

# Cholelithiasis on Imaging – An Analysis of Clinical Presentations by Age and Gender in a Jamaican Population

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## ABSTRACT

**Objective:** This study is a descriptive analysis of the clinical presentations in which cholelithiasis was diagnosed on imaging over a five-year period at the University Hospital of the West Indies, Jamaica and how the clinical presentation varied with age and gender.

**Method:** A retrospective review was done of all cases of cholelithiasis recorded in the reports of the Radiology section during the period January 1, 2002 to December 31, 2006. Patients' age and gender were noted. Each case was assigned to one of four clinical categories based on the clinical scenario at the time of referral for imaging: Acute abdomen-Incidental: (not referable to the biliary tract); Acute abdomen-Biliary (biliary colic/acute cholecystitis); Non-acute-Incidental: (not referable to the biliary tract) and Non-acute-Biliary (suspected cholelithiasis).

The data were analyzed using post-hoc cross-tabulations, ANOVA, and post-hoc Tukey-tests.

**Results:** Three hundred and forty-four females and 137 males were diagnosed with cholelithiasis with the mean age at diagnosis being 49 and 50 years respectively. Females were diagnosed with cholelithiasis at higher rates in the context of acute abdominal symptoms both referable and unrelated to the biliary tract, while males were diagnosed at higher rates as an incidental finding in a non-acute presentation. There was no significant difference between the genders in the rate of diagnosis of cholelithiasis when this was suspected clinically in the non-acute setting.

**Conclusion:** More females were diagnosed with cholelithiasis. There was no gender-related difference in the mean age at which cholelithiasis was diagnosed. There were statistically significant differences between the genders in the rates at which cholelithiasis was identified in different clinical scenarios.

# La Colelitiasis en Imágenes: un Análisis de Presentaciones Clínicas por edad y Género en una Población Jamaicana

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## RESUMEN

**Objetivo:** Este estudio constituye un análisis descriptivo de las presentaciones clínicas en las que se diagnosticó colelitiasis a partir de imágenes médicas por un periodo de cinco años en el Hospital Universitario de West Indies, Mona, Jamaica. También se analiza como la presentación clínica varió de acuerdo con la edad y el género.

**Método:** Se llevó a cabo una revisión retrospectiva de toda la serie de casos de colelitiasis registrados en los reportes de la Sección de Radiología, durante el periodo del 1ero de enero de 2002 al 31 de diciembre de 2006. Se señaló la edad y el género de los pacientes. Cada caso fue asignado a una de cuatro categorías clínicas sobre la base del escenario clínico en el momento de la remisión para el examen mediante imagen:

Abdomen agudo – Incidental: (no referible al tracto biliar); Abdomen agudo – Biliar: (cólico biliar/colelitiasis aguda); No agudo – Incidental: (no referible al tracto biliar) and No agudo – Biliar: (sospecha de colelitiasis)

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*Los datos fueron analizados utilizando tabulaciones cruzadas post-hoc, ANOVA, y el Turkey-test post hoc.*

**Resultados:** *A trescientos cuarenta y cuatro hembras y 137 varones, se les diagnosticó colelitiasis, siendo la edad promedio en el momento del diagnóstico 40 y 50 años respectivamente. A las mujeres se les diagnosticó colelitiasis con tasas más elevadas en el contexto de los síntomas abdominales agudos tanto referibles como no relacionados al tracto biliar, mientras que los varones fueron diagnosticados con tasas más altas como hallazgo incidental en una presentación no aguda. No hubo diferencia significativa entre los géneros en la tasa de diagnóstico de colelitiasis cuando se sospechaba clínicamente de ella en el escenario no agudo.*

**Conclusión:** *Más mujeres fueron diagnosticadas con colelitiasis. No hubo diferencias en relación con el género en la edad promedio a la que la colelitiasis fue diagnosticada. No hubo diferencias estadísticamente significativas entre el género en las tasas en las cuales la colelitiasis fue identificada en diferentes escenarios clínicos.*

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## INTRODUCTION

It has been estimated that approximately 10% of the adult population of the USA has gallstones and that some 500 000 cholecystectomies are performed in the USA every year (1). The condition is reported to be more common in young females than in young males, but this difference narrows with age becoming negligible in later life. Prevalence increases with age and varies between ethnic groups (2 – 4).

