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The Effect of the Coptic Orthodox Christian Fasting On Dietary Intake and Some Biochemical Parameters.

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ABSTRACT

To assess the dietary intake and some biochemical parameters of Coptic Orthodox Christian during fasting compared with non-fasting subjects. Fifty-two voluntary Egyptian Orthodox Christian fasters were enrolled in this study and thirty-two matching non-fasters served as controls. The results showed significant reduction intake in energy, total fat, saturated fatty acid and sodium, while a significant increase of percent of energy from carbohydrate, magnesium and potassium when compared with control. The results of biochemical parameters showed significant decrease in triglycerides, total cholesterol and low density lipoprotein, while showed significant increase in BUN/Creatinine ratio when compared with control. There were significant increase and decrease in plasma iron and plasma Zinc and Copper, respectively. No significant change in plasma Magnesium, Calcium and Phosphorus were detected. Food intake of Egyptian Orthodox Christian fasting rituals showed benefit effects towards blood lipid levels. These benefit effects are so important in prevention of chronic disease. Vegetarian diets used in this type of fasting must be balanced for avoiding deficient in micronutrients.

Keywords: Coptic Orthodox Christian; fasting; dietary intake and lipid profile.

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INTRODUCTION

Dietary habits play an important role on the prevalence of metabolic syndrome and non-communicable diseases [1]. The increment in consumption of animal protein, saturated fat sources, fast food are the major reason of these diseases. Consumption of vegetables, fruits and whole cereals grains elevates body resistance to diseases due to its high content of minerals and vitamins. Also vegetables, fruits and whole cereals grains are the richest sources of dietary fibers, which play an important role in improving bowel movement. So the vegetables, fruits and whole cereals grains play an important role as antioxidant, which protect cells from damage and prevent them from chronic diseases [2, 3].

Vegetarian diets depend on elimination of animal protein sources such as eggs, milk and milk products. Vegetarianism consumes foodstuffs of plant origin such as fruit, vegetables, cereals, nuts, mushrooms and legumes [4]. In Egypt Coptic Orthodox Christian (COC) fasting depends on vegetarian diet.

Studies on Egyptian Orthodox Christianity are very limited. The Coptic Church is fasting almost 200 days each year. During 55 days they eat vegan diet, while they permitted to eat fish as the only animal protein source in the remaining days. During fasting periods Orthodox Christians followed vegetarian diet, which is like Mediterranean diet [5, 6]. The objective of the present study was to assess the effects of Egyptian Christian religious fasting rules on dietary intake and some biochemical parameters.

SUBJECTS AND METHODS

Subjects

Subjects of this study were selected from an adult population in National Research Centre in EGYPT. Fifty-two voluntary Egyptian Orthodox Christian (24 men; 28 women) fasted regularly according to the dietary rules and the fasting periods of the Christian Orthodox Church were enrolled in this study. The average age of subjects was 47.9 ± 9.2 years old (mean±SD). Thirty-two matching non-fasters, Muslims and Christians voluntarily participated in this study (20 men; 12 women) and served as controls. Their mean age was 46.0 ± 8.1 years old (mean±SD).All subjects in both groups did not suffer from any disease and did not take any medication.

Methods

Subjects were weighed by a digital scale and barefoot in very light clothing. Standing height was measured without shoes to the nearest 0.5 cm with the use of a standiometer. Body Mass Index (BMI) was calculated by dividing weight (kg) by height squared (m^2).The study was carried out according to the Medical Research Ethics Committee, National Research Centre, Cairo, Egypt.

Dietary intake:

For each subjects, a trained dietitians using the three separate 24-h dietary recalls method and food frequency questionnaire recorded the average daily food intake [7]. Intakes of individual nutrients were calculated by using World Food Dietary Assessment computer program [8]. A part from the quantitative assessment of individual intakes during the previous 24 h, subjects were asked about the frequency of eating selected foods containing relatively large amounts of fiber, minerals and the type of used fat.

Biochemical assays

Blood samples were obtained from fasted subjects after twelve hours fasting. Hemoglobin concentration was measured in the fresh samples by using the cyanomethaemoglobin method [9]. The rest of the blood samples were received on heparin for separation of plasma for determination of activity of transaminases AST [10] and ALT [10] as indicator of liver function. Plasma total cholesterol (T-Ch) [11], high density lipoprotein-cholesterol (HDL-Ch) [12], low density lipoprotein-cholesterol (LDL-Ch) [13] and triglycerides (TG) [14] were determined. T-Ch/HDL-Ch ratio was calculated as risk factor for cardiovascular diseases. Plasma level of creatinine [15] and blood urea nitrogen [16] were estimated as kidney function tests.

