



## Research Article

# Functional Gelato: “How to Reduce the Excessive Amount of Added Sugars, While Still Maintaining the Perfect Taste”

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### Abstract

Is it possible to process a very tasty food, like ice cream, so that it meets the dietary and nutritional needs of both healthy people and chronic disease carriers and at the same time make it functional? The answer is yes, in fact, we have come up with an Italian Artisan Gelato that is low in added sugar, fat, and low in calories. It modulates each flavor to the different dietary needs of both healthy people and chronic disease carriers.

By using vegetable fibers, we were able to reduce both added sugars and fats during the making of the ice cream. The presence of vegetable fiber in the composition has also made this food “functional,” since ice cream is usually devoid or has minimal amounts of this macronutrient.

Following the guidelines of providing a “food for ALL” we later developed the sugar-free variant that can also be eaten by type 1 diabetics. In addition to its nourishing and satiating qualities, this tasty ice cream can be given to people who have restrictive diets as a deterrent for dietary transgressions and help the patient in maintaining his/her chosen dietary treatment.

**Keywords:** Gelato, Ice Cream, Functional, Food, Hypocaloric, Diet

### Introduction

Currently, the Western World’s Diet is rich in simple sugars, especially saturated and trans-fatty acids, salt/sodium and is low in fiber.

Excessive consumerism has resulted in overeating and has caused a significant increase in nutritional, dietary and medical problems. It has increased the occurrence of obesity, dysmetabolic syndromes, type 2 diabetes, gastro-intestinal, cardio-vascular, chronic neurological and oncological diseases [1-3].

The aim of the research was to identify and rework a mouth-watering product, such as the Italian Artisan Gelato, in order to create flavors that appeal to everyone. It can be eaten by healthy people, the elderly, children and ones who must follow specific restrictive diets. Consequently, this is a “Gelato for All.” The idea was to create a very tasty product, with selected and easily traceable ingredients, having reduced sugar and fat, although still providing nutritional benefits with low caloric intake [4,5].

At the same time, it is functional by providing fiber in its composition.

## Material and Methods

Common Gelato is a dilution in water, milk or vegetable derivatives (rice, soy, etc.) of several main ingredients (e.g. cocoa, pistachio, fruit, etc.)

We have used vegetable fibers for the composition of this alternative Artisan Gelato. These fibers come from peas, chickpeas, potatoes, beets, baobab, citrus, chicory root, usually chosen singularly or in combination depending on the consistency you want to create.

The fibers are dried, not industrially treated, tasteless, odorless, and give a sense of satiety to the consumer. They were chosen, because they possess similar physico-chemical characteristics to simple sugars, for their osmotic and anti-freezing characteristics and fat for its spreadability. Their use has therefore allowed a reduction in simple sugars and fats.

The flavors developed for the milk-based ice creams are Vanilla and Hazelnut. The water-based ice creams are Pistachio, Chocolate, Almond, Raspberry and Mango. Hazelnut also comes in the water-based version.

We made sure that this Gelato did not contain any gluten, eggs or soy, in order to eliminate possible allergens. In the water-based flavors, there is obviously no trace of lactose. As a thickener we only used carob flour and chose one type of simple sugar produced from organic Italian beets.

This ice cream contains no artificial coloring, preservatives or emulsifiers, therefore, the shelf life for the milk-based ones is only of 4 months, based on repeated tests. The reason for the short shelf-life is due to problems of lactose precipitation that crystallizes and produces a “glassy” sensation, while for the water-based (vegan) flavors, the shelf life can last up to a year.

We also produced the flavors of Chocolate, Hazelnut, Almond and Pistachio without adding any sugar, but using a mixture of polyalcoholic sweeteners instead, such as Erythritol and Maltitol, so that even type 1 diabetics, as well as any other person, could benefit from this delicacy.

The structure of the sugar-free flavors does not contain vegetable fiber, because of the combination of polyols and fibers could cause unwanted gastro-enteric effects, such as intestinal meteorism, flatulence or diarrhea.

