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HIGH DIETARY FAT INTAKE IS NOT ASSOCIATED WITH HIGH LEVELS OF CIRCULATING LIPOPROTEINS OR TOTAL CHOLESTEROL

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ABSTRACT

Brahler CJ, Wilson C, Baer J. High Dietary Fat Intake is not Associated with High Levels of Circulating Lipoproteins or Total Cholesterol. ***JEP****online* 2007;10(1):7-11. The objective of this study was to determine the association between dietary intake of fats, waist to hip ratio (WHR), body mass index (BMI) and blood lipoproteins and total cholesterol (TC) using food frequency data in one group of apparently healthy, urban African American women and their daughters (n = 110). Subjects were fasted when blood was drawn, waist and hip circumferences and body weight and height were measured and WHR and BMI were calculated. Average daily total fat intakes were 91.46 g and 77.83 g for mothers and daughters, respectively, but average LDL levels of 104.4 g/L and 103.1 g/L were low compared to the NIH cut off point for normal LDL of less than 130 g/L. The data support the recent findings that race may exert an independent effect on the relationship between high dietary fat intakes and blood lipid values in that high dietary fat intakes were not significantly correlated with high levels of circulating lipids for these relatively young African American females.
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Key Words: African American females; lipoprotein; diet.

INTRODUCTION

Athlerosclerosis and CHD are the leading causes of death within the United States, and various forms of CHD have been positively correlated with diets high in saturated fats and cholesterol (1). It has been shown that diets high in saturated fat increase the LDL and TC in the blood, and decrease HDL, which further impairs removal of LDL and leads to the formation of fatty plaques (2). Coronary heart disease is inversely related with HDL levels (2). Accumulation of fatty plaques is not solely a pathogenesis of adults; it begins early in childhood with small fatty deposits in the arteries that can progress into plaque as the individual matures (1).

The association between high dietary fat intakes and high levels of circulating lipids for Caucasians is accepted (2,3,4). Despite the elevated risk factors that African Americans are prone to and their greater correlation with CHD than other races, it has been reported that African American women aged 20 –74 show no significant association between high serum total cholesterol and CVD (5). Kayrooz (1998) (6) compared the diet profiles of African American and Caucasian women and found that in the African American group, less than a third of the population kept their total fat intake below 30% of their total dietary intake. Additionally, African American women consumed a far greater amount of dietary cholesterol compared to Caucasian women (2). Despite increased dietary cholesterol intake, serum cholesterol does not consistently predict a risk of (CHD) among African American women between the ages of 22 and 51 (5).

Thus, race may exert an independent effect on this association, as some researchers report normal blood lipid levels for African Americans who consume high-fat diets (3,7). The purpose of this descriptive study was to determine if dietary intake of fats is significantly correlated with the blood lipid and total cholesterol profile for African American women and their daughters.

METHODS

Subjects

Announcements were placed in bulletins in two mid-western churches and fliers were placed in an agency in downtown Dayton, OH, which provides assistance for low-income families and their children to recruit participants. The final sample consisted of 97 African-American women and their daughters (n=41 and 56, respectively); the study protocol was approved by the University of Dayton Institutional Review Board and participation in this study was voluntary, with all participants giving written informed consent, including children. Participants were scheduled and transportation was provided to the University of Dayton for testing. Selection criteria included African American females and their biological daughters between the ages of 4-17 years, who were apparently healthy.

Procedures

Subjects were 12-14 hours fasted at the time data were collected. After providing informed written consent to participate, 24-hour food recalls were completed by using interview techniques to ask the individual to recall every food, drink, and supplement consumed in the past 24-hours. Subjects were questioned regarding portion sizes, serving sizes, brands of food, and preparation methods to establish food frequency data. A registered dietitian oversaw these interviews. Blood draws also took place at this time for each participant. Blood was drawn sent to a local laboratory for analysis, and analyzed for lipoproteins and TC. Dietary fat intake was determined by entering food intakes into the Nutritionist V computer program (March, 2000, First DataBank, Inc., San Bruno, CA). The software program was used only for determining total fat intakes in grams. Body weight was measured in light clothing without shoes to the nearest pound on a beam balance scale, and height was measured without shoes with the head position in the Frankfort plane (eye and ear level) to the nearest 0.1 cm with an anthropometer. Weight was converted to kilograms to calculate BMI. Subject age was

recorded. Waist circumference was measured at the level of the superior iliac crest and hip circumference at the greatest girth of the gluteus per the recommendation of the National Health and Nutrition Examination Survey III (NHANES III). Waist was not measured at the umbilicus because the umbilicus can be displaced in obese individuals, and a bony landmark, such as the iliac crest is a more reliable anatomical marker than the umbilicus.

Statistical Analyses

The independent variable was dietary fat intakes determined from 24-hr food recalls and food frequency data. The dependent variables were HDL and LDL and TC. The relationship between body fatness (BMI), body fat distribution (WHR) and HDL and LDL and TC was also assessed as it is possible that blood lipids are influenced by a person's degree of fatness and body fat patterning. This study determined the dietary intake of fat and blood lipoproteins and TC levels for 97 African American mothers and daughters. All data were reported as Mean ± SD.

RESULTS

Mothers' ages ranged from 21-50 years and the daughters from 5-17 years. The average age for the mothers (N=44) was 34.02 ± 8.39 years, and for the daughters (N=66) 10.05 ± 3.71 years. Percentages of normal weight, overweight, and obesity for mothers and daughters were 18, 23, 59, and 59, 29, and 12 %, respectively. Cut-off points for adults were: normal weight (BMI<25); overweight (BMI 25-29.99); and obesity (BMI>30) and for children overweight and obesity cutoff points was per Cole et al and the International Obesity Task Force (8).

