

A Case Study: Low-carb, High-fat (LCHF) Diet Combined with Fried Food in Patient with Type 2 Diabetes and Central Obesity Reduces Need for Exogenous Insulin Injection

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Abstract

Eating is not a simple act of feeding our body. Diet plays a pivotal role in health promotion and chronic disease prevention. According to DGA [1] more than 117 million of American adults have one or more preventable chronic diseases, many of which are related to poor quality eating patterns and physical inactivity. These include cardiovascular disease, high blood pressure, type 2 diabetes, some cancers, and poor bone health. The importance of diet mostly as prevention for all the disorders correlated with metabolism should be strongly highlighted in this day: in fact, this clinical case shows how it's possible to decrease glycemia with diet in type 2 diabetes (T2D). Fat foods and fried foods play an unsuspected important role in Diabesity.

Introduction

'Diabesity' is a term for diabetes occurring in the context of obesity. Some country guidelines recommend that people with type 2 diabetes (T2D) limit their consumption of fats and cholesterol in general, which results in an unbalanced carbohydrate meal. The positive effect of LCHF diets (low carb, high-fat diets) is well documented: LCHF diets are at least as effective as other dietary strategies for reducing body weight, improving glycaemic control and reducing both hyperinsulinemia and blood glucose (reduction of HbA1c) in type 2 diabetes and have unique positive effects on blood lipid concentrations and cardiovascular risk factors [2]. Despite the recommendations, foods rich in fats and cholesterol, like eggs, doesn't show any negative effect on blood lipid level in T2D patients [3]. Also, it is well-recognized that nuts, notoriously high in fats, have the capacity to lower blood cholesterol concentrations and to modify blood lipoprotein levels [4]. People that eat nuts have a lower risk of various diseases. This includes obesity, heart disease, and type 2 diabetes [5]. However, people with T2D may benefit from (good) fats consumption.

Generally, nobody talks about the different types of cooking methods and how these can affect our physio-endocrine system. The same potato boiled or fried can increase or decrease insulin. In fact, in obese insulin-resistant women, food fried in extra-virgin olive oil significantly reduced both insulin and C-peptide responses after a meal whit fried food respect the same meal whit boiled food [6].

In this case study, is show how combining both dietary strategies produces a strong effect on blood glucose, resulting in a "forced" reduction of exogenous insulin injection to avoid the problem of hypoglycemia. Blood tests after 3 months of this dietary treatment show how HbA1c was slightly improved despite the reduction of exogenous insulin injection, and a positive effect was registered in blood lipid profile (LDL, HDL, Total Cholesterol). For continuous glucose monitoring (CGM) the patient used FreeStyle Libre before and after the dietary treatment. In order to check general body functions and glycosuria, the patient used the urine test Multistix 10 SG Siemens.

Objective

This current case study shows the effects of the high-fat diet combine with fried foods as dietary interventions to lower blood glucose level

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and consequently reducing the amount of exogenous insulin injection. High fat diet-fried food diet not have any negative effect on blood lipoprotein levels.

Materials and Methods

Design

The patient is 67 years old at the time of the visit with type 2 diabetes, mild hypertension, 93 Kg of weight. He has prescribed a week's renewable dietary strategy and He was instructed on how to cook the recipes, which foods, and which cooking method avoids. He was followed for 3-mo with this dietary strategy and he chek glycemia with FreeStyle Libre system every day and Glucosuria with Multistix 10 SG siemens 3 times/week.

Dietary interventions

Patient was assigned to a fried high fat/egg diet. The patient was advised weekly about his diet allocation and diet prescription, he was instructed with help of two chefs about the different cooking methods. Dairy products were excluded from the diet Was prescribed also other protein-rich alternatives such as legumes that have a low glycemic index (GI): foods as legumes have been shown to improve glycemic control in patients with type 2 diabetes mellitus (DM) [7].

Patient was given a menu with notes as a guide to the specific types of foods, cooking methods, and quantities to be consumed with particular emphasis on replacing foods containing saturated fats with foods containing MUFAs and PUFAs. Patient was also instructed not to change their activity level: in clinical trials of ≥ 8 weeks duration structured exercise interventions reduce significantly HbA1c (A1C [8].

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The principles of the diet were:

1. increase the content fat from extra-virgin olive oil (EVOO)
2. use the only EVOO for frying
3. avoid any dairy product
4. increase the consumption of fatty-fish
5. pasta or toasted bread are allowed in the quantity of 50 g 3 times a day and only in the principal meals (breakfast, lunch, and dinner)
6. do not eat between the meals: if hungry only nuts are allowed
7. drink only water if possible with fresh lemon juice without any sugar

Primary outcomes

At screening was evaluated the anthropometric measures, nutritional analysis.

