*ejpmr, 2018, 5(7), 550-553*

**SJIF Impact Factor 4.897**

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

# ULTRASONOGRAPHIC ANALYSIS IN CHOLELITHIASIS TO EVALUATE ITS IMPACT IN DIAGNOSIS, TREATMENT AND GALL STONE COMPOSITION

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**Article Received on 01/06/2018** **Article Revised on 16/06/2018** **Article Accepted on 01/07/2018**

## ABSTRACT

**Introduction:** Lifestyle and dietary habits of the patient are the most influencial factors for the formation of gall stones. Gallstones constitute a significant health problem in developed countries, affecting 10% to 15% of the adult population. In India prevalence of gall stones is 10 -20 %. Gallstones are common in the female population as compared to males. Formation of gallstones is due to inadequate physical activity, high waist hip ratio and excessive intake of saturated fats. Cholelithiasis is sometimes diagnosed in patients incidentally or as silent stones. Also they are reported in association with clinical symptoms such as cholecystitis and cholangitis. Ultrasound is the method having best sensitivity and specificity for evaluating patients with suspected gallstones. **Material and Methods:** The present study was carried out in the department of Radiology CCM Medical College and Hospital Kachandur, Durg. Total 150 patients were included in the study who were diagnosed of cholelithiasis. All patients underwent ultrasound examination prior to their surgery and histopathological analysis of gallbladder postoperatively. The gall stone was taken out and was further examined for bilirubin, calcium, cholesterol and phosphate. **Results:** 133 were positive for gallstones and 17 negative for gallstones. Out of 133 positive for gall stones 129 were confirmed by histopathology and 4 were found to have no gallstones on histopathology. Of the 17 ultrasound scans found to be negative for gallstone, no subsequent gallstones found on histopathology. As compared to histopathological reports sensitivity of ultrasonography was 100% (95% CI 97.18% to 100.00%). Specificity was 80.95 %( 58.09% to 94.55%). Positive Predictive Value 96.99 %( 95% CI 93.03% to 98.73%) and negative Predictive Value was 100.00 %. Accuracy of ultrasonography was 97.33% (95% CI 93.31% to 99.27%).Of the total histologically confirmed gallstones 20(15.03%) were cholesterol stone, 96 (74.04%) were mixed stone, while 13(10.34%) were pigment stone, **Conclusion:** Ultrasonography is accurate in diagnosing cholelithiasis and is considered the preferred initial imaging technique for patients who are suspected of having acute calculous cholecystitis.

**KEYWORDS:** Ultrasound, gall stones.

## INTRODUCTION

The most common diseases of gallbladder for which surgery department is approached is cholecystitis and gallstones are very common cause for the development of cholecystitis. Components of the gallstones are bile pigment, cholesterol and calcium salts, in the form of phosphate, carbonate and palmitate. Lifestyle and dietary habits of the patient are the most influencial factors for the formation of gall stones.[1] Gallstones constitute a significant health problem in developed countries, affecting 10% to 15% of the adult population.[2,3] Gallstone disease is a leading cause for hospital admissions related to gastrointestinal problems.[4] In India prevalence of gall stones is 10 -20 %.[5] Gallstones are common in the female population as compared to males. Formations of gallstones are due to inadequate physical activity, high waist hip ratio and excessive intake of saturated fats.[6]

Cholelithiasis is sometimes diagnosed in patients incidentally or as silent stones. Also they are reported in association with clinical symptoms such as cholecystitis and cholangitis.[7] The prevalence of gallbladder disease has advanced with the use of ultrasonography.[2] Ultrasound is the method having best sensitivity and specificity for evaluating patients with suspected gallstones.[8] One of the most important advantages of ultrasound over other imaging techniques is the ability to assess for a sonographic Murphy sign, which is a reliable indicator of acute cholecystitis.[9]

**AIMS AND OBJECTIVES OF STUDY**

1. Correlation between ultrasonography and histopathology findings for detection of Cholelithiasis.
2. To find the sensitivity and specificity of ultrasonography for diagnosis of cholelithiasis.

**MATERIAL AND METHODS**

The present study was carried out in the department of Radiology in collaboration with Dept. of Pathology at CCM Medical College and Hospital Kachandur, Durg over a period of 2 years from December2014 to March 2017. Inclusion criteria consisted of all stable patients without any complications and all vital signs are normal. An exclusion criterion was patients who were not willing for study, seriously ill patients and patients with deranged renal functions.

Total 150 patients were included in the study who were diagnosed of cholelithiasis. All patients underwent ultrasound examination prior to their surgery and histopathological analysis of gallbladder postoperatively.

A retrospective analysis of patients comparing their pre-operative ultrasonography findings and histopathology findings for the presence or absence of gallstones.

Detailed history of the patient was taken. Demographic data was recorded. The gall stone was taken out and was further examined for bilirubin, calcium, cholesterol and phosphate.

Written informed consent from all the patients were taken.

**RESULTS AND OBSERVATIONS**

A total of 150 ultrasound scans were performed by radiologists at radiology Dept. out of 133 were positive for gallstones and 17 negative for gallstones. Out of 133 positive for gall stones 129 were confirmed by histopathologically and 4 were found to have no gallstones on histopathology. Of the 17 ultrasound scans found to be negative for gallstone, no subsequent gallstones found on histopathology.

