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Prevalence of gallstones in patients who underwent abdominal ultrasound in a tertiary level hospital of Nepal: A cross sectional study

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Abstract
Objective: The aim of this study was to estimate the prevalence of gallstone diagnosed by abdominal ultrasound in a tertiary level hospital of Nepal.
Methodology: Total 5144 patients (1290 males & 3854 females) were enrolled in the study. All the patients were examined by abdominal ultrasound using curvilinear probe of 2-5 MHz at Department of Radiology of National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal from January 1, 2023 to February 28, 2023. Data was collected from all the patients who were diagnosed with gallstone and analyzed.
Result: Gallstone was detected in 528 patients (102 male and 426 female). Prevalence of gallstone in female patients was higher (11%) than in male patients (7.9%). Out of the total patients with gallstones, multiple stones were seen in 65.9% and large stones (≥ 5 mm) in 61.9%. In both male and female patients, multiple and large gallstones were more common than single and small (<5 mm) gallstone respectively. Pattern of increasing prevalence of gallstone was seen with increasing age of patients. The maximum patients diagnosed with gallstone (34.1%) belonged to age group 51-60 years.
Conclusion: Prevalence of gallstone was seen 10.2% in this study. Female patients had higher prevalence than male. Prevalence increased with increasing age. In both male and female patients, multiple and large gallstones (≥ 5 mm) were more common than single and smaller ones respectively.

Keywords: Gallstone, gall bladder, ultrasonography

Introduction

Stone formation occurs within gall bladder (Gallstone) due to deposition of crystals in bile [1]. Majority of gallstones are detected incidentally on ultrasonography but some patients with gallstones experience pain in right hypochondrium. Although the majority of gallstone cases are detected incidentally, some patients complain of right hypochondriac pain. Few of them may present with more serious complications like acute calculous cholecystitis, cholangitis, biliary obstruction and abscess formation. Definitive therapy of gallstone is surgery but it comes with tremendous financial burden to the patients and to the country as well [2].

Gallstones are classified into three types- cholesterol stones, pigment stones and mixed type. Composition of gallstone is different from one population to another population. Mixed type of gallstones are the most common (78.75%) in Nepalese population followed by cholesterol (12.5%) and pigment stones (8.75%) [3]. There are many known risk factors for gallstone formation and the majority include female gender, old age, obesity, oral contraceptive use, hormone therapy, hypertriglyceridemia, rapid weight loss, metabolic syndrome and pregnancy [4]. Prevalence of gallstone ranges from 10 to 15% in majority of the hospital based studies although it may vary according to population [5]. The most common mode of detection of gallstone is in an incidental way while performing abdominal ultrasound, however, few patients complain of right hypochondriac pain, epigastric pain and even fever with or without jaundice if cholecystitis develops [6].

Abdominal ultrasound is the diagnostic modality of choice for the detection of gallstones. Abdominal ultrasound done with curvilinear probe after 6 hours of fasting shows gallstones as hyperechoic foci within the lumen of gall bladder with posterior acoustic shadow [7]. It can also detect wall thickening, distended gall bladder and pericholecystic collection as signs of acute cholecystitis.

Nowadays abdominal ultrasonography is widely available, relatively inexpensive, easily accessible and accurate modality for the detection of gallstones. In comparison to ultrasonography, other modalities are far more expensive as well as time consuming [8]. Those modalities include endoscopic retrograde cholangiographic pancreatography (ERCP), magnetic resonance cholangiographic pancreatography (MRCP), ultrasonographic endoscopy, oral cholecystogram, intravenous cholangiogram, computed tomography (CT) scan etc.

Management of asymptomatic gallstone is conservative but symptomatic patients require definitive treatment in the form of surgery. Removal of whole the gall bladder and stones within it by laparoscopic cholecystectomy is the method of choice. In some cases, sphincterotomy can be used to extract stone from the gallbladder, whereas, shock-wave lithotripsy is also used in some places. Few oral medicines are also available claiming to dissolve gallstones but they have wide variation in terms of efficacy and hence, not as reliable as surgery [9].

This study aims to find out the prevalence of gallstone in Nepalese people who are referred for abdominal ultrasound to the Department of Radiology of a tertiary care hospital in Kathmandu, Nepal. Estimation of the severity of the problems because of gallstones are beneficial for further exploration of needful measures to be taken to reduce its burden throughout the country.

