

A South Indian Cadaveric Study on the Prevalence of Gallstones

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ABSTRACT

Background

Gallstone disease (GSD) is one among the most prevalent diseases that affects approximately 10-15% of the population. It is associated with many other diseases like gallbladder cancer, renal stones, atherosclerosis, coronary heart disease and stroke.

Objective

Objective of this study is to document the prevalence of gallstones among south Indian cadavers.

Method

One hundred and twenty three South Indian cadaveric livers/gallbladders were observed for the presence of gallstones. The age range was 40 to 70 years. The gallbladders were palpated to know the presence of stones. They were then dissected and the stones were classified based on appearance. Gall bladder walls were also observed to know the associated fibrosis.

Result

Among the cadavers studied, 0.81% possessed cholesterol stones and 4.06% had pigment stones. Among the stones, 83.33% were pigment stones and 16.66% were cholesterol stones.

Conclusion

Compared to the western countries and north Indian studies, the prevalence of gallstone disease is low in the south Indian population (4.87%). The low prevalence was probably due to the low socioeconomic status and the diet and lifestyle.

KEY WORDS

Cholelithiasis, Gall bladder, Gallstones, Hepatobiliary, Liver

INTRODUCTION

Gallstones are masses of a mixture of cholesterol crystals, calcium carbonate, phosphate, palmitate, phospholipids, glycoproteins and bilirubinate. They were first described by Antonio Benivenius.¹ Gallstone disease (GSD) is one among the most prevalent and costly diseases in the developed countries.² Prevalence of gallstones in adults ranges from 10 to 15%. Gallstones are classified in the western countries and cholesterol stones and pigment stones.³ In western countries, the cholesterol stones predominate whilst, in Asian countries, the pigment stones are more prevalent.² Majority of the people with gallstones are asymptomatic. A study reports that nearly 70% of the population with gallstones are asymptomatic.⁴ In India, gallstones are more common among north Indian population. In southern part of India, prevalence of GSD is less and there are very few studies of GSD and most of them are hospital based. There are no cadaveric studies from India on prevalence of gallstones. Hence, this study was undertaken.

Aim of this study was to document the prevalence of gallstones and to classify them based on their appearance among south Indians as observed in the cadavers. The statistics could help the clinicians to be aware of the prevalence of gallstones in the South Indian population.

METHODS

The study was retrospective study, conducted on embalmed cadavers. The study was conducted in the department of Anatomy, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Manipal, India.

One hundred and twenty three South Indian cadaveric livers with gallbladders were used in the study. These livers were used from our dissection hall storage. The cadavers from where the livers were obtained belonged to body donors of Southern part of India. The bodies were donated for educational and research purpose. Most of the cadavers belonged to people from low socioeconomic status and had a moderately built body. The age of the cadavers studied ranged from 40 – 80 years and most of the cadavers were above 60 years of age. No medical history or data about diet, lifestyle or biliary symptoms was available.

This gross anatomical study included naked eye examination of the liver and gall bladder. The gall bladder and biliary duct system was pressed with fingers to find out if there were any stones in them. The gall bladders with stones were separated and dissected to see the stones and location of the stones. The stones were classified as cholesterol stones and pigment stones based on their appearance. Since more than 90% of the cadavers were male cadavers, gender wise classification of gallstones was not done. The gallbladder wall was also observed to check if there was any fibrosis. The gallbladders with stones were photographed (fig. 1-7).

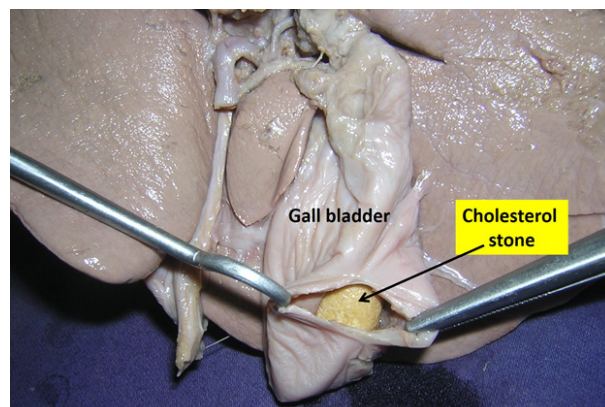


Figure 1. Photograph of liver with gall bladder, showing a huge cholesterol stone.



