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ORIGINAL ARTICLE

Prevalences of and risk factors for biliary stones and gallbladder polyps in a large Chinese population

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Abstract

Objectives: This study aimed to identify the prevalences of and risk factors associated with the development of gallbladder stones and polyps in a large Chinese population.

Methods: Prevalences of and risk factors for biliary stones and gallbladder polyps were retrospectively investigated among subjects who underwent a general check-up at the Health Screening Centres of Peking Union Medical College Hospital and Beijing Charity Hospital between January 2007 and June 2010.

Results: A total of 60 064 people were enrolled in the study. Overall prevalences of biliary stones and gallbladder polyps were 4.2% (n = 2527) and 6.9% (n = 4119), respectively. Risk factors associated with increased odds ratios (ORs) for the development of biliary stones were female gender (OR = 1.51), age ≥50 years (OR = 2.09), history of hypertension (OR = 1.37), thickened gallbladder wall (cholecystitis) (OR = 1.98), fasting blood glucose ≥6.10 mmol/l (OR = 1.27), body mass index ≥25 kg/m^2 (OR = 1.25), systolic blood pressure ≥140 mmHg (OR = 1.31) and diastolic blood pressure ≥90 mmHg (OR = 1.44). Factors associated with gallbladder polyps were female gender (OR = 0.66), thickened gallbladder wall (OR = 2.09), negativity for hepatitis B surface antigen (HBsAg) and positivity for hepatitis B core antibody (anti-HBc) (OR = 2.61), and positivity for both HBsAg and anti-HBc (OR = 3.21).

Conclusions: Prevalences of biliary stones and gallbladder polyps among Chinese people are similar to those reported for other populations. Biliary stones appear to be associated with female gender, age, obesity, blood glucose, blood pressure and cholecystitis. Male gender, hepatitis B virus infection and cholecystitis were strong risk factors for the formation of gallbladder polyps.

Keywords

China, hyperlipidaemia, hepatitis B virus, HBV, cholecystitis, ultrasonography

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Introduction

Biliary stones (including stones in the gallbladder and/or bile ducts) and gallbladder polyps are the most common biliary diseases and are important public health problems in many countries and significant causes of morbidity in the Chinese population.[1–6] Strategies aimed at reducing the incidence of biliary stones and gallbladder polyps would be deemed beneficial. In population studies, biliary stones and gallbladder polyps can be easily diagnosed by abdominal ultrasonography (US) with high sensitivity (>92%) and specificity (>95%). As a result, abdominal US has become widely used during routine check-ups in the general public.[4,7,8]

Hyperlipidaemia is generally characterized by high serum levels of total cholesterol (TC), triglycerides (Tri), low-density lipoprotein (LDL), and a low level of high-density lipoprotein (HDL),

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all of which have been associated with gallstones.[4,9–11] Given the relationship between hyperlipidaemia and biliary stones, and the strong link between biliary stones and gallbladder polyps, it is plausible that serum lipids, particularly hyperlipidaemia, may be associated with gallbladder polyps.

A thickened gallbladder wall (TGW) is thought to be a major clinical manifestation of cholecystitis.[12] Few studies have addressed the relationship between asymptomatic TGW and gallbladder diseases.

Hepatitis B virus (HBV) infection is endemic in China.[13] A recent case–control study carried out in China suggested that HBV infection is a strong risk factor for the development of gallbladder polyps.[4] However, the study did not differentiate between subjects who were negative for hepatitis B surface antigen (HBsAg) and negative for hepatitis B core antibody (anti-HBc) and those who were negative for HBsAg and positive for anti-HBc.

