

Dyslipidemia in Outpatients at General Hospital in Kumasi, Ghana: Cross-sectional Study

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Aim. To determine the prevalence of dyslipidemia among hospital patients in Kumasi, Ghana, whose diet consists mostly of carbohydrates and little proteins, and assess the effect of age, sex, and the presence of hypertension and diabetes mellitus on serum cholesterol concentration.

Methods. The hospital-based study included 248 patients (145 women and 103 men) selected by strict random sampling from patients visiting Komfo Anokye Teaching Hospital between May 1, 1999, and April 30, 2000. The patients were divided into four groups: patients with hypertension, diabetes mellitus, both conditions, and without either disease. We measured lipid concentration in the serum of patients and assessed its correlation with age, sex, body mass index, and the presence or absence of diabetes mellitus or hypertension.

Results. Almost half of the patients (45%) had serum total cholesterol concentration > 5.17 mmol/L and 26% had also serum triglyceride concentration > 1.69 mmol/L. High-density lipoprotein (HDL)-cholesterol dyslipidemia (HDL < 1.03 mmol/L) was found in 30.5% of the patients, and low-density lipoprotein (LDL)-cholesterol dyslipidemia (LDL > 2.58 mmol/L) in 72%. Serum total cholesterol concentration was significantly high in the patients with hypertension alone ($p=0.01$). LDL-cholesterol and serum triglyceride concentrations appeared higher in those who had both hypertension and diabetes, but this was not statistically significant. Serum HDL-cholesterol was higher in the group with diabetes alone but also failed to achieve statistical significance.

Conclusion. Dyslipidemia is common in patients visiting hospital in Kumasi, although the regular diet is based on carbohydrates and poor in fat. Steps are needed to curb lipid-related disorders.

Key words: diabetes mellitus; Ghana; hyperlipidemia; hypertension; sex distribution

Hyperlipidemia contributes to the process of arteriosclerosis, which develops even faster in the presence of hypertension and diabetes mellitus (1). A reduction in cholesterol concentration can delay the development and decrease the severity of coronary atherosclerosis and ischemic heart disease (2). Epidemiological studies showed that total serum cholesterol level increases with age in both men and women over the age of 20 (2). The cholesterol increase rate in men slows down after the age of 45-50, and cholesterol concentration seems to decline after the age of 70 (2). In women, the cholesterol level continues to rise until the age of 70 (2). It is also known that the mean total cholesterol in women aged between 50 and 70 exceeds that in men of similar age (2).

The aim of our study was to determine the prevalence of dyslipidemia in patients visiting the hospital in Kumasi and also investigate possible factors associated with that disorder. Kumasi, the capital of the

Ashanti Region of Ghana, is the second largest city in Ghana with a population of about a million. Komfo Anokye Teaching Hospital (KATH) in Kumasi is the second largest hospital in Ghana. The people of Kumasi are mainly farmers, traders, and industrial workers. Their diet consists of carbohydrates and small amount of proteins. Main carbohydrate sources are plantains, cassava, and yams, whereas proteins come from beef, fish, and vegetables. Since such diets are poor in fat and lipids, we could expect lipid disorders to be rare in Kumasi population.

Patients and Methods

Patients

The participants were selected by strict random sampling from the adult population visiting clinics at Komfo Anokye Teaching Hospital for various problems between May 1, 1999, and April 30, 2000. Out of 248 participants in the study, 145 (58.6%) were women and 103 (41.4%) were men (Table 1). The mean (\pm standard deviation) age of participants was 52.9 ± 12.3

years, ranging from 22 to 85 (median, 53 years). All patients signed an informed consent before entering the study.

Methods

General data, including age, sex, and body mass index (BMI), were collected by using a specially constructed questionnaire. Blood pressure and blood glucose were measured, and the

Table 1. Characteristics of patients visiting Komfo Anokye Teaching Hospital in Kumasi, Ghana, between May 1, 1999, and April 30, 2000

Parameter	No. of patients
Sex:	248
men	103
women	145
Age (years):	
mean \pm SD	52.9 \pm 12.3
range	22-85
median (95% CI*)	53 (49.1-55.9)
Body-mass index (kg/m ² , mean \pm SD):	
men	29.1 \pm 6.2
women	26.8 \pm 4.8
Systolic blood pressure (mm Hg, mean \pm SD)	30.5 \pm 6.5
Diastolic blood pressure (mm Hg, mean \pm SD)	147.9 \pm 26.3
Hypertension only (%)	88.6 \pm 13.7
Diabetes mellitus only (%)	72 (30.0)
Hypertension and diabetes mellitus (%)	33 (13.3)
Neither hypertension nor diabetes mellitus (%)	25 (10.0)
	118 (47.6)

*95% confidence interval.