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Plasma glucose [17] was assessed. Minerals such as Zn, Cu, Mg, Fe, Ca, and P were measured by atomic absorption spectrophotometer (AAS; Model IL 157 with air-acetylene burner).

Statistical analysis

Data were expressed as means ± standard error of the means. The computer SPSS release 16 software was used for calculations (SPSS Inc., Chicago, II, USA). Two-tailed Student's t-test was used to compare the variables at a significance level of $p<0.05$.

RESULTS

The results of energy and nutrients daily intake of fasters Egyptian Orthodox Christian compared with non-fasters (control) are shown in table 1. The results showed significant reduction in energy intake (8.3%), total fat (31.21%), saturated fatty acid (44.12%) and sodium (8.3%), while a significant increase in percent of energy from carbohydrate by 17.31% when compared with control. Magnesium and potassium intake were increased significantly in COC Egyptian by 22.59% and 7.78%, respectively when compared with control. There were no statistically significant differences in the other nutrients.

Table 1: Energy and nutrients daily intake of Coptic Orthodox Christian compared with non-fasted subject.

	Controls (n=32)	Fasters (n=52)	%change
Energy (kcal)	1892.40±30	1735.0*±25	-8.3
Protein (g)	75.80±10	57.90±9	-23.6
Protein (% energy)	16.02±1.2	13.35±1.6	-16.7
Carbohydrates (g)	270.40±17	290.8±16	7.54
Carbohydrates (% energy)	57.15±3.4	67.0*4±3.5	17.3
Dietary fiber (g)	18.6±4.2	23.7±3.3	27.4
Cholesterol (mg)	260.0±13.2	125.0**±12.3	-51.9
Total fat (g)	56.40±5.3	38.8*±4.4	-31.2
Total fat (% energy)	26.82±3.1	19.61±2.3	-26.9
SFA (g)	27.2±1.1	15.2*±1.2	-44.1
MUFA (g)	23.4±4.4	16.40±3.4	-29.9
PUFA (g)	5.52±2.2	7.2±2.1	30.4
Calcium (mg)	643.7±36	567.2±35	-11.9
Phosphorus (mg)	1110.0±21	1087.0±24	-2.1
Magnesium (mg)	323.6±23	396.7*±22	22.6
Sodium (mg)	1800±20	1650***±25	-8.3
Potassium (mg)	2135±28	2301***±36	7.8
Iron (mg)	9.92±1.2	12.40±1.5	25.0
Zinc (mg)	9.5±1.2	10.9±1.1	14.7

Values significantly differ from control: *: $p < 0.05$, **: $p < 0.005$, ***$p < 0.001$.

Table 2: BMI and biochemical parameters of Coptic Orthodox Christian compared with non-fasted subject.

	Controls (n=32)	Fasters (n=52)	%change
BMI (Kg/m^2)	32.30±1.7	30.43±2.3	-5.8
Glucose (mg/dl)	85.52± 2.1	78.41± 3.2	-8.3
Hemoglobin (g/dl)	13.82±2.1	12.70±1.8	-8.1
TG (mg/dl)	109.91±4.2	73.00***±2.2	-33.6
T-Ch (mg/dl)	198.73±3.7	182.45**±3.8	-8.2
LDL-Ch (mg/dl)	97.68±3.9	81.27**±2.8	-16.8
HDL-Ch (mg/dl)	41.73±2.1	39.41±1.0	-5.6
T-Ch/HDL-Ch ratio	4.76±1.2	4.63±0.9	-2.7
BUN (mg/dl)	20.6±1.4	17.9±1.8	-13.1
Creatinine(mg/dl)	1.02±0.1	1.2±0.09	17.7
BUN/Creatinine	20.20±1.2	14.92**±1.3	-22.5
AST (U/l)	17.70±1.0	18.8±1.1	6.2
ALT (U/l)	17.9±1.3	18.9±1.4	5.6

Values significantly differ from control: *: $p < 0.05$, **: $p < 0.005$, ***$p < 0.001$.

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Table 3: Plasma minerals of Coptic Orthodox Christian compared with non-fasted subject.

Minerals	Controls (n=32)	Fasters (n=52)	%change
Magnesium (mg/dl)	2.15±0.5	2.17±0.5	0.9
Calcium (mg/dl)	10.02±1.0	9.51±2.7	-5.1
Phosphorus (mg/dl)	6.37±1.1	5.85±1.6	-8.2
Iron (ug/dl)	98.00±2.6	125.09**±3.9	27.6
Zinc (ug/dl)	108.18±2.5	97.45*±2.6	-9.9
Copper (µg/dl)	126.86±4.2	116.64*±2.1	-8.1

Values significantly differ from control: *: $p < 0.05$, **: $p < 0.005$, ***$p < 0.001$.