Methodology

Study type was descriptive cross sectional and was conducted at National Academy of Medical Sciences, Bir Hospital, Kathmandu from January 1, 2023 to February 28, 2023. Patients who were referred for abdominal ultrasound to the Department of Radiology, Bir Hospital were examined by curvilinear probe after at least 6 hours of fasting. Data was collected from patients who were having gallstones on abdominal ultrasound. Predesigned and pretested proforma was used for data collection. Age of the patient at the time of examination and his/her gender was noted. Size of gallstone was taken with largest diameter in millimeter. Single or multiple gallstone was mentioned and if multiple stones were present, the largest dimension of the largest calculus was noted. Associated complications were noted separately which comprised of diseases like chronic cholecystitis, acute calculous cholecystitis, cholangitis, abscess formation or dilated biliary tree.

SPSS 24 was used for the data entry and tabulation. The collected data was analyzed to calculate the demographic variables (age and gender). Prevalence of patients having gallstone was calculated as a whole and in both female and male gender separately. Proportion of single or multiple gallstone was calculated. Small gallstones were defined as gallstones having diameter up to 5 mm and larger than that were classified as larger gallstones.

Results

We performed abdominal ultrasound of 5144 patients during our study period and diagnosed gallstones in 528 (10.2%) patients. Gender distribution of the total patients was 3854 female (75%) and 1290 male (25%) whereas gallstone was seen in 426 female and 102 male patients. So, frequency of female patients with gallstone was found to be higher than male patients i.e. 11.0% (426/3854) vs 7.9% (102/1290) (Table 1). In both female and male participants, multiple gallstones (65.9%) were seen more commonly than single ones (Table 2). Similarly, large gallstones (≥ 5 mm) were more commonly seen than small ones in both female (63.1%) and male (56.9%) patients (Table 3). The mean age of the participants was 49.2 years. Prevalence of gallstone increased with increasing age of the participants as we could see that maximum proportion of gallstone positive cases (34.1%) belonged to age group 51-60 years (Table 4).Complications were seen in less than 1% cases with acute cholecystitis (2 cases), chronic cholecystitis (1 case) & cholangitis (1 case).

Table 1: Distribution of gallstones according to gender

Gallstones	Male	Female	Total
Yes	102	426	528
No	1188	3428	4616
Total	1290	3854	5144

Table 2: Distribution of single and multiple gallstones

Gallstone	Male	Female	Total
Single	41 (40.2%)	139 (32.6%)	180 (34.1%)
Multiple	61 (59.8%)	287 (67.4%)	348 (65.9%)
Total	102	426	528

Table 3: Distribution of small and large gallstones

Gallstone	Male	Female	Total
Small (<5 mm)	44 (43.1%)	157 (36.9%)	201 (38.1%)
Large (≥ 5 mm)	58 (56.9%)	269 (63.1%)	327 (61.9%)
Total	102	426	528

Table 4: Distribution of gallstone in different age group

Age group	Male	Female	Total
<20 years	1	17	18
21-30 years	4	22	26
31-40 years	13	59	72
41-50 years	20	107	127
51-60 years	41	139	180 (34.1%)
>60 years	23	82	105
Total	102	426	528

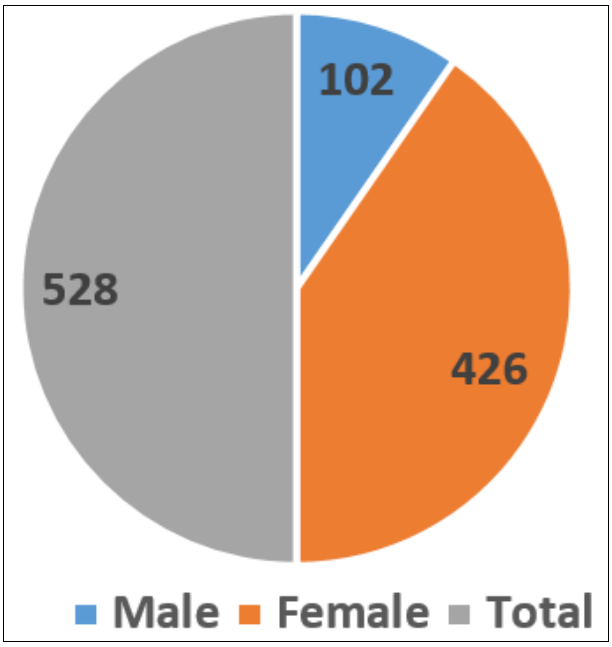

Fig 1: Distribution of gallstones in male and female (Pie chart)