Table 2. Patients with dyslipidemia visiting Komfo Anokye Teaching Hospital (KATH) in Kumasi between May 1, 1999, and April 30, 2000

Lipid fraction (mmol/L)	No. (%) of patients	Normal value (mmol/L) ranges for KATH laboratory
Total cholesterol > 5.17	112 (45.0)	3.1-6.5
Triglyceride > 1.70	64 (25.7)	0.3-1.7
HDL-cholesterol < 1.03	75 (30.5)	men: 0.75-1.42 women: 0.98-1.88
LDL-cholesterol > 2.58	176 (72.4)	3.88-4.91

Table 3. Serum cholesterol (mean \pm SD) in women and men visiting the Komfo Anokye Teaching Hospital (KATH) in Kumasi between May 1, 1999, and April 30, 2000

Lipid fraction	Concentration (mmol/L)			Normal value (mmol/L) ranges for KATH laboratory
	women	men	p	
Total cholesterol	5.2 \pm 1.5	5.0 \pm 0.3	ns*	3.1-6.5
Triglyceride	1.5 \pm 0.9	1.5 \pm 0.6	ns	0.3-1.7
HDL-cholesterol	1.7 \pm 0.4	1.6 \pm 0.5	0.04	men: 0.75-1.42 women: 0.98-1.88
LDL-cholesterol	1.7 \pm 0.4	1.7 \pm 0.5	ns	3.88-4.91

*Not significant (Kruskal-Wallis for groups).

Table 4. Biochemical values (mean \pm SD) of the patients coming to Komfo Anokye Teaching Hospital (KATH) in Kumasi, between May 1, 1999 and April 30, 2000

Biochemical parameters	Group of patients with					Normal value ranges for KATH laboratory
	total	hypertension only	diabetes only	hypertension and diabetes	controls	
Hemoglobin (g/dL)	13.0 \pm 1.9	12.6 \pm 2.3	13.0 \pm 1.9	13.1 \pm 1.9	13.3 \pm 1.7	12-16
Fasting blood glucose (mmol/L)	6.7 \pm 3.7	5.0 \pm 1.1	10.7 \pm 3.5	11.1 \pm 5.4	5.4 \pm 2.3	3.3-6.4
Serum urea (mmol/L)	4.8 \pm 3.2	5.2 \pm 3.8	6.3 \pm 4.2	3.7 \pm 1.2	4.3 \pm 2.4	1.7-8.3
Serum creatinine (μ mol/L)	97.9 \pm 124.8	114.0 \pm 165.4	87.9 \pm 77.0	80.5 \pm 11.6	84.1 \pm 81.7	men: 53-125 women: 40-110
Serum uric acid (mmol/L)	345.8 \pm 103.0	358.6 \pm 100.0	387.9 \pm 105.2	348.3 \pm 49.0	314.0 \pm 124.4	men: 102-416 women: 142-339
Serum total cholesterol (mmol/L)	5.13 \pm 1.39	5.4 \pm 1.4*	4.6 \pm 1.4	5.1 \pm 1.3	5.1 \pm 1.3	3.1-6.5
Serum triglycerides (mmol/L)	1.48 \pm 0.81	1.5 \pm 0.9	1.6 \pm 0.7	1.7 \pm 0.9	1.4 \pm 0.8	0.3-1.7
Serum HDL-cholesterol (mmol/L)	1.30 \pm 0.63	1.3 \pm 0.5	1.9 \pm 0.6	1.2 \pm 0.4	1.4 \pm 0.8	men: 0.75-1.42 women: 0.98-1.88
Serum LDL-cholesterol (μ mol/L)	3.29 \pm 1.22	3.5 \pm 1.2	2.9 \pm 1.0	3.6 \pm 1.4	3.2 \pm 1.2	3.88-4.91

*p = 0.016 in comparison to other groups, Kruskal-Wallis.

presence of hypertension (blood pressure higher than 140/90 mm Hg measured in supine position) or diabetes mellitus were recorded.

