



Lowering Blood Lipid in Patients by Lifestyle Intervention at Cardiology Institute of Abidjan (Cote D'ivoire)

ANVOH Koutoua Yves Blanchard^{*1,2}, Loukou Ahou Leticia¹, Jean Brice Gbakayoro¹, Diabagaté Hadja Fatim^{1,2}, Houroupou Mbambai Jacques⁴, BROU Kouakou¹

Department of Science of food and Technologies Nangui Abrogoua University, 02 BP 801 Abidjan 02, Cote d'Ivoire

Abstract

Cardiovascular diseases are still the primary cause of death in both developed and developing countries. In these heart disorders, cholesterol is considered as one of major risk factor. The causes of higher serum lipidemia was not really understood by doctors. Dietary cholesterol seems less prevalent than that of internal biosynthesis.

In Cardiology, when serum cholesterol level is high, physicians used to treat patients with statins generally. These statins are expensive and sometimes they are toxic. The objective of this study was to detect the real causes of hypercholesterolemia and propose a good management by lifestyles.

Methods: This descriptive study included 411 selected randomly patients with cardiovascular complications with hypercholesterolemia. Food frequency questionnaire was used cholesterol and triglyceride measurement were done.

Results: Patients with higher serum triglycerides are those who ate two main meals ($p \leq 0.5$). The results of food frequency questionnaire shown that patients ate more meals with frying (67.75%) than meals with sauce (32.25%). Then, Meals with frying induced more triglyceride production than meals with sauce ($p \leq 0.5$). Among beverage, sodas and homemade juices were most consumed respectively at 36.6 and 51.3%. These beverages were associated with higher serum LDL cholesterol. After 6 months of nutritional advises, drop in cholesterol were observed.

Conclusion: Lowering Hyperlipidemia involved reducing homemade juices, Sodas (Ldl Cholesterol) and meals with frying (triglyceride) promoting meals with sauce.

Keywords: Heart Diseases, Glycaemic Index, Type of Meal, Cholesterol

Corresponding author: ANVOH Koutoua Yves Blanchard

Department of Science of food and Technologies Nangui Abrogoua University, 02 BP 801 Abidjan 02, Cote d'Ivoire.

Email: akybcr6@gmail.com **Tel:** +22508184498

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Introduction

Cholesterol is an organic matter with an important role in the human body. It is needed for the synthesis of bile acids, which are essential for the absorption of fats, and of many hormones such as testosterone, estrogen, dihydroepiandrosterone, progesterone, and cortisol (Hume et Boyd, 1978; Lecerf et Lergoril, 2011). Several studies have presented elevated triglycerides, total and low-density-lipoprotein (LDL) cholesterol levels, as well as lowered high-density-lipoprotein (HDL) cholesterol as a risk of Cardiovascular diseases as well as smoking, hypertension, diabetes, obesity, (Anonymous 1, 2002). Thus, dietary guidelines recommend limiting the amount of saturated and trans fat, and cholesterol in the diet Lichtenstein et al, 2006 [2]

However, Previous observational studies have shown an association between specific types of dietary fats and CVD risk (Hu et al 2001) [3]. Observational studies examining the association between dietary cholesterol and CVD risk have been inconsistent. Limiting egg consumption is often recommended as part of a heart-healthy diet

because eggs are a major source of dietary cholesterol. However, several studies have not found an association between egg consumption and CVD risk in the general population (Fraser 1994, Hu 1997). Studies were not limited to eggs, several other studies showed that there was no correlation in the daily consumption of fat and cardiovascular diseases (Fernandez 2006, Houston et al 2011).

Otherwise, contrary to phytosterols (originated from plants), cholesterol is synthesised in the human body in order to maintain a stable pool when dietary intake is low. Dietary cholesterol content does not significantly influence plasma cholesterol values, which are regulated by different genetic and nutritional factors that influence cholesterol absorption or synthesis (Houston et al. 2009). The relation between dietary cholesterol and serum cholesterol was not linear (Berger et al., 2015). Several studies did not find association between dietary cholesterol and cardiovascular diseases (Posner et al., 1991; Ascherio et al., 1996).

The primary objective of this study was to examine real causes of hypercholesterolemia in our patients. A second aim was to propose an adequate diet to reduce the dyslipidaemia

Research Design and Methods

This study was conducted at Cardiology Institute of Abidjan (Côte d'Ivoire) in 2017. During 4 months dietary trials were proposed to patients with high cholesterolemia by modification of their habitual diets when necessary.