Table 1: Daily fat and cholesterol intake, lipoprotein levels, and indices of fatness (BMI, WHR) in African American daughters and mothers (mean ± SD).

Subjects	Fat (g)	Cholesterol (mg)	HDL (g/L)	LDL (g/L)	WHR	BMI
Daughters	77.83 ± 32.90	223.72 ± 166.75	55.75 ± 13.93	103.07 ± 31.30	0.81 ± 0.05	20.24 ± 4.76
Mothers	91.63 ± 49.77	303.89 ± 217.64	52.46 ± 15.64	104.44 ± 33.90	0.89 ± 0.07	33.35 ± 8.82

Average daily total fat intakes were 91.63 g and 77.83 g for mothers and daughters, respectively, but average LDL levels of 104.44 g/L and 103.07 g/L (Table 1) were low compared to the NIH cut off point for normal LDL of less than 130 g/L (Table 2).

There was not a significant correlation between total fat intake and LDL (r = -0.0257) and (r= -0.187) for the mothers and daughters, respectively. Mean HDL was 52.46 g/L and 55.75 g/L for mothers or daughters, respectively compared to the NIH guideline 50 g/L. HDL was not significantly correlated with total fat intake for daughters (r = -0.0125) but was significantly correlated with total fat intake for mothers (r = 0.3589; $p < 0.05$). LDL, HDL and mean daily fat intakes were significantly correlated between mothers and daughters (Figure 1).

Table 2: NIH Guidelines for Total Cholesterol, HDL, and LDL

Range	Total Cholesterol	HDL	LDL
Normal	<200 g/L	>60 g/L	<130 g/L
High Risk	>240 g/L	<40 g/L	>160 g/L

From the food frequency questionnaires it appeared that the young girls between the ages of 4-8 and 9-13 consumed the majority of their weekday breakfast and lunch meals from the school's food program. This may be a major factor to the difference between the caloric intake of the mother and child despite their common food choices. It is also seen that despite the positive energy found

amongst these mothers and daughters, that they are consuming many foods high in fat and low in nutritional value (Figure 1). Those calories were accounted for in only 3-6 and 4-6 servings of grains and bread, respectively. They also averaged 3 sodas per day, along with 2 servings of chips and candy; the foods high in caloric density are the foods that contain few nutrients and have a high fat content (9).

Waist to hip ratio (WHR) was inversely correlated with HDL (r = -0.2432 and –0.2326, for mothers and daughters respectively), as was BMI (r = -0.2264 for the mothers and r = -0.3545 for the daughters); however, these relationships did not reach statistical significance.

DISCUSSION

Total blood cholesterol and lipoprotein levels appeared not to be significantly affected by dietary fat intake. Interestingly, they were *also* not significantly correlated with measures of body fatness.
This sample of African American women and daughters appeared to be able to eat considerable amounts of dietary fats and carry excess body weight without elevating their total cholesterol and lipoprotein levels. However, the average age for the mothers was only 34.02 years (± 8.39), and for the daughters 10.05 (± 3.71). It is possible that lipoprotein levels will remain fairly unaffected by high dietary fat intakes for relatively young African American women. Several studies have reported that lipoprotein levels may remain within the normal range for African American women who consume large quantities of dietary fat, but that these levels tend to increase between the ages of 65 and 74 years (10). Compared to Caucasian women, these levels are substantially lower for a given dietary fat intake and remain low until a later age (6,7,10).

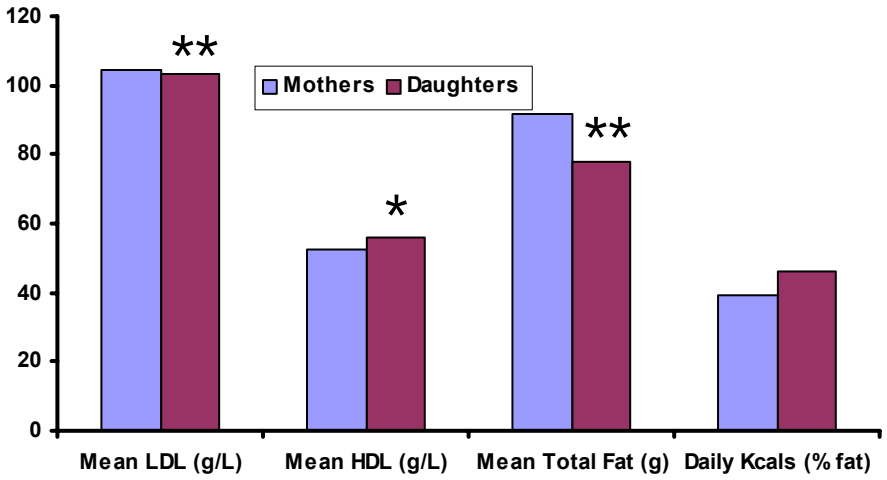

Figure 1. Comparison of blood lipids and fat intake between mothers and daughters. LDL; low density lipoprotein, HDL; high density lipoprotein,*; statistically significant correlation. p ≤ 0.05, ** ; statistically significant correlation p ≤ 0.01

CONCLUSIONS

It is possible that the detrimental effects of a high fat diet and excess body weight have not begun to independently manifest themselves yet in the relatively young population in the current study. However, given the fact that African American women are at higher risk for CV and metabolic diseases, young African American females should be encouraged to decrease their daily total fat intake as it is associated with the increased body weight and increased WHR. Both body weight and WHR are inversely related to HDL.

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