

## Evaluation of Prevalence of Various Sonographic Sub-Types of Cholesterol Gallstones: An Institutional Based Cross-Sectional Study

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### ABSTRACT

**Background:** One of the most common medical problems leading to surgical intervention is gallstones disease. Since Ultra sonographic images depend on the composition of the object, it is logical to postulate that different gallstones may have different sonographic characteristics when studied in finer detail. Hence; we planned the present study for sonographic assessment of gallstones among patients of known population.

**Materials & Methods:** The present study included sonographic assessment of gallstones among patients of known population. A total of 30 patients attending the department of general surgery were included in the present study. Ultrasound was performed in the fasting state using a 3.5 MHz transducer. Biochemical analysis of these calculi was done for the estimation of their cholesterol content. All the results were analysed by SPSS software.

**Results:** On performing the biochemical analysis, it was found that in all the 30 patients, the gallstones were of cholesterol calculi. Full moon, half moon and crescent type of gallstones were among the most commonly detected gallstones followed by comet tail gallstones.

**Conclusion:** No single sonographic pattern is exhibited by cholesterol gallstones.

**KEYWORDS:** Cholesterol, Gallstones, Sonographic.

### INTRODUCTION

Gallstone disease remains one of the most common medical problems leading to surgical intervention. An estimated 20% of adults over 40 years of age and 30% of those over age 70 have biliary calculi.<sup>1,2</sup>

During the last two decades, the general principles of gallstone management have not notably changed. However, methods of treatment have been dramatically altered. Today, laparoscopic cholecystectomy, laparoscopic common bile duct exploration, and endoscopic retrograde management of common bile duct (CBD) stones play important roles in the treatment of gallstones.<sup>3-5</sup>

These technological advances in the management of biliary tract disease are not infrequently accomplished by a multidisciplinary team of physicians, including surgeons trained in laparoscopic techniques, interventional gastroenterologists, and interventional radiologists. It is well known that variable response of cholesterol calculi to oral dissolution drugs and extracorporeal shock wave lithotripsy occurs.<sup>6-9</sup> Since Ultra sonographic images depend on the composition of the object, it is logical to postulate that different gallstones

may have different sonographic characteristics when studied in finer detail.<sup>10</sup> Hence; we planned the present study for sonographic assessment of gallstones among patients of known population.

### MATERIALS & METHODS

The present study was planned the department of radiology and surgery, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Vijayawada, Andhra Pradesh (India) and included sonographic assessment of gallstones among patients of known population.

Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 30 patients attending the department of general surgery were included in the present study. Ultrasound was performed in the fasting state using a 3.5 MHz transducer. An attempt was made to profile the calculus fully and delineate the acoustic shadowing clearly. Classification of gallstone morphology was done on the basis of sonographic findings as follows:<sup>11</sup>

- (i) Full Moon,
- (ii) Half Moon
- (iii) Crescent
- (iv) Comet Tail
- (v) Others.

**Chemical Assessment of Gallstones**

Biochemical analysis of these calculi was done for the estimation of their cholesterol content. A stone with a cholesterol content of more than 70 gm percent was classified as a cholesterol calculus. All the results were analysed by SPSS software. Univariate regression curve and chi- square test were used for assessment of level of

significance. P- Value of less than 0.05 was taken as significant.