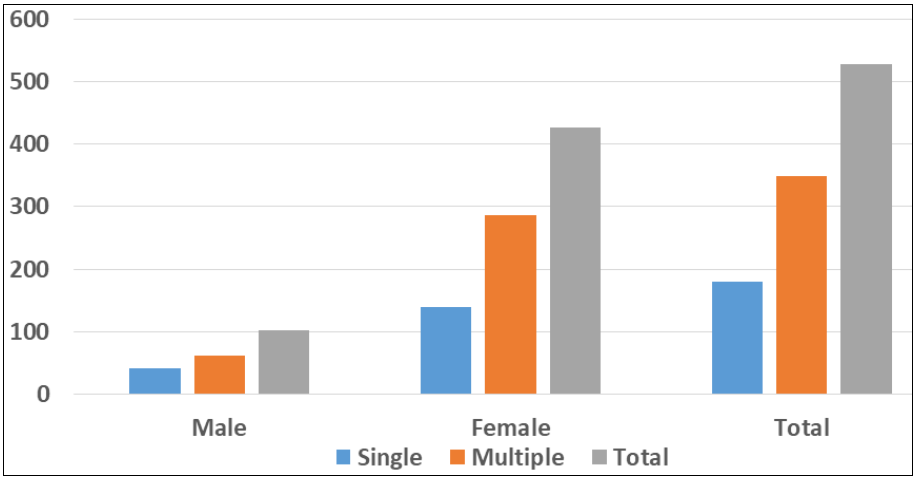

Fig 2: Single and multiple gallstone in male and female (Bar diagram)

Discussion

Prevalence of gallstone was found to be 10.2% in our hospital based study. Debnath J *et al.* had conducted similar study in India and found prevalence of 11.6% [10]. Getachew A. *et al.* showed gallstone prevalence of 5.2% in Ethiopia [11] but Abu-Eshy SA *et al.* showed 11.7% in Saudi Arabia, [12]. After going through many studies conducted in the different parts of the world, it was concluded that prevalence of gallstone varies greatly according to the study population and the type of the study conducted.

In our study, prevalence of gallstone seen in female was significantly higher (11.0%) than that seen in male (7.9%) population. Debnath J *et al.* had conducted similar study in India which showed the prevalence of 9.3% in female and 2.3% in male participants. Getachew A. *et al.* showed the prevalence of 5.4% in female and 3.1% in male in Ethiopia. Result from another study conducted by Abu-Eshy SA *et al.* in Saudi Arabia also showed prevalence of 9.6% in female and 2.0% in male. Hence, most of the studies showed that prevalence of gallstone was significantly higher in female gender in comparison to male. This conclusion strongly suggests that female gender is an independent risk factor for acquiring gallstone disease.

The maximum number of patients diagnosed with gallstone (34.1%) belonged to age range of 51-60 years whereas, the minimum number was seen in less than 20 years of age. In a study done by Getachew A. *et al.* in Ethiopia, the maximum number of patients with gallstone belonged to age group 65-74 years (8.2%) and minimum number was seen in 15-24 years of age. It concludes that the older age is another risk factor for acquiring gallstone disease. The different age group having maximum patients with gallstone in our study might be due to less frequent visit of our hospital OPD by patients more than 60 years of age.

Our study showed multiple gallstones were more common (65.9%) than single ones. Debnath J *et al.* had also showed similar finding of 75% patients having multiple gallstones in a study done in India. However, in another study done by *Abu-Eshy SA et al.* in Saudi Arabia, single gallstone was seen more commonly (63.3%) than multiple gallstones. So, prevalence of single or multiple gallstones varies in different countries and the reason behind that might be different food habits of the people.

Large gallstones (≥ 5 mm in diameter) were seen more commonly (61.9%) than the small gallstones in our study. Debnath J *et al.* had conducted similar study in India which showed small gallstones (2-4 mm) were more common. Lack of consistency in occurrence of large and small gallstones in different region of the world might be due to different genetic predisposition and food habit of the study population. Complications were not common and combination of all cases of chronic cholecystitis, acute calculous cholecystitis and cholangitis contributed less than 1% of the gallstone positive cases. Other studies also showed similar findings [13].

Conclusion

Prevalence of gallstone was found to be 10.2%. Gallstone disease affected female gender more commonly than male. Gallstone was seen more commonly in older age group of population than in younger age group. Significant majority of patients showed multiple gallstone in comparison to single ones and the commonest size of gallstones detected on abdominal ultrasound was found to be ≥ 5 mm in diameter. Complications were uncommon and few to mention were chronic cholecystitis, acute calculous cholecystitis and cholangitis.

Conflict of interest

No conflict of interest was involved. No sponsorship was present.

Limitation

Since it was institution based study, samples taken from patients who visited our hospital might not be the true reflection of the general population of our country.

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