Symptoms associated with gallstones have been reviewed and the concept that the disease occurs in “fat, fair, fertile, flatulent females of forty” is generally regarded as medical anecdote rather than medical fact. Berger analyzed 24 studies conducted between 1966 and 1998 assessing abdominal symptoms in patients in whom gallstones were confirmed by ultrasound or oral cholecystography (5). They concluded that biliary colic was specific for gallstones, but 80% of patients with gallstones presented with other abdominal symptoms; and further that there is no current evidence that justifies the use of single abdominal symptoms, save for biliary colic, in the diagnosis of symptomatic gallstones (5).

In 2004, the same researcher in a prospective cohort questionnaire study reported that neither biliary pain nor any other gastrointestinal symptom was consistently related to gallstone disease (6).

Festi *et al*, in a large population based cross-sectional study at 14 centres in Italy, reviewed 29 504 subjects and found certain clinical features such as pain in the right hypochondrium and epigastrium to be significantly associated with gallstones (7). Kraag *et al* conducted a meta-analysis of 21 studies reviewing the presence of dyspeptic symptoms and gallstones and concluded that the results excluded with reasonable certainty an association between gallstones and classic dyspeptic symptoms such as flatulence, heartburn, acid regurgitation, bloating and belching. An exception was nausea and vomiting (8). In a large study in Italy, Attalli *et al* concluded that gallstone disease was a highly prevalent condition, that gallstones rarely cause symp-

toms and subjects are mostly unaware of their presence (9). Some authors suggest that level of physical activity may influence the symptoms produced by gallstones in males (10).

The clinical diagnosis of cholelithiasis must be confirmed by imaging. However, to our knowledge, there is no report on the clinical scenarios in which cholelithiasis is diagnosed on imaging in a Jamaican population. This study was undertaken to describe these clinical presentations and to how they varied with age or gender.

## PATIENTS AND METHOD

This was a retrospective case series descriptive study. Using Microsoft Word search option, the reports of the Radiology Department of the University Hospital of the West Indies, Jamaica, were reviewed for the diagnosis of cholelithiasis or gallstones during the period January 1, 2002 to December 31, 2006. Patients with gallstones were placed in four categories based on the clinical presentation at the time of the request for the study. These were:

C Acute abdomen – not referable to biliary system [incidental] (AI)

C Acute abdomen – referable to the biliary system – [biliary colic/acute cholecystitis] (AB)

C Non-acute presentation – not referable to biliary system [incidental] (NAI)

C Non-acute presentation- [suspected cholelithiasis] (NAB)

The modality with which the diagnosis was made was also documented. The data obtained were analyzed using *post-hoc* cross – tabulations, ANOVA and *post-hoc* Tukey-tests.

## RESULTS

Four hundred and eight-one patients were found to have cholelithiasis (344 females and 137 males) with an age range of 1 to 94 years (mean age 49.8, SD = 21.6, median 49 and interquartile range 35 years). Thirty-one patients (6%) had sickle cell disease, 14 females and 17 males, with ages

ranging from 3 to 58 years (mean 30.4). The underlying cause of cholelithiasis in 450 patients was not identified.

The following imaging modalities were utilized in the majority of patients: abdominal ultrasound (439) and computed tomography (28). Other modalities employed were plain abdominal X-ray (2), barium enema (2), barium meal (2) and magnetic resonance cholangio-pancreatography (1).

Two hundred and fifty-three patients (52.3%) were diagnosed with cholelithiasis after presenting with clinical symptoms not referable to the biliary tract; 48(19%) with acute abdomen and 205 (81%) with non-acute presentations.