Bodyweight, waist circumference, the recording of side effects, any medication changes, and a dietetic review was registered during the diet.

The primary outcome was the positive change in the level of glycemia already in the first week of diet (as shown in the results).

All other assessments were secondary outcomes.

Pathology

Blood samples were collected from laboratory for fasting blood glucose, Hb A1c, total cholesterol, HDL cholesterol, LDL cholesterol,. Blood was also collected for a full blood count, thyroid function, and liver and renal function.

Secondary outcome

There was a strong reduction of glycemia detected by different episodes of hypoglycemia.

There was no significant difference in HDL cholesterol after 3-mo of diet.

There was an improvement in total cholesterol, LDL cholesterol, from screening to 3-mo (data not shown).

There was a slight reduction of HbA1c after 3-mo of diet despite the reduction of insulin injection.

Change in anthropometric measures and vital signs

Reduction in waist circumference and blood pressure was detected.

Results

After a 3-mo dietary strategy the results were:

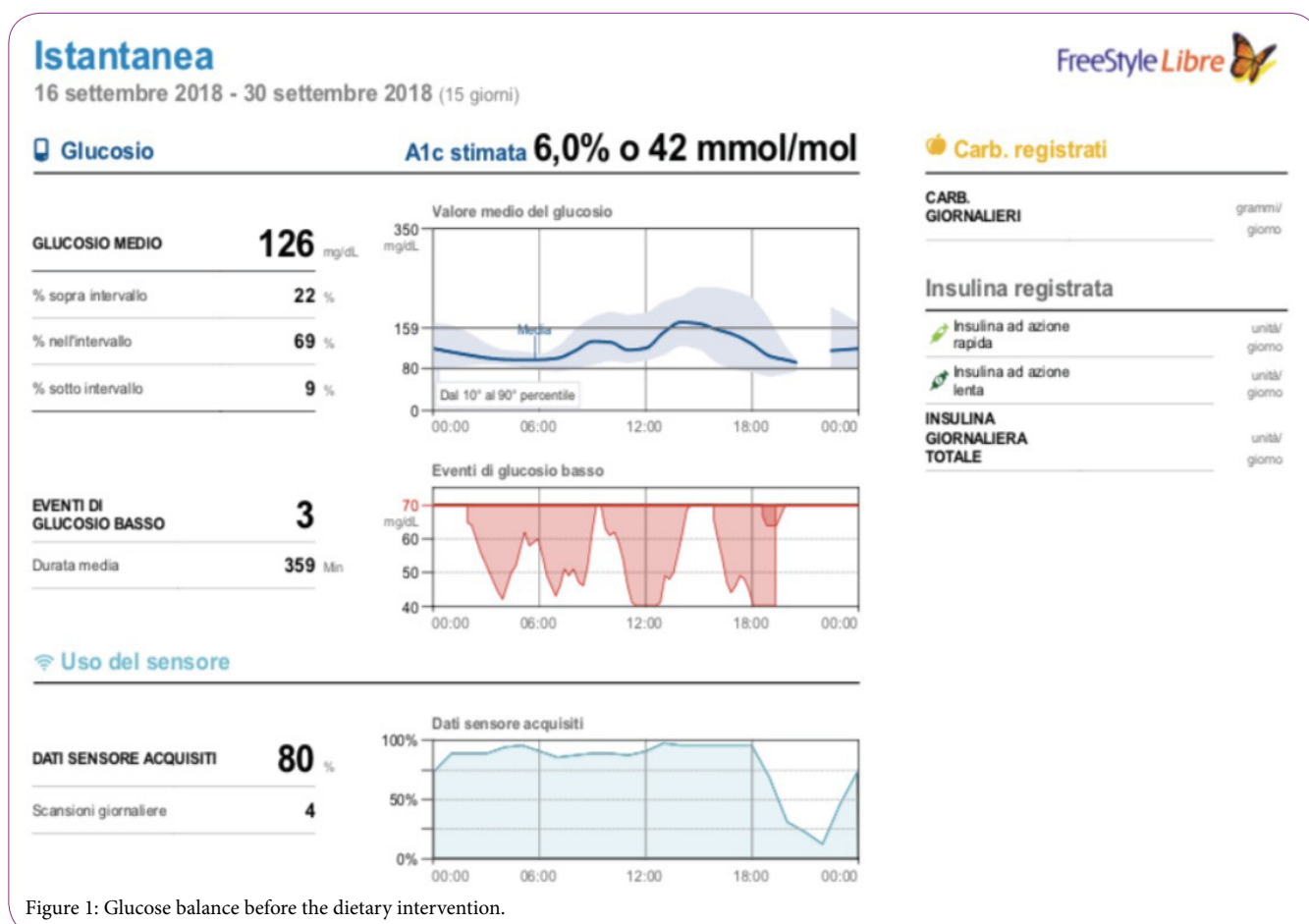


Figure 1: Glucose balance before the dietary intervention.

