre-malignant lesion while 64% Mixed dietary habit had pre-malignant lesion. 20% Vegetarian had malignant lesion while 80% Mixed dietary habit had malignant lesion as depicted in Table no 5.

**Table no 5: Distributions of cases of gall bladder lesions according to the diet**

Diet	Non-Neoplastic (n=95)	Percentage	Pre-Malignant (n=25)	Percentage	Malignant (n=35)	Percentage
Vegetarian	23	24.21	09	36	07	20
Mixed	72	75.78	16	64	28	80
Total	95	100	25	100	35	100
$\chi^2=10.687$ * $p=0.019$ (Highly Significant)						

## DISCUSSION

Earlier gallbladder stones and its associated complications were regarded as an uncommon disease. However, reports within the last few decades showed that it's not as rare as it was previously supposed. Rather it is the most common malignant tumor of the biliary tract. However early diagnosis of gallbladder stones and its associated complications is difficult as there are no specific signs and symptoms. Recent improvement in the hepatobiliary imaging techniques has been increasingly promising with respect to accurate preoperative diagnosis and assessment of the extent of gallbladder stones and its associated complications.

As the clinical presentation is confusing, these modern imaging modalities can play an important role in the diagnosis of the disease. However, the imaging appearance of gallbladder stones and its associated complications in USG and other imaging techniques and their sensitivity, specificity and accuracy in the correct diagnosis are not yet evaluated in our country.

Our study reports revealed male preponderance than female accounting for 60.64% male and 39.35% female. Majority of published literature were in contradiction to our study findings and reported female as prone candidate for gallbladder stones and its associated complications.<sup>16, 17</sup> The most obvious reason could be because of the fact that since this study was conducted in rural set up hospital where male patients presenting with the symptoms belonged to low socioeconomic status and had mixed pattern of diet along being alcoholics because of poor literacy rate.

Similarly, it was observed that at majority of Patients were in the middle age group ranging from 30-50 & accounting 29.67% for age group of 30-39 followed by age group of 40-49 (20%) while Patients with age group of >80 was minimum (1.29%) which was in accordance with findings of Pradhan et al<sup>18</sup> who reported maximum 32.5% cases belongs to age group 30-39 years with M:F of 1:3.2, similar observations were reported by Idris et al<sup>19</sup> and Aslam et al<sup>20</sup>, who observed majority of cases from age group 31-50 years. One of the cause of these aged people association with Gall bladder disease is because these aged group people prefer to eat food like Non-veg and oily food which have more lipid content.

In our study it was observed that, most common presenting symptoms to surgeons were Right hypochondrial pain accounting 39 (25.16%) followed by Epigastric pain 28 (18.06%), Dyspepsia 21 (13.54%) while least presenting symptoms was Jaundice 06 (3.87%) which was Similar with observations reported by Pradhan et al<sup>18</sup> who observed maximum cases presented with pain in Right Hypochondrium followed by epigastric pain. The commonest physical sign in the present study was gallbladder lump followed by right hypochondrial tenderness. However, in majority of the cases, there was no major clinical sign suggestive of biliary disease at the time of presentation. This being a tertiary care referral centre, the patients are usually referred here by local practitioners from remote areas after giving them symptomatic relief.

In our study based on histopathology/USG evaluation it was observed that majority of patients was diagnosed with Cholelithiasis 72 (46.45%) followed by Benign gall-bladder lesions 35 (22.58%), Acute cholecystitis & Chronic cholecystitis 14 (9.03%) & 09 (5.80%) & Gall-bladder carcinoma 35 (22.58%) of which Stage I was 08 (5.16%), Stage II was 03 (1.93%), Stage III was 17 (10.96%) and stage 4 was 07 (4.51%). These findings were similar to study results reported by Khanduri S et al who reported Cholelithiasis as most common diagnosis followed by benign gall-bladder lesions. Cholelithiasis is a well-established risk factor for the development of gallbladder carcinoma. Gall stones cause chronic irritation and inflammation of gallbladder leading to mucosal dysplasia and subsequent carcinoma.

The study reports revealed that 63 patients had Mixed type gall stone, 31 had combined type gall stone, 34 had pigment type gall stone 27 patients cholesterol type stone while majority of stone were found in Non-neoplastic lesion. These findings were in accordance with a study done by A. C. Srivastav et al<sup>21</sup> who reported maximum percentage of cases having mixed type of gallstones and contradiction to the findings of Idris et al<sup>19</sup> who reported maximum (51.1%) cases had pigment stone.

The study reports revealed that 24.21% Vegetarian had Non-neoplastic lesion while 75.78% Mixed dietary habit had Non-neoplastic lesion. Similarly, 36% Vegetarian had pre-malignant lesion while 64% Mixed dietary habit had pre-malignant lesion. 20% Vegetarian had malignant lesion while 80% Mixed dietary habit had malignant lesion. Non-vegetarians were found to be more commonly involved with cholelithiasis than vegetarians. The ratio of incidence of different lesions were more in non-vegetarian than the vegetarian though the exact cause cannot be stated, however it could be due to the consumption of high protein and fat. The findings were similar with the findings in a study done by Pradhan et al.<sup>18</sup>

## CONCLUSION

The study findings helped to conclude that gall bladder diseases were more common in males. Multiparty and mixed diets are important risk factors for developing gall bladder stones. Majority of the cases were benign lesions & maximum number of gall stones were mixed type followed by pigment, combined, cholesterol.

As the histopathological diagnosis of the present study correlated well with USG findings in the diagnosis of gallbladder stones and its complications, it can be concluded that USG is useful imaging modalities for diagnosing this disease & its skillful use helps in early detection of gall bladder stones and its complications in low resource settings. It can help in the identification of a large number of gall-bladder stones and its complications in settings where advanced imaging tools such as CT and magnetic resonance are not available. USG is also an economical tool for screening and detection of gall-bladder stones and its complications and minimizing the role of more costly imaging modalities such as CT.

The findings of present study showed that with the Gallbladder stones and its complications has poor prognosis due to delayed presentation and early spread. Early diagnosis and identification of high-risk cases and providing prophylactic cholecystectomy could offer a potential cure for patients. However, as the sample size was small further large-scale study is recommended to validate the findings of the present study.

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