In 228 patients (47.4%) with the clinical diagnosis of biliary tract disease, gallstones were confirmed by imaging; 102 (45%) with acute symptoms (acute cholecystitis/biliary colic) and 126 (55%) with a non-acute presentation that suggested the presence of cholelithiasis (Fig. 1).

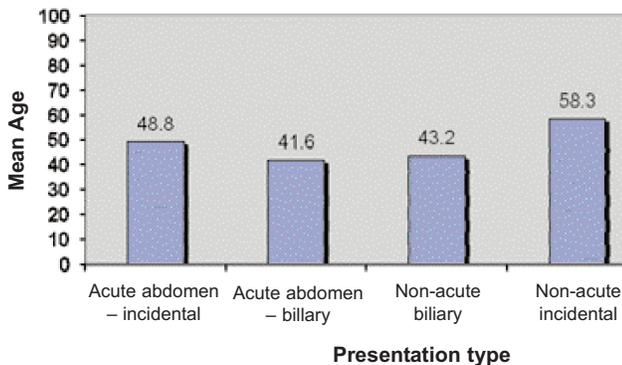


Fig. 1: Mean age of four clinical presentations of cholelithiasis.

In the patients with sickle cell disease, the majority (87%) had non-acute presentations with symptoms referable to the biliary tract while 9% were incidentally discovered after presenting with an acute abdomen. Analysis revealed no significant gender-related difference in mean (M) age of clinical presentation ( $M_f = 50.07$  vs  $M_m = 49.03$ ;  $t(467) = 0.471$ ,  $p = 0.64$ ). However, a comparison of males and females revealed highly significant differences in type of clinical presentations;  $\chi^2(3) = 15.3$ ,  $p = 0.002$ . *Post-hoc* cross-tabulations revealed that compared to males, females were more likely to be diagnosed with cholelithiasis in the context of acute abdominal symptoms incidentally (11.9% vs 5.1%;  $\chi^2(1) = 5.06$ ,  $p = 0.025$ ), as well as with clinical diagnoses of acute cholecystitis/biliary colic (24.1% vs 13.9%;  $\chi^2(1) = 6.17$ ,  $p = 0.013$ ). Compared to females, males were more likely to be diagnosed with cholelithiasis as an incidental finding in a non-acute presentation unrelated to biliary symptomatology (54% vs 38.1%;  $\chi^2(1) = 10.2$ ,  $p = 0.001$ ). There were no significant differences between males and females in the rates at which cholelithiasis was confirmed on imaging when this was suspected clinically on the basis of non-acute presentation [27% vs 25.9%;  $\chi^2(1) = 0.65$ ,  $p = 0.798$ ] (Fig. 2).

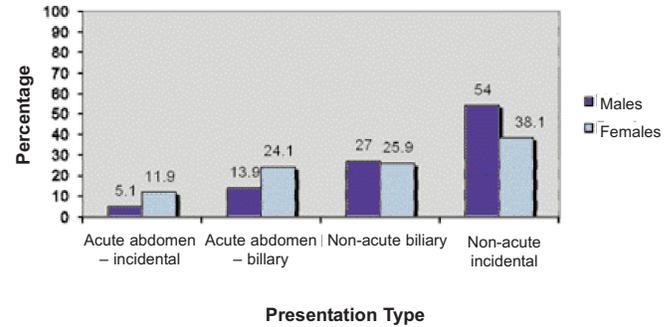


Fig. 2: Gender related frequencies of four clinical presentations in which cholelithiasis was demonstrated on imaging.

To determine whether the four clinical presentations occurred at the same age, and did so across both genders, we conducted a 2 (gender: male, female) by 4 (clinical presentation type: AI, AB, NAI, NAB) analysis of variance (ANOVA). This revealed a significant main effect of clinical presentation type on age of presentation;  $F(3, 468) = 17.47$ ,  $p < 0.001$  but no effect of gender on age of presentation;  $F(1, 486) = 0.74$ ,  $p = 0.39$ , and no significant interaction  $F(3, 468) = 0.64$ ,  $p = 0.598$ .

