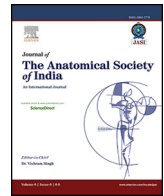




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## Original Article

# Ultrasound imaging of gallbladder variants

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## ABSTRACT

**Introduction:** This article examines the variations and anomalies of gallbladder. This study is highly useful for surgical purposes where there is always a lot of variations seen, to prevent misdiagnosis and to aid in evaluation of differential diagnostic possibilities.

**Methods:** Ultrasonography was used to perform this study.

**Result:** This study demonstrates wide array of variants including anomalies in location, number and configuration. The present study shows that there is double gallbladder found in 1%, kinking of posterior wall of gallbladder in 15%, Phrygian cap deformity in 7%, curved gallbladder found in 1%, intrahepatic gallbladder observed in 9%, transverse gallbladder detected in 7% and the gallbladder is located under the left lobe of liver in 2% of the cases. Normal location in right Hypochondrium is seen in 81 subjects.

**Discussion:** The present study shows various anomalies of gallbladder that can be diagnosed prior to the surgery, so as to avoid misdiagnosis that could cause any fatality.

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## 1. Introduction

The gallbladder is an organ that stores and concentrates bile before it is delivered to the small bowels. It consists of fundus, body and neck. Shape is normally pear shape. It is situated on the under-surface of right lobe of Liver in the fossa for the gallbladder. Normally location is the right Hypochondrium. Our objective is to study the prevalence of variations in gallbladder and its morphology, locations, number and configuration, to compare findings with other group findings, to infer any factors or clues in gallbladder diseases and to alert the clinician of variations of the gallbladder that could result in fatality during procedures.

## 2. Materials and methods

Subjects include 100 normal, healthy adults who came for master health check with no known signs and symptoms of any disease clinically, biochemically and ultrasonographically. Subjects are picked up randomly from cosmopolitan urban upper to middle class population group. Subjects include 61 males and 39 females (Graph 1). Age ranges from 19 to 65 years. Prior consent was taken in all cases. Study is approved by the Local Ethical

committee of Nitya Diagnostic Centre Study and performed at Nitya Diagnostic Centre.

## 3. Result

The present study shows that there is double gallbladder found in 1%, kinking of posterior wall of gallbladder in 15%, Phrygian cap deformity in 7%, curved gallbladder found in 1%, intrahepatic gallbladder observed in 9%, transverse gallbladder detected in 7% and the gallbladder is located under the left lobe of liver in 2% of the cases. Normal location in right Hypochondrium is seen in 81 subjects (Graph 2, Tables 1–3, Figs. 1–7).

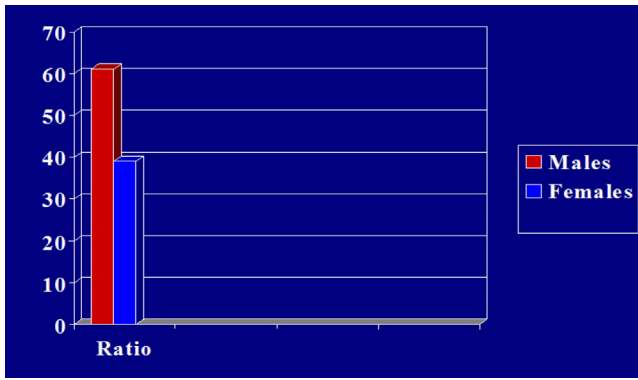
## 4. Discussion

### 4.1. Variation in form and shape

Several variations in the ultrasonographic appearance of gallbladder shape were described. The so-called junctional fold is a kinking or folding of the gallbladder, usually of the posterior wall, but can occur anteriorly as well. Such junctional folds occur frequently, and are easily shown by ultrasonography as well as by other imaging techniques. The gallbladder may show gross folding or bending, occasionally forming a bizarre appearance or an unusual shape. Careful analysis usually excludes adjacent disease.

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Graph 1. Male to female ratio in our study.

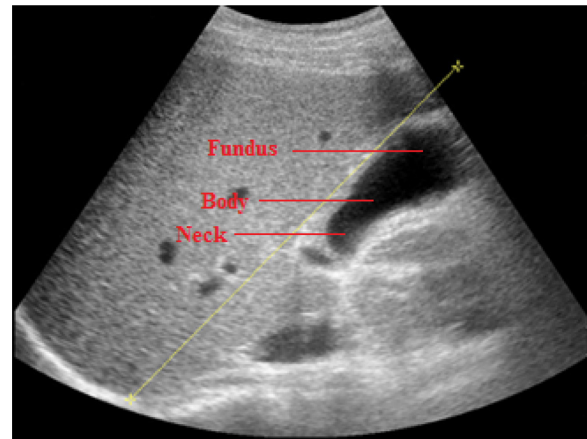
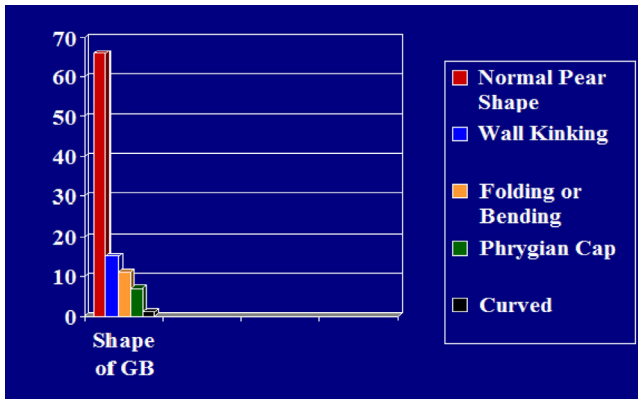


Fig. 1. Normal pear-shaped gallbladder.



Graph 2. Variants of gallbladder.

The Phrygian cap is a common normal variation. The name is derived from ancient Greek headgear, descriptive of the asymptomatic folding of the gallbladder fundus.

Two most significant variations are the folded fundus and variations at neck of the gallbladder.<sup>1</sup> According to Khamiso Altaf, Phrygian cap variations are about 1 in 300 cases i.e. 0.33.<sup>2,3</sup> It is a

**Table 1**  
 Variants in form and shape.

S. no.	Variations	Subjects
1.	Normal gallbladder	66
2.	Posterior wall kinking	15
3.	Folding or bending	11
4.	Phrygian cap	7
5.	Curved (bizarre)	1

**Table 2**  
 Variation in location.

S. no.	Variation	Subjects
1.	Normal variation in right hypochondrium	81
2.	Intrahepatic	9
3.	Transverse	7
4.	Under the left lobe	2

**Table 3**  
 Variation in number.

S. no.	Variations	Subjects
1.	Single gallbladder	99
2.	Double gallbladder	1



Fig. 2. Gallbladder with folding or bending.

rare cause of false positive diagnosis of stones. According to Williams B. Sutter and Phillips, variants in double gallbladder are 2.5 in 10,000. Due to inadequate drainage by any lobe it may be a predisposing factor for the development of cholelithiasis.<sup>3</sup> Meistrup et al., 1991<sup>4</sup> observed that gross bending of the gallbladder can occur posteriorly or anteriorly and lead to bizarre or unusual shapes when visualized by sonography and other



Fig. 3. Junctional fold in gallbladder.

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