Figure 2. Photograph of the cholesterol stone (full and sectioned).

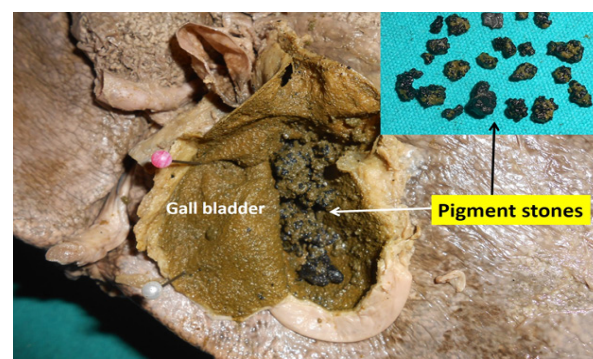


Figure 3. Pigment stones as seen within gallbladder and after washing them

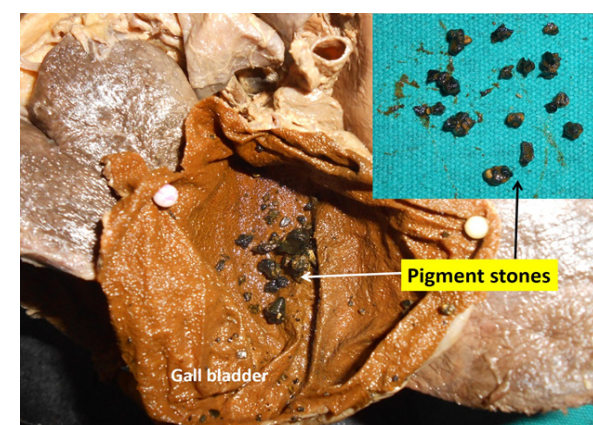


Figure 4. Pigment stones as seen within gallbladder and after washing them

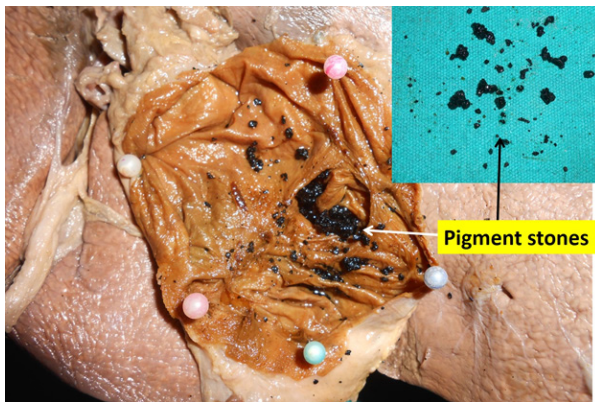


Figure 5. Pigment stones as seen within gallbladder and after washing them



Figure 6. Pigment stones as seen within gallbladder and after washing them



Figure 7. Pigment stones as seen within gallbladder and after washing them

Institutional research committee has permitted the study on cadaveric materials. Full livers with the intact gallbladders were used in the study. Damaged livers or ruptured gall bladders were excluded from the study.

Since the study involved only percentage statistics, no special statistical software was used to document the statistics.