Table (2) represents body mass index [BMI] and biochemical parameters of fasters compared with control. Both fasters Egyptian COC and control group showed moderate obesity but fasters Egyptian COC were lower by 5.8% than control. Plasma levels of triglycerides, T-Ch, LDL-Ch decreased significantly in fasters COC Egyptian compared with control, while HDL-Ch decreased non-significantly. Blood hemoglobin and plasma glucose reduced non-significantly in fasters COC Egyptian compared with control. Faster Egyptian COC plasma levels of BUN and creatinine as kidney function indicator decreased and increased non-significantly respectively compared with control. The ratio between BUN and creatinine decreased significantly in fasters Egyptian COC compared with control. The activities of plasma transaminases (AST and ALT) showed non-significant increase in fasters Egyptian COC compared with control but still within normal range.

Table (3) represented plasma levels of minerals in fasters Egyptian COC and control subjects. Plasma levels of phosphorus and calcium showed non-significant reduction, while plasma levels of magnesium increased non-significantly in fasters Egyptian COC compared with control. Plasma levels of iron increased significantly in fasters Egyptian COC compared with control, while plasma levels of zinc and copper reduced non-significantly in fasters Egyptian COC when compared with control.

DISCUSSION

Significant favorable changes were found when macronutrient intake was expressed as a daily energy intake where fasters had lower intakes of total fat and protein when compared with control. This is the most probably reflecting the absence of animal foods in fasting Egyptian COC diet.

The results indicated that intake of total fat, saturated fat, mono unsaturated fatty acids and dietary cholesterol were lower compared with control, and intakes of dietary fibers, carbohydrate and polyunsaturated fatty acids were higher. Lower intake of cholesterol may be due to non-consumption of animal foods like egg, meat and meat products. The increase in vegetable oil intake during fasting period was reflected by the elevation and reduction in polyunsaturated fatty acids and saturated fatty acids intake, respectively. Similar to our findings, Kafatos [6] demonstrated that Eastern Orthodox Church diets contain higher amount of dietary fibers and lower content of saturated fat and dietary cholesterol. Also, Sari *et al*. and Papadaki *et al*. [18, 19] reported that Greek Orthodox faster showed lower intake of protein, saturated fat and calcium, while carbohydrate, dietary fiber and iron showed higher intake.

Despite meat and meat products being important sources of iron in the diet, intake of iron higher in the fasters group. This might have resulted from that fasters increased intake of molasses (black honey), legumes (beans), vegetables (leafy greens) and fruits (rich in vitamin C). Foods rich in iron and vitamin C increased iron absorption from foods. These results are in agreement with the results of some previous studies [20-23].

The results indicated that dietary intake of calcium was lower in the fasting group than control; most probably reflecting the absence of dairy and dairy products in their diet. These results are in agreement with the results of Papadaki *et al*. [19] who found that calcium intake of Greek Orthodox Christian monks was lower.

The results revealed that fasting Egyptian COC showed significant decrease in plasma triglycerides, total cholesterol and low density lipoprotein. The present results are in agreement with the results of sari *et al*. [18] who reported that regular fasters exhibited blood lipid levels and body weight during fasting periods

[24].In the present study plasma levels of HDL-Ch were reduced non-significantly in fasting Egyptian COC. Consumption of vegetarian and low fat diets showed reduction in HDL-Cholesterol levels as reported by Masarei *et al*. [25]. In the present study the observed non-significant reduction in the ratio of T-Ch/HDL-Ch in fasting Egyptian COC adopting a vegetarian diet may be an important way to reduction of cardiovascular diseases.

The present results revealed that minerals levels of fasting Egyptian COC were in accordance with the dietary intake.

CONCLUSIONS

The healthy eating pattern was shown in favorable blood lipid levels, suggesting the beneficial effects of the Egyptian Christian fasting rituals towards chronic disease prevention especially cardio protective benefits. Such diet should be balanced to avoid the insufficient intake of micronutrients.

Abbreviations: COC: Coptic Orthodox Christian; SFA: saturated fatty acid; MUFA: mono unsaturated fatty acid; PUFA: polyunsaturated fatty acid; T-Ch: total cholesterol; HDL-Ch: highdensity lipoprotein-cholesterol; LDL-Ch: lowdensity lipoprotein-cholesterol; TG: triglycerides; BUN: blood urea nitrogen; AST: aspartate aminotransferase; ALT: alanine aminotransferase.

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