1. improved control of glycemia that “forced” a reduction of exogenous insulin injection
2. greater satiety and better weight management
3. despite the high egg consumption, there were no differences in total cholesterol, lowdensity lipoprotein cholesterol, triglycerides, or glycemic control.

As shown in figure 1 and 2:

1. the average of glycemia was higher before (126 mg/dl) than after the diet (104 mg/dl)
2. the HbA1c estimation was decreased after the diet (from 6.0% or 42 mmol/mol to 5.3% or 34 mmol/mol)
3. was increased the glycemia times in the range (from 69% to 71%) and more interesting the times that the glycemia was over the range decrease from 22% to 5%
4. hypoglycemic episodes were more frequently after the dietary treatment (25 times) than before (only 3 times)

All this data forced the endocrinologist to reduce insulin therapy.

Discussion

Diabetes is a worldwide raising problem today, and T2D and obesity are conditions where food plays a pivotal role in treatment and prevention. The message is clear and strongly marked from the SARS-Cov-2 pandemic: we need to reverse the trend of Diabetes.

In several descriptive studies, the infected persons who died were most frequently older than 70 years, males, hypertensive, diabetics, and affected by serious comorbidities such as congestive heart failure, chronic obstructive pulmonary diseases, or renal diseases [9-17]. Males, hypertensive, diabetics, and those with COPD or major cardiovascular diseases all showed an approximately doubled risk of death or severe disease [18-21]. Obesity is also emerging as a significant, independent predictor of severe/lethal disease [22-25].

A good positive effect in the lipidic panel was detected in accordance with several studies in nondiabetic populations that showed an increase in HDL cholesterol and apolipoprotein A-I concentrations with increased egg intake, with minimal effects on LDL cholesterol [26-28]. The formation of intestinal apolipoprotein A-I, which is the major protein component of HDL cholesterol, was shown to be increased with cholesterol and fat feeding in both insulin-sensitive and, lesser, in insulin-resistant subjects [28].

This is a possible area of future research to confirm whether a high-egg diet in individuals with T2D is beneficial in raising HDL cholesterol.

Improvement in blood lipid profiles can be confounded by the trial being a weight-loss intervention. Weight loss itself has effects on blood lipid profiles that might outweigh any effects of fried/fat/egg diet on such variables. In this case study, there was a little reduction in body weight.