Lipid analysis was performed after 12 h fast on an ATAC 8000 Random Access Chemistry System (Elan Diagnostics, Smithfield, RI, USA); the reagents used in the analysis were made by the same manufacturer. Low density lipoprotein (LDL)-cholesterol was calculated according to the Friedewald equation (3): LDL-cholesterol = total cholesterol - HDL-cholesterol - (triglycerides/2.19).

Dyslipidemia was defined as follows: serum total cholesterol > 5.2 mmol/L; serum LDL > 2.58 mmol/L; serum triglycerides (TG) > 1.7 mmol/L; and serum HDL < 1.03 mmol/L (4).

Statistical Analysis

For the purpose of analysis, the participants were divided into four main groups: those with hypertension, diabetes mellitus, both diseases, or without either disease (control group). Baseline characteristics were presented as percentages and mean \pm standard deviation (SD), where appropriate. Kruskal-Wallis test was used to compare group means, and chi-square test was used to compare proportions. P-value of < 0.05 was considered statistically significant.

Results

The mean systolic and diastolic pressures of 248 participants were 147.9 \pm 26.3 mm Hg and 88.6 \pm 13.7 mm Hg, respectively (Table 1). Women had significantly higher body mass index (BMI) than men (p < 0.05). Seventy-two (30%) participants had hypertension only, 33 (13.3%) had diabetes mellitus only, 25 (10%) had both diseases, and 118 (47.8%) did not suffer from either disease.

Out of all patients with dyslipidemia, 112 (45%) had total cholesterol above 5.2 mmol/L, 75 (30.5%) had HDL-cholesterol below 1.03 mmol/L, and 176 (72.4%) had LDL-cholesterol dyslipidemia (Table 2). There was no significant difference in serum lipid concentrations between men and women, except in HDL-cholesterol, which was significantly higher in women (p = 0.04) (Table 3).

Serum total cholesterol was significantly higher in the patients with hypertension only, as compared with other study groups (p = 0.016; Table 4). LDL-cholesterol and serum triglyceride concentrations were highest in those who had both hypertension and diabetes, but this finding was not statistically significant (F = 2.44, p = 0.06 and F = 1.29, p = 0.27 respectively). There was no significant difference in serum HDL-cholesterol concentration between the groups either (F = 1.07, p = 0.36; Table 4).

Discussion

Previous studies among general population showed that dyslipidemia was not a problem in Ghana (5). In our study, 25-72% of the participants had some sort of dyslipidemia. Total serum cholesterol level above 5.2 mmol/L was found in 45% of the participants and HDL-cholesterol below 1.03 mmol/L in 31%. The concentration values in our study were higher than those obtained by Asibey-Berko et al (5), Swanikar (6), and Nyarko et al (7), probably because participants in these three studies were all young adult men between 18 and 55 years of age.

We found that the total serum cholesterol and LDL-cholesterol levels were higher in the presence of hypertension. Similar results were obtained by Landray et al (8), who investigated the hypothesis that untreated patients with essential hypertension might exhibit abnormalities of LDL subfractions in the absence of vascular disease. They found that LDL locus was significantly increased in persons with hypertension, ie, that they had a preponderance of smaller LDL subfractions.

We found that HDL-cholesterol was lower in the presence of diabetes. Ko et al (9) also studied the quantitative abnormalities and determinants for lipid abnormalities in Chinese patients with type 2 diabetes mellitus. After making adjustments for age, sex, smoking, obesity, use of lipid-lowering drugs, and anti-diabetic agents, they found that diabetic patients had higher risk of having low HDL-cholesterol than non-diabetic subjects.

The people of Kumasi are mainly subsistent farmers, traders, and industrial workers with low income. Their diet is simple and so it was surprising to get such results. In recent years, the city of Kumasi has grown enormously, and population mostly uses public and other forms of transportation. Most farmers, for example, do not walk to their farms anymore, and walking represented one of the main forms of exercise for them. This is coupled with the changing lifestyle, characterized by increasing consumption of saturated carbohydrates and fats. Overweight or obesity (average BMI = 29.1) is a sign of well-being, respect, or beauty in this part of the country, and represents another part of the problem, especially when there is a regular inflow of foreign money to family members from relatives abroad. These recent socio-economic changes in the society may account for this trend, but further investigation will be needed to assess their real contribution.

In conclusion, our study shows that hyperlipidemia is becoming a problem in Kumasi and Ashanti

Region. It will be necessary to adopt pragmatic steps to reduce its incidence. Hypertensive and diabetic patients will have to check their lipid levels regularly and control them with diet and lipid-lowering drugs to avoid cholesterol-related disorders.

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