Diet and Cholesterol Gallstones

A Study of 101 Patients with Cholelithiasis Compared to 101 Matched Controls

HENRI SARLES, MD, CHRISTIANE CHABERT, YVETTE POMMEAU, ELISABETH SAVE, HÉLÈNE MOURET, and ANDRÉ GÉROLAMI, MD

A group of 101 female patients with gallstones were compared to 101 age-matched controls. The patients with gallstones had a statistically significant (p = 0.0005) increased intake of calories, irrespective of dietary composition. Psychologic stresses were more frequent in patients with gallstones (p < 0.001); the following factors were not significantly different in the two groups: body weight, working conditions, and physical exercise.

Gallstones generally are divided into two main groups: (1) cholesterol gallstones containing over 70% cholesterol, and (2) bilirubin stones containing less than 20% cholesterol. Only very few stones (7.5%) come between the two major groups in terms of cholesterol content. According to these investigators, cholesterol stones occur much more frequently in patients in the United States, and bilirubin stones in those in China. The Japanese are in an intermediate position: the incidence of cholesterol stones has gradually increased in the recent years at the same time that the average daily intake of fat has gone up from 16.6 to 23.9 g. This observation suggests that dietary factors play an important role in the formation of cholesterol stones.

In an epidemiologic study of cholelithiasis among railroad workers in India, Malhotra found that the disease was seven times more frequent in North India than in South India. North Indians eat 8–19 times more fat, mostly short-chained (C4–C5) and saturated, and have a masticatory diet (wheat). On the contrary, South Indians use long-chain, unsaturated (oleic-acid) fats and have a nonmasticatory diet (rice).

From the Unite de Recherches de Pathologie Digestive, Marseille, France.

Address for reprint requests: Dr. Henri Sarles, 46, Chemin de la Gaye, 13, Marseille, 9e, France.
Previous authors\textsuperscript{1--3} have reported data related only to the lipid ration of the diet and have neglected carbohydrates, proteins, and total calories, which might vary in the same direction and play an important role in the formation of cholesterol gallstones.

There are few data comparing the diet of patients with cholelithiasis to the diet of the normal population. In 1957, Sarles \textit{et al}.\textsuperscript{8} compared the diet of patients with gallstones to that of patients, of similar age in the same hospital, without gallstones. The patients, all well aware of their dietary habits and whose troubles were recent enough that they had not modified their usual diet, were questioned by a trained dietitian and the composition of the diet calculated. The percentage of the caloric intake supplied by the proteins, lipids, carbohydrates, and ethanol was not different, but the total caloric intake was significantly higher in patients with gallstones. A similar study was undertaken in 1965.\textsuperscript{4} Each patient was matched with a normal subject of the same sex (female), same age ± 2 years, same race, and similar profession. The conclusions were identical to those of the 1957 study.

In another series, Sarles \textit{et al}.\textsuperscript{5,6} emphasized the part played by the total calories of the diet. They studied the influence of the diet on the composition of the hepatic bile collected, after cholecystectomy, by a T-tube in patients with and without cholelithiasis. In patients with gallstones the mean cholesterol concentration of the bile during the 3--37 days of the experiment was significantly correlated to the total calories of the diet and to the protein intake during the same period, but not to lipids and carbohydrates.

The purpose of this paper is to verify the conclusions of our two first studies and to examine the way of living and environmental conditions of patients with gallstones compared with normal people.

**METHODS**

The criteria used for selecting the patients were: (1) female, aged 20--55; (2) presence of gallstones in the gallbladder and/or the main bile duct proved by operation and/or radiology; (3) sufficient knowledge of the patients' diet; (4) symptoms recent enough not to have modified the usual diet; (5) similar number of children (± 1); and (6) no hemolytic anemia.

As in the United States,\textsuperscript{1} gallstones in France are composed mainly of cholesterol;\textsuperscript{7} pigment stones are seen almost only in patients with hemolytic anemia, who were excluded from this series. Of the 101 patients, 56 were operated on, and it was verified that stones were of the cholesterol type. Furthermore, all our patients had gallbladder stones which were cholesterol stones.\textsuperscript{1}

The 101 patients were studied in four different clinics of our city. Each patient was matched with a woman of the same age (± 2 years), same race, and similar profession, drawn randomly from lists of normal people supplied by Inserm's administration; women without a profession were classified