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Original Research Article

A Hospital Based Case Control Study of the Gallbladder Wall Thickness in Patients with Cholecystitis and Cholelithiasis by Ultrasonography

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Abstract

Background: This is hospital based case control study of Cholelithiasis and choledocholithiasis by usage of ultrsonography. Cholelithiasis and choledocholithiasis is the presence of stones in gall bladder and in the common bile duct. Aim of this study is to determine the gallbladder (GB) wall thickness in patients with cholecystitis and cholelithiasis with the help of ultrasonography for the estimation of epidemiology.

Methods: This was a hospital-based case–control study. Patients with cholecystitis and cholelithiasis of age between 15 and 70 years of either sex were included in the study. The GB wall thickness was determined in the fasting state. A total of 50 samples, 36 cases (with diseased bladder) and 14 controls (with normal bladder) were included in the study.

Results: More than one-third of cases (38.9%) were between 30 and 40 years. The mean age of cases and controls was 42.22 ± 12.81 and 35.43 ± 11.85 years, respectively.

More than one-third of both cases (36.1%) and controls (35.7%) were males. The GB wall thickness was significantly (P = 0.005) higher among the cases (4.06 ± 2.28 mm) than that of controls (2.22 ± 0.67 mm). Full distention of the GB was in more than half of both cases (69.4%)and controls (57.1%). Partial distended was in 11.1% of cases and in 21.4% of controls. Contracted (8.3%) and over distended (2.8%)were only seen among cases. The GB wall thickness of ≥3 mm was among 66.7% of patients and in 14.3% of controls. The GB wall thickness of <3 mm was 92% lower in cases compared to controls (odds ratio = 0.08, 95% confidence interval = 0.01–0.43, P = 0.001).

Conclusion: During ultrasonography, a higher degree of the GB wall thickness was found in patients with cholecystitis and cholelithiasis as compared to the control group.

Keywords: Carcinoma, cholecystitis, cholelithiasis, epidemiology, gallbladder wall thickness, ultrasonography.

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Introduction

Cholelithiasis (gallstones) and cholecystitis are highly prevalent in India, with reported prevalence rates ranging between 2% and 29%, showing significant regional variation and increasing trends due to lifestyle changes. The condition is substantially higher in North India compared to South India, with females over 40 being at higher risk (1:1.97 ratio), often presenting with chronic cholecystitis.

Cholecystitis (inflammation of the gallbladder) and cholelithiasis (gallstones) are highly prevalent in Bihar, particularly within the Gangetic belt, which is considered an endemic region for gallbladder disease (GBD). Studies indicate that these conditions are heavily associated with environmental factors, lifestyle changes, and dietary habits. Based on studies conducted at Sri Krishna Medical College and Hospital (SKMCH) in Muzaffarpur, cholecystitis and cholelithiasis (gallstone disease) are highly prevalent, particularly among middle-aged, female patients in the North Bihar region.

Cholelithiasis or gallstone is the presence of hardened deposits of digestive fluid that is formed in the gallbladder. The gallbladder is a small organ located just beneath the liver. It holds the digestive

fluid known as bile, which will be released into the small intestine [1]. Cholelithiasis affects approximately 5.3- 25% of the population, according to clinical survey reports from Europe, North and South America, and Asia [2,3]. Commonly, this disorder occurs asymptomatically, and only 20% of people with cholelithiasis experience pain and complications. The most common risk factor of cholelithiasis is gender, with females being one of the unmodifiable risk factors and is also related to metabolic syndrome events [4]. Pimpale et al. [5] stated that cholelithiasis is commonly found in females in the 4th to 5th decade of life, with abdominal pain being the most typical symptom. There are some other risk factors of cholelithiasis, such as genetics, the lack of physical activity which is also associated with metabolic syndrome, obesity which is related to the increase of cholesterol gallstones formation, dietary factors, and other comorbidities [6].

The aim was to estimate epidemiology of the GB wall thickness in patients with cholecystitis and cholelithiasis by ultrasonography.

Materials and Methods

This was a hospital-based case–control study conducted at Department of General Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from February 2025 to July 2025. Patients with cholecystitis and cholelithiasis of age between 15 and 70 years irrespective of gender were included in the study (cases).All patient's cases (36) and controls (14) were advised the night before that did not eat or drink. Control groups (normal gallbladder) were collected when patients are having other abdominal diseases diagnosed by ultrasonography. The GB wall thickness was measured in fasting. Total 50 cases, 36 cases and 14 controls were included in the study. The results are presented in frequencies, percentages, and mean ± standard deviation.

The Chi-square test was used to find the associations of categorical variables between cases and controls. The unpaired t-test was used to compare the GB wall thickness between cases and controls. The odds ratio (OR) with its 95% confidence interval (CI) was calculated. The $P<0.05$ was considered statistically significant. All the analysis was carried out using SPSS software 24.0 version (Chicago, Inc., IL, USA).

Results

More than one-third of cases (38.9%) and 28.6% of controls were between the age group of 30 and 40 years. The average age of cases and controls was 42.22 ± 12.81 and 35.43 ± 11.85 years, respectively. More than half of both cases (63.9%) and controls (64.3%) were females. No significant ($P > 0.05$) difference was observed in age and gender between cases and controls showing comparability of the groups in terms of age and gender [Table 1].

