

TOTAL SERUM BILE ACIDS IN HEALTHY PAKISTANI SUBJECTS

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Abstract

Sera of 119 apparently healthy subjects (63 males and 56 females) were analysed for total serum bile acids. The individuals were divided into five different age groups and findings between males and females were compared. A significant difference ($p=0.02$) was observed in serum bile acid levels between males and females in the age group of 25-34 years. The mean value was higher in females (Mean 8.40 ± 0.73) than males (Mean 5.58 ± 1.22). The higher values in females in this age group may be due to excessive estrogen activity. No significant difference between the two sexes was observed in other age groups. Dietary habits and intestinal microflora may also influence serum bile acid level (JPMA 3:208, 1980).

Introduction

A wide variation in the values of serum bile acids in healthy subjects has been observed by many workers (Javitt, 1977). This study was planned to determine the normal levels of total serum bile acid in apparently healthy Pakistani subject.

Material and Method

One hundred and nineteen, two hours post-prandial, blood samples were collected from 63 males and 56 females of various age groups. The serum was immediately treated with alcohol, and charcoal to remove protein and pigments.

The charring method of kim and kritchevsky (1976) was adopted with a little modification. In this study 3 ml of serum was taken while kim and kritchevsky used 0.5 ml of bile owing to higher concentration of bile acids in the bile.

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Results

Table I: Mean Value of Serum Bile Acids in Pakistani Males and Females (ug/ml)

		<i>Males</i>	<i>Females</i>	<i>Total</i>
No	..	63	56	119
Mean	..	6.16	7.03	6.52
S.E.	..	0.40	0.41	0.29

Table I shows the mean values of total serum bile acids. The range was 0.0 to 12.6 u/ml in males and 0.5 to 14.9 ug/ml in females. Serum bile acids were comparatively higher in females than in males. The mean values of total serum bile acids in apparently healthy Pakistani subjects of different age and sex groups are shown in table II.

Table II: Mean Value of Serum Bile Acids in Different Age Groups (ug/ml)

<i>Sex</i>	<i>Age Groups</i>									
	15—24		25—34		35—44		45—54		55—64	
	<i>No</i>	<i>Mean±SE</i>	<i>No</i>	<i>Mean±SE</i>	<i>No</i>	<i>Mean±SE</i>	<i>No</i>	<i>Mean±SE</i>	<i>No</i>	<i>Mean±SE</i>
Males	24	5.82±0.58	12	5.58±1.22	10	7.5 ±0.93	10	4.84±0.70	5	7.11±1.90
Females	21	5.86±0.37	15	8.40±0.73	10	8.18±1.43	7	6.45±1.35	3	6.76
Total	45	5.84±0.34	27	7.15±0.72	20	7.84±0.83	17	5.50±0.69	8	6.98±1.20

A significant difference ($p=0.02$) was found in the values of 15 females (Mean 8.4 ± 0.73) and 12 males (Mean 5.58 ± 1.22) in the age group 25-34 years.

In males similar values were found in the age groups from 15-34 years. A slight increase was observed in the age groups 35-44 and 55-64 years, while the values were comparatively low in the age group 45-54 years. Bile acids in 2 males over 65 years were 9.0 and 10.6 ug/ml. In females the mean values of serum bile acids increased with the age upto 44 years, then a decrease was observed from 45 years and above.

Discussion

The mean value for total serum bile acids in apparently healthy Pakistani subjects was found to be 6.52 ug/ml. Ali and Javitt (1970) used gas-liquid chromatography and reported a level of less than 4 ug/ml in

Americans. These variations in normal levels may be due to the differences in the techniques employed for bile acid analysis, dietary habits of the subjects studied and the microflora of the gut.

The quality of diet may affect the bile acid levels because of its influence on their secretion and absorption. Serum bile acids reflect the instantaneous balance between intestinal input and hepatic uptake. As the hepatic uptake is independent of the load of bile acids in the intestine over a wide range, hence any disbalance could be a result of either enhanced absorption or poor hepatic uptake.

In normal subjects bile acid synthesis is probably regulated by the concentration of bile salts returning to the liver via portal circulation (Hofmann, 1977). Since cholesterol is the obligatory precursor of the bile acids, changes in the rate of hepatic synthesis of cholesterol, which itself is affected by dietary intake, also affects the rate of bile acid synthesis (Schwartz et al., 1975). There is some evidence that fats interfere with ileal bile acid absorption and, therefore, increase bile acid excretion (Annon and Phillips, 1974). Grundy and Metzger (1972) showed that by replacing carbohydrates with fats to raise 5 to 40 percent of total calories, an increased secretion of bile acids and cholesterol was observed.

Studies show that a diet rich in polyunsaturated fats increases bile acid excretion (Grundy and Ahrens, 1966; Moore et al., 1968; Conner et al., 1969), while others have shown that no major increase occurs (Avignon and Steinberg, 1965; Spritz et al., 1965; Grundy and Ahrens, 1970).

In average Pakistani diet about 63 percent of total calories are provided by fat (Ibrahim, 1979).

Accordingly the bile acid absorption must be altered with a concomitant increased excretion and therefore, decreased serum levels.

Besides the diet the intestinal bacteria also play an important role in the deconjugation and absorption of bile acids. The rate of deconjugation is markedly increased (a) if bacteria have access to the circulating bile acid pool more proximally in the intestine than normal, and (b) if a larger than normal fraction of the bile pool descends into the bacteria rich colon.

On both theoretical and experimental grounds, it is likely that deconjugated bile acids are efficiently absorbed and so conserved by passive diffusion throughout the small intestine. The higher concentration of the unconjugated bile acids in serum have been reported by Lewis et al (1969) in the patients with contaminated small bowel syndrome where an anaerobic, colonic type of flora is developed in place of normal aerobic flora of the small intestine. This higher concentration of serum bile acids does not seem to be due to liver damage, but is probably best explained by the fact that unconjugated bile acids are bound to plasma albumin more tightly than conjugated bile acids, and so are cleared more slowly.

The evidence from these studies makes it difficult to draw any firm conclusion about the effect of any one factor on the bile acid metabolism.

No significant difference was observed between the mean total serum bile acid values in males and females in the age groups 15-24 years, 35-44 years and above. However a significant difference ($p=0.02$) was observed in the age group of 25-34 years. It is possible that during the child bearing period enhanced activity of estrogens might have affected the secretion, absorption, or circulation of bile acids. Recent studies (Kern, 1978) on the effect of estrogen on the liver show that after administering ethinyl estradiol, a synthetic estrogen, bile acid transport across both sinusoidal and canalicular membranes is altered due to decreased membrane lipid mobility, probably the result of an increased content of cholesterol in liver surface membrane fractions. This, as a whole may result in the altered hepatic uptake, hence the prolonged retention of bile acids in the blood. Pruritus is a common finding in the last trimester of pregnant women, enhanced estrogen activity resulted in elevated serum bile acid levels and pruritus (Stichl, 1977). However no hard data are available on the direct effect of hormones on bile acid metabolism and its serum levels.

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