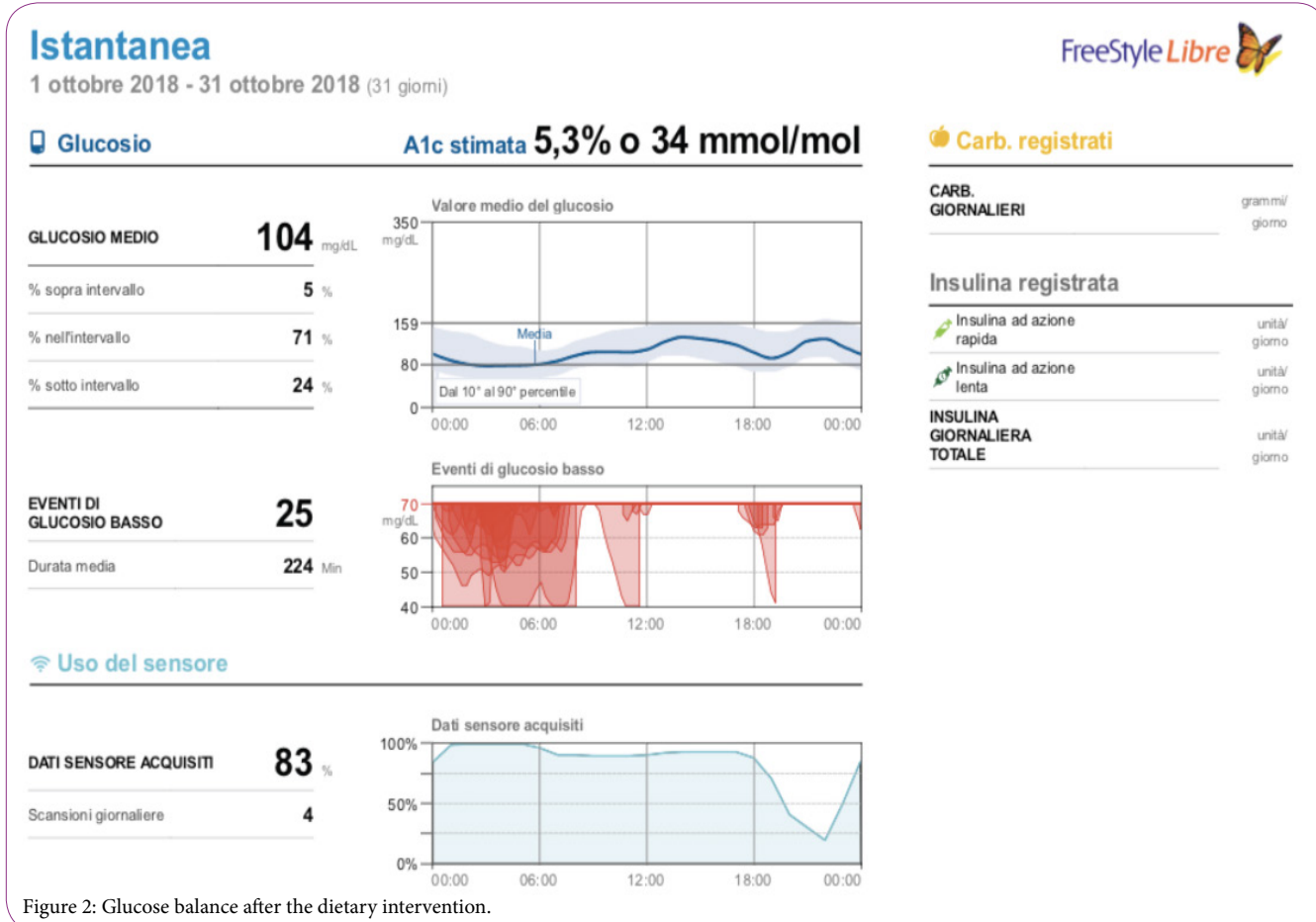


Figure 2: Glucose balance after the dietary intervention.

Fried food (and fat in general) was demonized in the last years. Despite this conception, their positive effect in improving postprandial insulin response in obese, insulin-resistant women was well detected. Food fried in extra-virgin olive oil improves postprandial insulin response in obese, insulin-resistant women [6]. Obese subjects have higher body weight, larger waist circumference, higher BMI, generally higher triglycerides, and lower HDL-C levels concerning lean subjects [6]. In lean healthy women, fried extra-virgin olive seem to not have any biological effect on the glycemic and insulinemic response. These findings could be attributed to the fact that the more severe the glycemic deregulation, the greater the positive effect of the addition of fat to high GI food on glycemic metabolism [6,29]. In contrast, fried food (in extra-virgin olive oil) reduced the insulin response and circulating C-peptide concentrations in obese women [6].

The author's responsibilities was as follows: report the principle of prescribed diet, report the data from FreeStyle Libre, report changes in the pharmacological therapy from the endocrinologist and report the blood/urine test from the laboratory. The author declare that there is no conflict of interest.

Conclusions

A person with T2D (or prediabetes) who consumed an High Fat-High Eggs-Fried Food diet can easily improve glycaemic control of blood sugar reducing (probably in variable proportion) the exogenous insulin injection. This dietary strategy seem to be one of the best external intervention for this purpose.

In according to Fuller et al. no significant difference in the change in HDL cholesterol, total cholesterol, low-density lipoprotein cholesterol was founded despite an high egg diet. Also, as claimed by Noakes in the narrative review, LCHF diet improving glycaemic control and reducing both hyperinsulinaemia and blood glucose (HbA1c) in type 2 diabetes, effects on decreasing glucose level enhanced by the presence of fried foods. It's time to revisit and update population guidelines including more eggs, more good fats and fried food (in extravirgin olive oil) in the recommended diet for health o type 2/ prediabetes/insulin-restisten people.

In the western countries, reverse or better prevent conditions as obesity and type 2 diabetes can be the way to increase the general status of health population and make people more "resistent" for any unexpected adversity as SARS-Cov 2 teach.

Competing Interests

The author declare that there is no competing interests regarding the publication of this article.

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