

GALLBLADDER EMPTYING AFTER DRINKING WATER AND ITS POSSIBLE ROLE IN PREVENTION OF GALLSTONE FORMATION

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SYNOPSIS

Gallbladder emptying normally occurs after ingestion of a meal. Fat and protein present in the meal are the substances that cause gallbladder emptying. In this study a drink of 500 ml of water was found to produce gallbladder emptying and common bile duct opacification in normal subjects and also in a patient with gallstones.

INTRODUCTION

There is a positive correlation between gallstone disease and obesity, diabetes mellitus, atherosclerosis, serum cholesterol level and parity (1). Incidence of gallstones has been related to the intake of dietary fibre in the western countries (2). Cholesterol rich diets and diets rich in fats have been thought to predispose to gallstones. The mechanism responsible for the frequency and the change in constituents of gallstones on a dietary basis has not been established (1). Nevertheless both clinical observation and experiments indicate that dietary and nutritional factors do play a role in gallstone formation. Oral ingestion of water stimulates the release of motilin, gastrin, pancreatic polypeptide and vasoactive intestinal peptide (3). Atropine blocks the water induced release of pancreatic polypeptide but not other hormones (3).

An enquiry into the food and fluids consumption in patients with gallstone disease in this hospital (Hopital de Cimiez) suggested that their daily water consumption is low. The present study was done to find out the average amount of daily water consumption in patients with gallstone disease and also to find whether ingestion of water produces gallbladder emptying.

METHODS AND RESULTS

Thirty consecutive patients who had gallstones demonstrated by oral cholecystography at this hospital in 1981 were inquired about their daily water intake. Their water consumption was 400-700 ml (mean 550 ml) per day. At breakfast these patients consumed very little water or none at all. They drank 200-350 ml of water after each meal (lunch and dinner). They did not drink any water between the meals or late at night after dinner except on rare occasions.

Six patients, four women and two men aged 16 to 87 years who were advised oral cholecystography were studied after an overnight fast. These patients had no history of heavy alcohol consumption and they were not taking any medication or contraceptive steroids. Informed consent was obtained from these patients.

Six tablets of iopanoic acid (0.5 gm each) were given to these patients after a low fat evening meal. They were advised not to drink or eat till the oral cholecystography was done and x-ray films were taken on the next morning. Next morning, x-ray films of gallbladder region were taken. Five patients had no gallstones and one patient had three gallstones in the gallbladder. 500 ml of tap water (drinking water) at room temperature was given to these six patients and they were asked to drink the water during a period of 1 to 2 minutes. Screening was done to see gallbladder emptying and x-ray films were taken at 10, 15, 20, 25 and 30 minutes after drinking water. Gallbladder emptying and common bile duct opacification were seen at 10 to 20 minutes after drinking water in the five patients without gallstones and at 30 minutes after drinking water in the female patient with gallstones. The gallbladder emptying was slow and of lesser degree in this patient.

DISCUSSION

Cholesterol concentration is highest in gallbladder bile during fasting (4). Nucleation for gallstone formation may occur during the fasting state when cholesterol concentration in gallbladder bile is higher. Only 50 percent of the overnight hepatic secretions enter the gallbladder (5). Van Berge Henegouwen and Hofmann observed that more than 50 percent of the bile secreted at night bypassed the gallbladder in both healthy subjects and gallstone patients (6), whereas Mok and colleagues observed that greater than 50 percent of bile secreted appears to enter gallbladder during fasting (7). Patients can have markedly supersaturated gallbladder bile even though hepatic bile during feeding is unsaturated (7, 8). Supersaturation of gallbladder bile is one of the important causes for cholesterol gallstone formation and many normal subjects have supersaturated bile without gallstones (9).

Stasis of bile in gallbladder during fasting is one of the factors favouring gallstone formation. In this study we observed a water daily intake of 400 to 700 ml in patients with gallstone disease. They consumed little water or none at all at breakfast. Ingestion of water produces distension of stomach and this distension produces stimulation of vagus nerve. Water ingestion stimulates the release of gastrin, motilin, pancreatic

polypeptide and vasoactive intestinal peptide. Ingestion of water also produces peristaltic waves in stomach and small intestine. Ingestion of 500 ml of water may stimulate the mechanoreceptors and osmoreceptors in the small intestine or it may release cholecystokinin leading to gallbladder emptying.

A high daily water intake and consumption of water at regular intervals can help in achieving dilution and promotes emptying of bile from gallbladder. This may be of help to prevent gallstone formation in the predisposed subjects as water does not add to the nutritional value of daily food intake.

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Note Added: After submission of this manuscript an abstract about effect of water ingestion on bile flow has been presented in a recent congress [Math MV, LaBrooy SJ, Jacob E, Ti Tk. Effect of water on bile flow in patients with T-tube biliary drainage. (Abstr) 18th Singapore Malaysia Congress of Medicine 2-5 August 1984 P. 84]. Another recent article also shows that ingestion of water produces gallbladder emptying, and this is mediated through stimulation of vagus nerve and not motilin even though water ingestion produces a rise in plasma motilin concentration [Svenberg T, Christofides ND, Fitzpatrick ML, Bloom SR and Welbrow RB. Oral water causes emptying of the human gallbladder through actions of vagal stimuli rather than motilin. *Scand J Gastroenterol.* 1985; 20; 775-78".]

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