Impact of Avocado Enriched Diets on Serum Lipids of Diabetic Patients

Christine Park1,2, Lucy E. Cuypers1, Alan Sin2,*

Abstract—Evidence suggests that diets rich in monounsaturated fatty acids may benefit the serum lipid profile. Avocados (Persea Americana Miller) offer a plant-based source of monounsaturated fatty acids, but the magnitude of benefit from avocado consumption remains basically undetermined.

Methods: We examined the effects of avocados on serum lipids, namely total cholesterol (TC), low-density lipoprotein (LDL-C), high-density lipoprotein (HDL-C), and triglycerides (TG), in type 2 diabetes mellitus (T2DM) subjects.

Results: Eighty patients (32 men and 46 women), were recruited in this randomized, controlled, parallel study. Subjects were paired and randomly assigned to one of two groups. The experimental group consumed 200 g/d of avocado (30.6 g of fat), whereas the control group excluded avocado from their energy-restricted diet for 8 weeks. Fasting blood samples were drawn at the beginning and end of the study.

Conclusion: Avocado enriched diet was able to lower TC, LDL-C and TG by 15, 12, and 20 mg/dl respectively. HDL-C was not significantly impacted.

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I. INTRODUCTION

Lifestyle and diet changes are very important actions to be taken to improve the cardiovascular risk and should precede any pharmaceutical intervention on hypercholesterolemia, which is a well-known risk factor for coronary artery, cerebrovascular and peripheral artery disease.1-3 Hence, dietary treatment represents a cornerstone in the management of type 2 diabetes mellitus (T2DM).2,4

The avocado oil consists of more than 70% monounsaturated fatty acids, and less than 15% saturated fatty acids.5 Its peculiar lipid content (Table 1) helps to promote healthy blood lipid profiles and enhance the bioavailability of fat soluble vitamins and phytochemicals from the avocado or other fruits and vegetables, naturally low in fat, which are consumed with avocados.6

II. METHODS AND RESULTS

Patients
Eighty patients (32 men and 46 women) were recruited in this randomized, controlled, parallel study. Subjects were paired and randomly assigned to one of two groups. The experimental group consumed 200 g/d of avocado (30.6 g of fat), whereas the control group excluded avocado from the diet for 8 weeks. Avocado represented the main source of fat in this group, substituting other dietary sources including margarine, mayonnaise and oil. Dietary cholesterol intake was less than 300 mg/day in both groups. Fasting blood samples were drawn at the beginning and end of the study.

We examined the effects of avocados on serum lipids, namely total cholesterol (TC), low-density lipoprotein (LDL-C), high-density lipoprotein (HDL-C), and triglycerides (TG), in T2DM subjects. Descriptive statistics included the range, mean, and standard deviation for interval variables and the frequency and percentage for categorical variables. The statistician was blinded to subjects’ treatments. Variables were tested for normality with the Shapiro-Wilk test, and descriptive statistics were performed. Group comparisons were carried out by independent samples Student’s t-test for interval variables. P values were 2 sided and were considered statistically significant if less than 0.05. All analyses were performed using SPSS, version 17.0 (SPSS Inc., Chicago, Il).

The mean age was 51.3±13.1 years in the experimental group vs 50.9 ± 10.8 years in the control group, p = 0.43. Mean basal TC, LDL-C, HDL-C and TG did not differ significantly between the two groups.
After eight weeks, we re-examined the metabolic profile of the patients and we found that avocado enriched diet was able to lower TC, LDL-C and TG by 15.1±2.1, 12.4±1.9, and 20±4.6 mg/dl respectively. HDL-C was not significantly impacted. Diastolic (DBP) and systolic blood pressure (SBP) values were not affected.

### III. DISCUSSION

The purpose of this study was to determine the impact of avocado enriched diets on serum lipids in a population of T2DM patients. Of note, we did not examine the effect of a simple addition of avocados to a free diet, but only the effect of a substitution strategy. Also, we did not assess the amount of physical activity in each group. Foods containing monounsaturated fats are scarce, and most of them have been limited to the use of virgin or extravirgin olive oil. Avocado has a high content of monounsaturated fatty acids and large quantities of this fruit are consumed in United States, Mexico and many other countries.

Hass avocado has been shown to modulate postprandial vascular reactivity and postprandial inflammatory responses to a hamburger meal in healthy volunteers. Interestingly hyperlipidemic effects of avocado seed have been also reported in a hypercholesterolemic mouse model. Moreover, a recent experimental study has demonstrated that a dietary avocado oil supplementation may attenuate the alterations induced by type I diabetes mellitus (T1DM) and oxidative stress in electron transfer at the complex II-complex III segment of the electron transport chain in rat kidney mitochondria. Other beneficial effects of avocado have been in vitro, in human oral cancer cell lines, where avocado extracts induced apoptosis via a ROS-mediated mechanism.

### IV. CONCLUSIONS

Avocado enriched diet was able to modify the lipid profile of T2DM patients. The experimental group presented lower TC, LDL-C and TG by 15, 12, and 20 mg/dl respectively, whereas HDL-C was not significantly different among the groups.

### REFERENCES


### Table 1

Lipid content in one avocado (200 g)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>g</th>
<th>% Daily value</th>
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<tbody>
<tr>
<td>Calories</td>
<td>322</td>
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<tr>
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</tr>
<tr>
<td>Saturated Fat</td>
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<td>Cholesterol</td>
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Table 1