Table 1: Distribution of demographic profile of patients between cases and controls

Demographic Profile	Cases (n=36), n(%)	Control (n=14), n(%)	p-value[a]
Age (years)			0.17
<30	4(11.1%)	5(35.7%)	
30-40	14(38.9%)	4(28.6%)	
41-50	10(27.8%)	4(28.6%)	
>50	8(22.2%)	1(7.1%)	
Mean±SD	42.22±12.81	35.43±11.85	
Gender			
Male	13(36.1%)	5(35.7%)	0.97
Female	23(63.9%)	9(64.3%)	

[a]Chi-square test. SD: Standard deviation

Smoking was in 13.9% in cases and in14.3% in controls. Alcohol habit was in 11.1% of cases and in 7.1% of controls [Table 2].

Table 2: Distribution of personal habit between cases and controls

Personal Habit	Cases (n=36), n(%)	Control (n=14), n(%)	p-value[a]
Smoking	5(13.9%)	2(14.3%)	0.91
Alcohol	4(11.1%)	1(7.1%)	
None	27(75.0%)	11(78.6%)	

[a]Chi-square test

The GB wall thickness was significantly ($P = 0.005$) higher among cases (4.06 ± 2.28) than that of controls (2.22 ± 0.67) [Table 3].

Table 3: Comparison of the mean gallbladder wall thickness between cases and controls

Groups	Gallbladder thickness (mm), mean±SD
Cases	4.06±2.28
Controls	2.22±0.67
P[a]	0.005*

[a]Unpaired t-test, *Significant, SD: Standard deviation

GB wall thickness ≥3 mm was among 66.7% of patients and in 14.3% of controls. The GB wall thickness <3 mm was 92% lower in cases compared to controls (OR = 0.08, 95% CI = 0.01–0.43, P = 0.001) [Table 4].

Table 4: Comparison of the gallbladder wall thickness between cases and controls

Gallbladder thickness (mm)	Cases (n=36), n(%)	Control (n=14), n(%)	OR (95%CI), P[a]
<3	12(33.3%)	12(87.7%)	0.08(0.01-0.43), 0.001*
≥3	24(66.7%)	2(14.3%)	

[a]Chi-square test. *Significant. OR: Odds ratio, CI: Confidence interval

A full distention of the GB was among more than half in both cases (69.4%) and controls (57.1%). Partial distended was seen in 11.1% of cases and in 21.4% of controls. Contracted distention was observed in 8.3% of cases only [Table 5].

Table 5: Comparison of distention of the gallbladder between cases and controls

Distention of gallbladder	Cases (n=36), n(%)	Control (n=14), n(%)	OR (95%CI), P[a]
Contracted	3(8.3%)	0(0.0)	NA
Full	25(69.4%)	8(57.1%)	
Over distended	1(2.8%)	0(0.0)	
Partial distended	4(11.1%)	3(21.4%)	
None	3(8.3%)	3(21.4%)	

[a]Chi-square test. NA: Not applicable (being >1 0s in controls)

Discussion

Cancer of the gall bladder is uncommon; however, it is fifth frequently common gastrointestinal malignancy and is found in 1% to 3% of cholecystectomy specimens.[7] 2.5 new cases detected per 100,000 inhabitants/year. The mortality rate is high due to GB as most of the time, it is diagnosed at advanced stages of disease. This is due to the scarcity of symptoms.[8]

Countries having a high incidence of GBC include Chile, Poland, India, and Japan. High incidence of GBC is being reported among North Indian women (21.5/100,000) and female native American Indians (14.5/100,000).[9] In the present study, 38.9% of cases and 28.6% of controls were between 30 and 40 years of age. The mean age of cases and controls was 42.22 ± 12.81 and 35.43 ± 11.85 years, respectively. Agrawal et al. reported that most of the patients were of the age group between 30 and 40 years with an average age of 37 years of acute and chronic cholecystitis patients.[10]

The percentage of females was higher than males in this study which was in consistent with the study by Agrawal et al. in which 70% of the acute and chronic cholecystitis patients were females.[10] Hasan et al.[11] reported that the youngest patient of this series was 28 years, and the oldest was of 79 years.Reported that female are more affected than male these ratio are 1:5-1:2. In this study, the GB wall thickness of ≥3 mm was among 66.7% of patients and in 14.3% of controls. The GB wall thickness of <3 mm was 92% lower in cases compared to controls (OR = 0.08, 95%CI = 0.01–0.43, P = 0.001). Agrawal et al.[10] observed that the GB wall was >3 mm in 25.5% of patients with acute calculus cholecystitis and >3 mm in 24.5% of patients with chronic calculous cholecystitis. Engel et al.[12]reported that majority of healthy individuals (97%) had the gallbladder wall thickness of <2 mm. Hasan et al.[11] reported that there was a strong correlation between cholelithiasis and GBC, with gallstones found in nearly 80% of all cases. GBC can be asfocal or diffuse asymmetric wall thickening in 20%–30% cases.[13]

According to several authors, the upper limit for the normal GB wall thickness is 3 mm. However, in patients with inappropriate fasting, the parietal thickness can be exceeded this limit. This is because of the organ's smooth muscle contraction.[8] GB contraction is recognized in resulting from long-standing chronic cholecystitis.[14] In this study, a full distention of the GB was among more than half in both cases (69.4%) and controls (57.1%). Partial distended was seen in 11.1% of cases and in 21.4% of controls. Contracted distention was observed in 8.3% of cases only.

Conclusion

During ultrasonography, a higher degree of GB wall thickness was found in patients with cholecystitis and cholelithiasis as compared to the

control group. The individual with the GB wall thickness of 7 mm and above is prone to have cancer; therefore, all such cases should be subjected to biopsy for histopathological examination to rule out the cancer GB for better prognosis.

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