Screening phase

For hundred and eleven (411) volunteers with high cholesterolemia aged 47.5 ± 7.95 years participate to the study. The minimum age was 44 years and the maximum age was 72years. These patients with known hypercholesterolemia were nonsmoker and no taking medication known to affect lipid metabolism from the clinical practices.

Dietary Interventions

Recommendations were delivered during one-to one consultation sessions. Volunteers were asked about their habitual diets by answering a questionnaire developed on local foods. Food frequency Questionnaire focused on type of breakfast, lunch and dinner were used. It also focused about type of meal, number of meal, type of beverage. Diets mistake were then explained and advises were

given to them during 30 to 45 minutes for changing experimenting. The nutritionist, in consultation with each volunteer, drew up meal programs for the study period and patients noted any deviation from the original program.

The nutritionist gave dietary advice to participant in order to avoid stressful diets. They met 2 weeks after the first consultation for the control. Any portion size was indicated. They had choice among diet proposed at breakfast and lunch, but they should follow strictly the dinner diet day by day. Only men were authorised to add 40 g of bread to vegetable soup on Tuesday and Friday when required. It was a hypocaloric diet especially in the evening.

The diet included low saturated fats, and increased in breads (morning and evening), roots tubers, vegetables and fish. It also had less red meat and more poultry. The participants were also taught to prepare their own meals or no.

In addition, fruits consumption was studied and limited to one fruits during the study.

None dietary Interventions

Although walking was encouraged during 45 minutes, patients were allowed to choose other types of moderate-intensity physical activity twice or 3 times a week.

Cholesterol and triglyceride control

Analyses were led each 2 months and half (75 days). First samples were made at T_0 . Second samples were made 75 days later and this date was mentioned T_0 then T_1 and T_2 . Plasma levels of cholesterol and triglycerides were measured using automated procedures in Cardiology Institute Laboratory.

Statistical Analysis

The statistical analyses was performed using STATA version 12.0. Spearman correlation coefficients (r) were calculate between total cholesterol, LDL HDL cholesterol, triglyceride and dietary meal. Cardiology patients suffering from hypercholesterolemia. Results were plotted on simple scatter plot and $p < 0.05$ was considered significant.

Results

The study included 423 patients (207 men and 216 women). The average age $47,50 \pm 7,95$ years ranged from 36 to 72 years. Two studies presented results only for men [21,22]

Characteristics	Numbers	(Pourcentage)	Average values (g/l)
2 main meals	204	(49.63%)	1.99 ± 0.30
3 main meals	207	(50.37%)	1.38 ± 0.49
P			0.00000

Table 1: Triglyceride and number of meals

In this table, $P \leq 0.05$, this survey is significant. This means that patients with 2 main meals had higher triglyceridemia than those with 3 main meals. The type of meal were eaten with fairly same rate

Characteristics	Numbers	(Pourcentage)	Average values (mg/l)
Meals with Sauce	132	(32.25%)	1.32 ± 0.49
Meals with Frying	279	(67.75%)	1.85 ± 0.48
P			0.000000

Table 2: Triglyceride and type of meals

P is significant, that means that meals with frying induce higher triglyceride levels than meals with sauce. Meals with frying had higher rate (67.7%) than meals with sauce (32.2%). Patients with higher triglyceridemia are those who ate more meals with frying

Characteristics	Numbers	(Pourcentage)	Average values (mg/l)
Liquid (porridge)	60	(14.8%)	2.46 ± 0.21
Sweet Coffee with Milk	279	(55.5%)	2.13 ± 0.44
With Juice	120	(29.6%)	2.19 ± 0.57
P			0.5928

Table 3: LDL cholesterol and breakfast

P≥5%, there is no significant difference this cholesterol values. But patients having sweet coffee with milk as breakfast represents more than the half (55.5%)

Characteristics	Numbers	(Pourcentage)	Cholesterol Average values (mg/l)
Type of Drink			
Sodas	147	(36.6%)	3.11 ± 0.33
Beers	3	(0.7%)	2.96 ± 0.45
Sweet Wine	30	(7.48%)	2.86 ± 0.45
Homemade Juices	206	(51.37%)	2.96 ± 0.27
Dry Wine (only)	15	(3.74%)	2.89 ± 0.04

Table 4: Beverages and blood LDL cholesterol levels

The table 3 shows the rate of dietary beverage consumption and LDL-cholesterol. About the number of main meals and the triglyceride rate, this study reveals that there was almost many patients (49.6%) consuming 2 main meal as there were 3 main meals (50.4%). However, those who consumed 2 meals had significantly higher average triglyceride compared to those with 3 meals. Also, the triglyceride of these persons were above the threshold value of 1.60 g/l.