Many previous studies have shown that the risk factors associated with biliary stones are age, race, gender, obesity and diabetes mellitus; and that those associated with gallbladder polyps are age, gender, body mass index (BMI), HBV infection and diabetes mellitus.[4,5,14–16] However, in China, prevalences of biliary stones and gallbladder polyps are seldom reported and the risk factors for these conditions are incompletely defined,[2,4,14,17] especially in terms of associations between hyperlipidaemia, TGW and hepatitis B status, and gallbladder polyps. A clearer understanding of prevalences and risk factors might improve strategies for the prevention and treatment of biliary stones and gallbladder polyps. Therefore, the aims of the current study were to identify the prevalences of and risk factors for biliary stones and gallbladder polyps in a large Chinese population.

Materials and methods

Study population and design

This study was conducted at the Health Screening Centres of Peking Union Medical College Hospital (PUMCH) and Beijing Charity Hospital (BCH). These two hospitals provide medical care for residents of Beijing and the surrounding metropolitan areas. The sample population consisted of consecutive subjects referred to the physical examination centre by their employers as an annual requirement of their employment, and of individuals who voluntarily attended a paid physical examination. A structured data sheet was issued by the attending physician. Body mass index (kg/m^2) was used as a measure of obesity. The recording of such data is routinely performed in both institutions and data forms are kept as a component of health examination reports.

Ultrasonography of the abdomen was conducted by ultrasonographers using a scanner equipped with a 3.5-MHz transducer (Philips Medical Systems, Inc., Bothell, WA, USA). In the current study, US assessment was carried out after an overnight fast. Subjects were asked to take up a supine position inclined to the left and were scanned along the long axis or the horizontal axis of the costal margins or between the ribs in order to obtain a clear display of the gallbladder outline and internal echo, and to observe the site, size, shape, number of internal lesions and echo characteristics. Biliary stones were defined by the presence of strong intraluminal echoes that were gravity-dependent or that attenuated US transmission (acoustic shadowing) in the gallbladder, biliary ducts or both. The criterion for US diagnosis of a gallbladder polyp was 'hyperechoic immobile echoes protruding from the gallbladder wall into the lumen without an acoustic shadow'. This examination displayed the position, size and number of gallbladder polyps and local changes in the gallbladder wall. Thickening of the gallbladder wall was defined as a wall thickness of >3 mm. Typically, it was associated with a layered appearance.[12] Historically, a TGW has been regarded as proof of primary gallbladder disease and is a hallmark feature of acute and chronic cholecystitis.[12] As most of the participants in the current study did not have related clinical symptoms, those with a TGW were regarded as having asymptomatic cholecystitis. On the completion of each patient's participation in the study, all US results were evaluated by experienced radiologists. In a second evaluation, all studies for each participant were viewed side-by-side in a masked fashion by the same radiologists. No discrepancies were found between the results of the first and second evaluations.

A manual retrospective review of the participants' health examination reports was performed to collect demographic, clinical and risk factor information. This review examined demographic information and asked detailed questions on personal medical history and medication intake. Age, gender, history of hypertension and diabetes mellitus, weight, BMI, fasting blood glucose (FBG), blood pressure, serum lipids, HBsAg and anti-HBc data were abstracted. This study was performed after its protocol had been approved by the ethics committees of both PUMCH and BCH. Informed consent was obtained from all participants.

Laboratory tests

All study participants were subjected to overnight fasting after which blood samples were drawn by venipuncture by clinical nurses for laboratory examination. Fasting blood glucose, Tri, TC, HDL and LDL were measured using a Hitachi Modular Analytics System (Roche Modular DPP; Hitachi Ltd, Tokyo, Japan). The presence of HBsAg and anti-HBc were tested using a second-generation, enzyme-linked immunosorbent assay (Abbott Laboratories, Inc., Chicago, IL, USA). Chronic HBV infection was defined by the presence of both HBsAg and anti-HBc.

Statistical analysis

In order to make an appropriate case–control comparison, participants with a history of cholecystectomy were excluded and participants who tested negative for both biliary stones and gallbladder polyps were recognized as controls. Distributions of selected characteristics were evaluated among cases and controls. Subjects with both gallbladder polyps and biliary stones were counted in both groups. The Mann–Whitney *U*-test was used to