**Table 1: Positive and negative by ultrasonography and Histopathology.**

| | | Histopathology | | Total |
|---|---|---|---|---|
| | | Positive | Negative | |
| Ultrasonography | Positive | 129 | 4 | 133 |
| | Negative | 0 | 17 | 17 |
| Total | | 129 | 21 | 150 |

**Table 2: Shows Sensitivity, Specificity, Positive Likelihood Ratio, Negative Likelihood Ratio, Disease prevalence, Positive Predictive Value, Negative Predictive Value and Accuracy by Ultrasonography.**

| Statistic | Value | 95% CI* |
|---|---|---|
| **Sensitivity** | 100.00% | 97.18% to 100.00% |
| **Specificity** | 80.95 % | 58.09% to 94.55% |
| **Positive Likelihood Ratio** | 5.25 | 2.17 to 12.68 |
| **Negative Likelihood Ratio** | 0.00 | |
| **Disease prevalence** | 86.00% | 79.40% to 91.12% |
| **Positive Predictive Value** | 96.99% | 93.03% to 98.73% |
| **Negative Predictive Value** | 100.00 % | |
| **Accuracy** | 97.33% | 93.31% to 99.27% |

*CI – Confidence interval

Total of 133 patients were diagnosed of gall stones by ultrasonography. As compared to histopathological reports sensitivity of ultrasonography was 100% (95% CI 97.18% to 100.00%). Specificity was 80.95 % (58.09% to 94.55%). Positive Predictive Value 96.99 % (95% CI 93.03% to 98.73%) and negative Predictive Value was 100.00 %. Accuracy of ultrasonography was 97.33% (95% CI 93.31% to 99.27%).

**Table 3: Age and incidence of gallstone by ultrasonography.**

| Age group | Number | Percentage |
|---|---|---|
| <20 years | 11 | 8.27 |
| 21-30years | 21 | 15.79 |
| 31-40 years | 29 | 21.80 |
| 41-50 years | 32 | 24.06 |
| 51- 60 years | 20 | 15.04 |
| >60 years | 20 | 15.04 |
| Total | 133 | 100.00 |

In <20 years group 11 (8.27%) were diagnosed of gallstones by ultrasonography. In 21-30 years patients were 21 (15.79%), in 31-40 years 29 (21.80%), in 41-50 years 32 (24.06%), in 51-60 years 20 (15.04%) and in >60 years 20 (15.04%).

**Table 4: Types of gallstones according to composition by histopathology.**

| Type of stone | Stone frequency (%) |
|---|---|
| Cholesterol stone | 20(15.03%) |
| Mixed stone | 96(74.04%) |
| Pigment stone | 13(10.34%) |

Of the total histologically confirmed gallstones 20(15.03%) were cholesterol stone, 96 (74.04%) were mixed stone, while 13(10.34%) were pigment stone

## DISCUSSION

Ultrasound (US) is the preferred imaging examination for the diagnosis of cholelithiasis and is the preferred method used when the clinical presentation is suggestive of biliary pathology. This method is non-invasive, inexpensive, no radiation, and is very accurate in skilled hands.

Main findings of acute calculous cholecystitis by ultrasound includes presence of stones, gallbladder wall thickening, distension of the gallbladder lumen, a positive US Murphy sign and pericholecystic fluid.[10,11] One of the common diseases of gallbladder is cholecystitis for which people rush to the emergency department with complaints of dyspepsia, flatulence and pain in upper abdomen. Out of the various causes of cholecystitis gall stones is very common. The increase of lifestyle-related risk factors was assumed to result primarily in an increase of cholesterol gallstones.[12]

In our study sensitivity and specificity of ultrasonography was 100% and 80.95%. Schlager et al in 1994 in his prospective study found that sensitivity and specificity of ultrasound was 86 % and 97% respectively.[13] Kendall et al[14] in his prospective study observed the sensitivity and specificity as 96% and 88%. Chintapalli KN et al in his study found that preoperative sonography of the gallbladder accurately predicted the presence of gallstones in 934 cases (98.7%).[15]

In our study gall bladder stone was not revealed by sonography in 17 cases and in 4 cases ultra sonography revealed stones but was not confirmed by histopathology.

The most common age group was 41-50 years followed by 31-40 years with 24.06 and 21.80% patients, respectively. Shrestha and Bajracharya[16] found the higher incidence of cholelithiasis among younger age group of 20-30 years.

The most common gallstones were of mixed constituting 74.04%, while cholesterol stones were 15.03% and pigment stones were 10.34%. The gallstones in Tamil Nadu and Pondicherry, South India, are may be due to the infection rather than super saturation as evidenced by the predominance of pigment stones, whereas in Sikkim and North Bengal cholesterol were predominant.[17]

Factor to limit the accuracy of ultrasonography is obesity.[18] With the increase in obese population, there is a possibility that this may be negating the improvements in ultrasound resolution over the same time period. There is the possibility that stones may be lost during cholecystectomy which accounts for positive findings. Spillage varies from as low as 3.3% to 17% and non-retrieval of 0.3%.[19]

## CONCLUSION

We have found that ultrasonography is accurate in diagnosing cholelithiasis and is considered the preferred initial imaging technique for patients who are suspected of having acute calculous cholecystitis This method is non-invasive, inexpensive, no radiation, and is very accurate in experienced hands.

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