About type of beverage, consumers of sweet white wine represented 7.48%. The rate of patients consuming beer and dry wine were the lowest 3.74% and 0.7%. Otherwise, this table indicated that highest blood Ldl-cholesterol levels were strongly associated with soda, homemade juices and beers. Drinks, sodas and homemade juices were most consumed with relatively scores of 36.6% and 51.37%

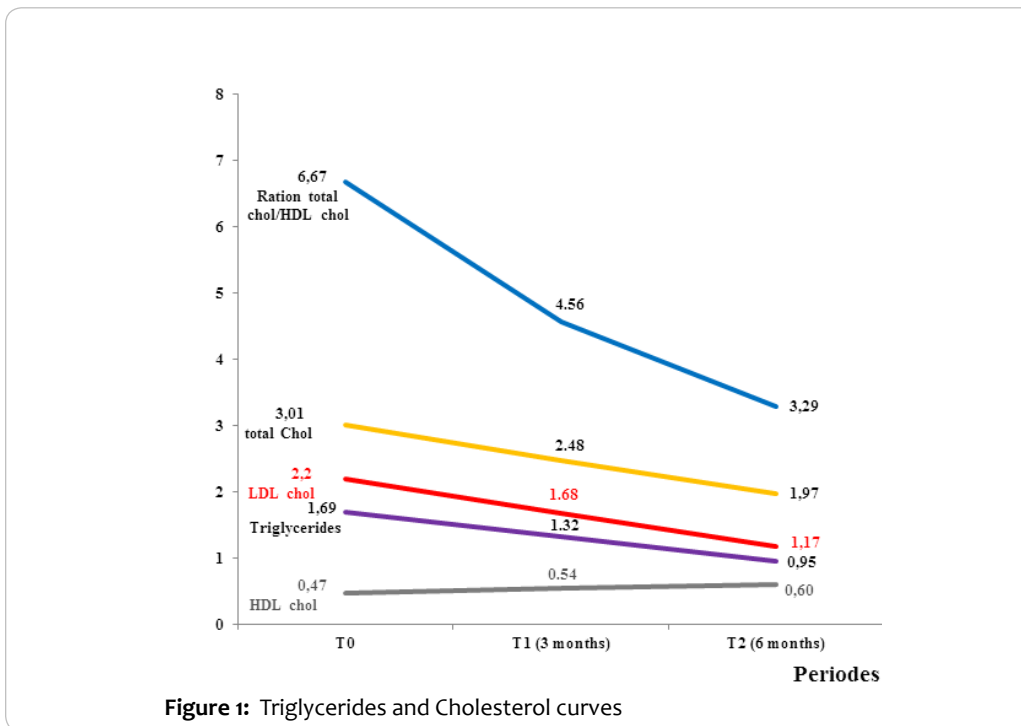


Figure 1: Triglycerides and Cholesterol curves

The figure shows mean values of selected characteristics. Total cholesterol, LDL cholesterol triglyceride reduction were observed during this study with increasing HDL cholesterol value. A drop in triglyceride was noted from 1.69 to 0.95 g/l. This drop was estimated by about 43.7%. Drop in total cholesterol and LDL cholesterol were estimated by about 18% and 23.6% respectively at T1. These decrease reached to 34.6 and 46.8% of the initial rate at the end of the study. HDL cholesterol levels increase is observed from 0.47 to 0.60mg/l, an increase average of 36% was observed. A deep decrease of the ratio total Cholesterol/HDL cholesterol was also observed during the first 3 months. It is estimated by about 31.6%. At the end of the experiment, the ration fell until 3.29. The drop was an average of 50.6%.

Discussion

Our study involved 411 patients suffering from hypercholesterolemia aged 47.5 ± 7.95 years. It focused about the number of meal, beverage, type of meals, type of cholesterol and triglyceride.

These trials revealed strong association between type of meals, number of meal and triglyceride. About type of meals, frying meals calories are generated most often carbohydrates and fat so rich in energy which contribute to produce triglyceride. This results was in concordance with **Levitan et al., (2008)** who substained that triglyceride is formed from excess of calories.