*Post-hoc* Tukey-tests revealed significant differences between the mean age at incidental non-acute ( $M = 58.25$ ) and incidental acute presentations ( $M = 48.83$ ,  $p = 0.021$ ). Significant differences were also demonstrated between the ages at which symptoms referable to the biliary tract presented in the acute ( $M = 41.55$ ) and non-acute settings ( $M = 43.19$ ,  $p < 0.001$ ).

## DISCUSSION

In this study, cholelithiasis was seen twice as often in females as in males and this is consistent with the pattern of the disease reported elsewhere (11). However, some researchers have reported essentially equal prevalence between the genders in particular ethnic groups and variation in prevalence over time (12).

The mean age at which cholelithiasis was diagnosed was statistically similar for both genders and approximately a decade later than the often quoted forty years. In slightly more than 50% of patients, cholelithiasis was an incidental finding. This is consistent with the conclusion drawn by Attili *et al* in Italy and reported by other authorities that cholelithiasis is a common and frequently asymptomatic disorder (9).

Cholelithiasis was more likely to be confirmed on imaging in the context of acute abdominal symptoms in females than in males but the converse was true when incidentally discovered in the setting of a non-acute presentation.

The finding of cholelithiasis in males with a non-acute presentation occurred at a statistically significant older mean age than that of the acute abdominal presentations seen in

females. The mean age at which patients presented with acute symptoms referable to the biliary tract was 41.6 years, similar to the age of classically described patients.

There was no statistically significant gender-based difference in the rate at which cholelithiasis was confirmed on imaging in patients in whom the diagnosis was suspected in the non-acute setting. There was also no statistically significant difference in the mean age at which each of the four clinical presentations occurred in males compared to females.

The diagnosis of cholelithiasis at higher rates in females in acute presentations both referable and unrelated to the biliary tract, is likely to be due to the condition being more common in females. Another consideration however, is that females may be more likely than males to develop complications of gallstones.

This was found to be so in a study by Freidman *et al* who followed 298 patients with gallstones for up to 25 years; 123 were asymptomatic while 46 had non-function on cholecystogram and mild or nonspecific symptoms. They found that severe events developed in about 1% per year of patients with visualized gallstones and in about 2% per year of patients with non-function. During each of the first 5 years after diagnosis, all events, both severe and non-severe (including surgery for continuing mild symptoms) occurred in about 6% of the patients with mild symptoms accompanying either gallstones or non-function, and in about 4% of patients with asymptomatic gallstones. The annual probabilities for all events tended to decrease with increased length of follow-up. Among patients with stones and mild symptoms, women were more apt to develop any event than men ( $p = 0.02$ ) and more obese patients were more likely to develop severe events than those who were thinner [ $p = 0.05$ ] (13). Lachman *et al* reported a prevalence of gallstones of 29% in children with homozygous SS disease (14) while Walker *et al* found a similar prevalence of cholelithiasis in a Jamaican cohort with only 2% developing acute symptoms which warranted cholecystectomy (15). On the contrary, Suell *et al*, in a retrospective study, found the presence of sludge or stones in 57% of patients with sickle cell disease and that histopathological evidence of chronic cholecystitis correlated poorly with clinical symptoms (16). Anecdotal evidence suggests that Jamaican males, like their American counterparts, are less likely to seek medical attention than females (17). Since symptoms associated with gallstones may be minimal or non-specific, the disease may be more common in males than this study suggests. In conclusion, in this sample of a Jamaican population, the male: female ratio of cholelithiasis was similar to that seen in other countries of the Western world and there was no difference in the mean age at diagnosis.

Slightly more than half the cases of cholelithiasis diagnosed on imaging were incidental findings. The fre-

quency with which cholelithiasis was diagnosed in different clinical scenarios varied with gender. Females predominated in the context of an acute abdomen. This presentation also occurred at a lower mean age than the incidental finding in a non-acute presentation which occurred more often in males. This study suggests that females with cholelithiasis may be more likely than males to develop complications which cause acute abdominal symptoms and that cholelithiasis may be more common in Jamaican males than is generally assumed.

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