RESULTS

Out of the 123 gallbladders/livers observed, 6 (4.87%) had gallstones. Among 123 gallbladders, only one (0.81%) had a huge cholesterol stone whereas, 5 gallbladders

(4.06%) had pigment stones. Among two types of stones, majority (83.33%) were pigment stones and only 16.66% were cholesterol stones. Among all the gallbladders with gallstones, only one had a slight fibrosis of its fundus. Walls of other gallbladders were gross anatomically comparable with other normal gallbladders. There were no adhesions or perforations of gallbladders. In two gall bladders, the stones were located in the fundus, in three gall bladders the stones were in the body and in one gallbladder the stones were in the neck of the gallbladder. The only cholesterol stone found was huge. It measured 3.5 cm in length and had a central circumference of 3 cm. Most of the pigment stones had sharp and irregular walls. They were dark green in color and varied in their size. Some of them were about 1 cm long and most were like sand grains. The stones found have been photographed and shown in figures 1-7. The prevalence of gallstones has been shown in table 1.

Table 1. Table showing the statistical details of the gallstones.

Total number of livers	123
Number of livers/gallbladders with gall stones	06
Percentage Occurrence of gall stones	4.87
Total number of livers/gall bladders with cholesterol stones	01
Percentage occurrence of cholesterol stones	0.81
Total number of livers/gall bladders with pigment stones	05
Percentage of livers/gall bladders with pigment stones	4.06
Percentage of cholesterol stone among all stones	16.66
Percentage of pigment stones among all the stones	83.33

DISCUSSION

Results of the current study show a low prevalence of gallstones among south Indian population. Most of the stones found were pigment stones. This is possibly due to the factor that most of the cadavers studied were males and were of poor socioeconomic status. The body built was also moderate. One previous study on south Indian population reported high prevalence of pigment stones. The authors conclude that this was possibly due to high level of serum bilirubin that may be due to the UGT1A1 gene involved in glucuronidation of free bilirubin.⁵ Our study too had higher percentage of pigment stones which indicates that pigment stones predominate in South Indian population. Moreover, the previous studies were not from on cadavers. They have not mentioned about the lifestyle and socioeconomic status of the participants too. A recent Sri Lankan study also shows high prevalence of pigment stones.⁶ This could be due to the similar geographic location and socioeconomic status. Geographic influences on prevalence of gall stones are yet to be studied. There are many studies on GSD on Indians, especially from northern parts of India. A study by Singh et al. reported that GSD is more common in people with high socioeconomic status and in multiparous than in nulliparous.⁷ In a study by Debnath et al. overall prevalence of GSD was 11.56% with a male to female ratio of 1:4.⁸ Many studies from north India have reported that GSD

is very common in northern part of India and is the major causative factor for gallbladder cancer.⁹ Cholesterol stones predominate in northern India. In a study conducted by Sarin et al. 94% of the stones were cholesterol stones.¹⁰ Another ultrasound study of gallbladder from India reported that GBD was common in older, multiparous women and men with diabetes, unsafe water and heavy metal water pollution.¹¹ A recent study by García-Gómez et al. conclude that rheumatoid arthritis could be a predisposing factor for GSD.¹² GSD is largely dependent on dietary factors. The study results of Sarles et al. suggested that GSD is uncommon in people with hypocaloric diet and a low intake of fat and protein of vegetable origin.¹³ There is a clear association between gallstones and gallbladder cancer. In a study by Hamdani et al. gallbladder cancer was 4-7 times higher in gallstone patients.¹⁴ A recent study by Li et al. indicated that even cirrhosis of the liver is more common in gallstone patients.¹⁵ There are numerous studies on association of GSD with other diseases. Study by

Sodhi et al. reported that GSD is common in patients with type 2 diabetes.¹⁶ Stroke patients have a higher chance of developing GSD.¹⁷ Studies by Kim et al. also showed that GSD patients are likely to develop atherosclerosis.¹⁸ Risk of renal stones is also high in the GSD patients.¹⁹ Studies by Zheng et al. have also shown that there is a high chance of developing coronary heart disease in patients with GSD.²⁰

CONCLUSION

There are no reports on cadaveric studies on prevalence of gallstone in south India. This cadaveric study concludes that there is a low prevalence (4.87%) of gallstones in south Indian region compared to northern part of India and in developed countries. Among the gallstone cases, most of them were pigment stones (83.33%). Low prevalence was probably due to the low socioeconomic status, a low calorie diet and an active lifestyle.

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