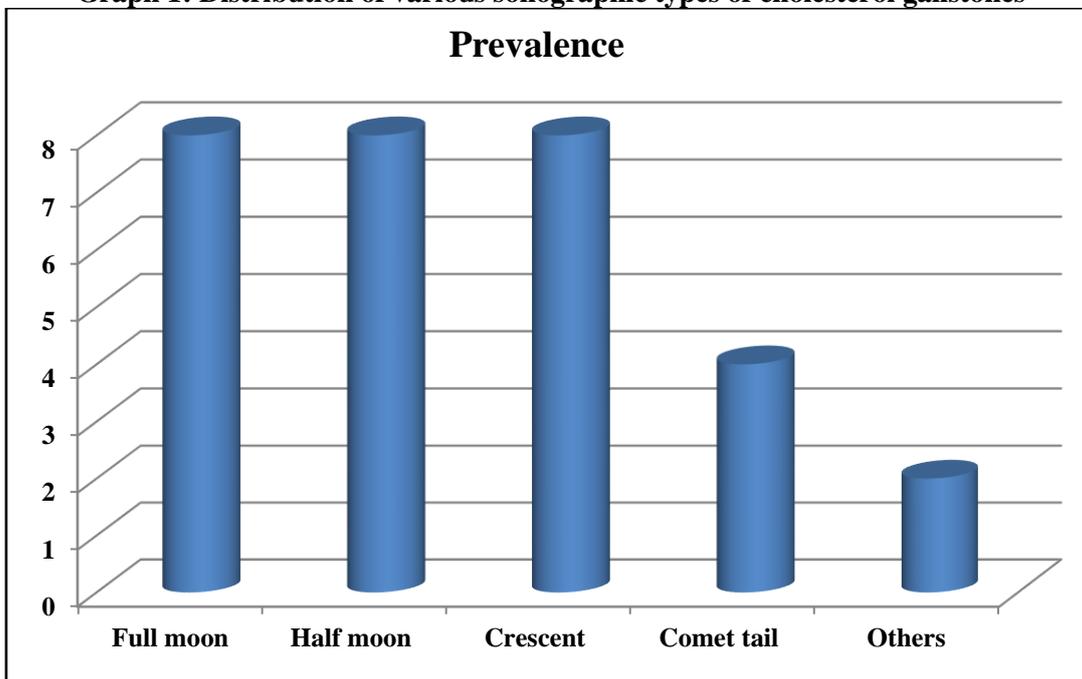
**RESULTS**

A total of 30 patients with gallstones were included in the present study. The mean age of the patients was 40.5 years. Out of 30, 21 patients were females while the remaining 9 were males. On performing the biochemical analysis, it was found that in all the 30 patients, the gallstones were of cholesterol calculi. Full moon, half moon and crescent type of gallstones were among the most commonly detected gallstones followed by comet tail gallstones.

**Table 1: Distribution of various sonographic types of cholesterol gallstones**

S No.	Type	Prevalence
(i)	Full moon	8
(ii)	Half moon	8
(iii)	Crescent	8
(iv)	Comet tail	4
(v)	Others	2

**Graph 1: Distribution of various sonographic types of cholesterol gallstones**



**DISCUSSION**

The present study included sonographic assessment of gallstones among patients of known population. In the present study, we observed that no uniform sonographic pattern is exhibited by gallstones, however; a distinctive variety of patterns is exhibited. Kapoor BS et al studied the ultrasonographic characteristics of 233 patients with gallstone disease and functioning gall bladders and an effort was made to correlate cholesterol and calcium content of different types of stones (as estimated by X-Ray powder diffraction study and atomic

absorption spectrophotometry) with their ultrasonographic characteristics. Sonographic criteria for the presence of cholesterol stones were those which were floating and gallstones producing acoustic shadowing without internal echoes from within the stone. In detecting findings which would predict the presence of cholesterol stones on ultrasound, ultrasound had a sensitivity of 72.90% and a specificity of 100%. The predictive values of positive findings and negative findings were 100 % and 93.4 %, respectively. The

demonstration of typical features of cholesterol stones on ultrasound obviates the need for oral cholecystography.<sup>12</sup> Brakel K et al compared the results of ultrasound (US) and oral cholecystography (OCG) in 171 patients with gallstones being assessed for non-surgical therapy. Sonographic criteria for non-visualization were a contracted gall-bladder and stone impaction in the gall-bladder neck or cystic duct. In detecting findings which predict non-visualization on OCG, US had a sensitivity of 78.3% and a specificity of 97.6%. The predictive values were: positive findings 92.3% and negative findings 92.4%. The overall accuracy was 92.4%. We conclude that US can be used as a first step in selecting patients for non-surgical therapy and if US indicates a contracted gall-bladder, 11% of the patients can be excluded from further diagnostic imaging.<sup>13</sup>

Hussaini SH et al investigated gallstone composition by direct and indirect methods in 14 octreotide treated acromegalic patients with gall stones. Chemical analysis of gall stones retrieved at cholecystectomy from two patients, showed that they contained 71% and 87% cholesterol by weight. In the remaining 12 patients, localised computed tomography of the gall bladder showed that eight had stones with maximum attenuation scores of < 100 Hounsfield units (values of < 100 HU predict cholesterol rich, dissolvable stones). Gall bladder bile was obtained by ultrasound guided, fine needle puncture from six patients. All six patients had supersaturated bile (mean (SEM) cholesterol saturation index of 1.19 (0.08) (range 1.01-1.53)) and all had abnormally rapid cholesterol microcrystal nucleation times (< 4 days (range 1-4)), whilst in four, the bile contained cholesterol microcrystals immediately after sampling. Of the 12 patients considered for oral ursodeoxycholic acid (UDCA) treatment, two had a blocked cystic duct and were not started on UDCA while one was lost to follow up. After one year of treatment, five of the remaining nine patients showed either partial (n = 3) or complete (n = 2) gall stone dissolution, suggesting that their stones were cholesterol rich. This corresponds, by actuarial (life table) analysis, to a combined gall stone dissolution rate of 58.3 (15.9%). In conclusion, octreotide induced gall stones are generally small, multiple, and cholesterol rich although, in common with spontaneous gall stone disease, at presentation some patients will have a blocked cystic duct and some gall stones containing calcium.<sup>14</sup> Malet PF et al determine how stone type and composition are related to stone buoyancy by analyzing gallstones from 90 patients in the National Cooperative Gallstone Study. Seventeen patients had floating and 73 had nonfloating radiolucent stones at oral cholecystography. Stone analysis showed that all 17 floating stones were cholesterol stones; 64 of the nonfloating stones were cholesterol stones, while nine were pigment stones. The cholesterol contents of floating and nonfloating

cholesterol stones were similar, 90.4% +/- 1.7 and 87.0% +/- 1.2 of stone weight, respectively. The calcium salt content of the nonfloating cholesterol stones was 3.2% +/- 0.6, while that of the floating cholesterol stones was only 1.1% +/- 0.4 (P = .02). The results indicated that floating gallstones are cholesterol stones with a significantly lower calcium salt content than that of nonfloating cholesterol stones.<sup>15</sup>

## CONCLUSION

From the above results, the authors concluded that no single sonographic pattern is exhibited by cholesterol gallstones. However, future studies are recommended.

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