Meals with sauces are low in calories because they were cooked with leaves and vegetable without fat but with water like in african dishes (**Maundu et al.,1999 ;Chibuke et al, 2013**). Previous research indicated that increasing the volume of food by adding water can lead to affect satiety and food intake. However, the addition of water affects not only the volume but also the energy density (kJ/g) of foods (**Rolls et al., 1999**). These ingredients (vegetable and leafes) are higher in fibre content. High fibre-foods like sauces have low GI as shown **Foster-Powell et al. (2002)**, these fibres reduce the absorption of dietary and biliary cholesterol and promote its fecal excretion (**Koo and Noh, 2007**). High-fibre food are known to affect satiety and satiety (**Burley et al., 1993**) and lead to a suppression of hunger and a reduction in food intake (**Van Ittalie, 1978**).

About number of meals, our results provide great evidence that patients with two mean dishes had higher triglyceride than those having three meals. This evidence could be explain by that skipping meals increases the feeling of hunger and promotes the consumption of significant amounts of meals, so energy

Overwise, low GI carbohydrates have been associated with greater satiety and hence reduction in subsequent energy intake (**Roberts et al. 2003**). This quantity of sauce leads to satiety with low energy. These behaviours are due to the nutritional transition leading patients to abandon traditional foods and take advantage of imported menus. Our study found a relationship between dietary beverage and higher cholesterol levels. The concern about cholesterol was largely fueled by this study. Factors involved in cholesterol biosynthesis should well be known because this synthesis is more quantitatively more important than which contained in meals. Dietary cholesterol causes significant but minimal feedback inhibition of cholesterol biosynthesis in humans (**keys et al 1956**). In our study, beverage were recognized as the cholesterol producing factor. These beverage involved Sodas, homemade juice and sweet coffee and milk drunk as breakfast. These beverages are characterized by their high glycemic index (GI). This results are in agreement with **Levitan et al. (2008)** who found an association between dietary, glycemic index and total cholesterol among current postmenopausal women. It would be precious to reveal the higher rate of patients who preferred drinking homemade juice with higher GI instead of eating one fruit with fibre lowering GI. In the current study, Our essay in cholesterol reduction by diet leaded

to appreciable results. Comparing our resultats with medical one reported by **Yasunari et al. (2001)** who used Pravastatin (10mg), we obtained the same cholesterol reduction (25%) during the same periode (12 weeks) as reported **Antony Colpo (2001)**. Cholesterol reduction by about 43,7 % by nutritional methods like by using fluvastatin (20mg) was obtained after 6 months instead of 3 months in medical methods according to the same authors.

It is true that statins are generally used in the rapid reduction of cholesterol but their toxicity has been proven. In deed, **Puccetti et al. (2005)** observed that simvastatin, atorvastatin, and fluvastatin reduced platelet reactivity before significant reductions in LDL cholesterol occurred.

Control of dietary is one of easiest and least cost intensive means to achieve reduction in cholesterol. As our meal are mostly cooked with sauce, and sauce were cooked with leaves and vegetable, Polyphenols contained in leafes have been shown to reduce directly cholesterol synthesis (**Abel et al 2000**).

In other words, cholesterol is formed from excess calories which usually are generated most often from carbohydrates and fats (**Thomas et al.2012**)

Similarly, the cholesterol content was significantly higher in high G I than the low GI diet (**Hartman et al; 2010**), total LDL and Hdl cholesterol concentration were affected by diet. Contrarily to **shikany et al, 2009**; who thought that that improvement in total and LDL cholesterol concentration may be explained by slight difference in fatty acid profil of the diets.

High-fibre foods are known to affect satiation and satiety (**burley et al., 1993**) and lead to a suppression of hunger and a reduction in food intake (**Van Ittalie, 1978**).

The current data shown also an increase in HDL Cholesterol with meals by sauce. This results were in agreement with previous studies which that higher daily dietary fiber consumption was associated with beneficial effect on HDL cholesterol (**Quan et al., 2001, Ballesteros et al., 2001**).

Conclusion

This study suggests that the quantity and quality of carbohydrates consumed may influence blood lipid concentrations. Dietary cholesterol content has little impact on plasma cholesterol Diets characterized by lower GI and GL were associated with somewhat more favorable lipid profiles

Conflict of interest

The authors declare no conflict of interest

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