All of our recipes contain a maximum of 5 to 7 ingredients.

For every flavor we have selected the main ingredient based on its quality, genuineness and easy traceability.

To reach a superlative taste and proper aroma, we used the main ingredient in high percentages: Raspberry 70% fruit (from Italy), Mango 80% pulp (from Asia), Chocolate 15% cocoa (from Peru) without added cocoa powder, Pistachio 14% (1st choice Italian, 2nd choice, Iranian or Turkish), Hazelnut 12% (Tonda Gentile from Viterbo), and Almonds 12% (from Sicily).

We use the same percentage of the main ingredient in ice creams without sugar, although it is perceived by the palate as being of greater intensity than those with reduced sugars. While there is less aroma, due to the absence of sugars, it tends to release a lasting papillary sensation due to an osmosis effect. To verify this effect, we chose 5 healthy volunteers, that had been fasting, for a blood test. We wanted to measure the changes in their glucose and insulin levels, after 1 to 2 hrs of eating 70g of sugar-reduced Pistachio ice cream. We then repeated this test with 5 type 1 diabetic volunteers, in order to assess any rapid insulin consumption verified by their subcutaneous sensors.

## Results

Compared with other artisan type ice creams that follow the criteria of the Italian confectionery tradition, ours has up to 25-50% less sugar content and 40-50% lower fat content, but above all it contains fiber, thus becoming functional, as well [5].

In the two milk-based flavors, the total calorie count per 100 gr of product is of 169 kcal, respectively for Vanilla and 200 kcal for Hazelnut; in the five water-based flavors we have 175 kcal for Pistachio, 204 kcal for Chocolate, 197 kcal Citrusy Almond, 79 kcal for Raspberry and 77 kcal in the Mango.

These caloric discrepancies are both due to the different nutritional values that each main ingredient possesses and to the different quantities of sucrose added during its processing. This may vary from a 10%, with the milk-based flavors and the Raspberry flavor, to a 12% for the water-based flavors and a 5% in Mango.

In our recommended portion of 70g (corresponds to 2 scoops of ice cream), the calorie count is further lowered by 30%, which from a dietary point of view, can be considered a snack. The nutritional value that each flavor has, indicates that this food is not only dietary, but also multi-purpose. In fact, the Hazelnut and Vanilla ice cream are a “protein source”, because 12% of the energy comes from proteins. The “fiber source” is of 3g per 100g, meaning that there are at least 1,5g of fiber per 100 kcal. Dark Chocolate, Citrus Almond, and Pistachio are all high in fiber i.e., they contain at least 6g of fiber per 100g or at least 3g of fiber per 100 kcal.

Raspberry and Mango have a high fiber content. The first has 7,1% and the latte has 7,5%. Both are low in calories (30% reduced energy value), totally fat-free (the sum of saturated fatty acids and trans-fatty acids does not exceed 0,1g of saturated fat per 100g), is very low in salt/sodium (sodium or salt equivalent is 0,04g or less, per 100g/ml). In the sugar-free flavors, the calorie per kilo drop to 135 kcal for Pistachio, 138 kcal for Chocolate, 97 kcal for Almond and 93 kcal in Hazelnut. The caloric discrepancy is due to a higher amount of Erythritol (0 kcal) than Maltitol (2.4 kcal) in the Almond and Hazelnut flavors.

In these flavors, the nutritional values have no multi-purpose function, because they don't have the added fiber.

In healthy patients, after an intake of 70g of sugar-reduced Pistachio ice cream, the blood tests detected an elevation in glycemic and insulin values in the post-prandial norm range.

Two hours later the values returned to normal. After eating sugar-free ice cream there was no rise in both glycemic and insulin values. Therefore, this ice-cream has a low glycemic and insulin index.

Diabetic patients, who ate both the low sugar and no sugar ice-cream, had no need for the rapid insulin consumption and even after eating the sugar-reduced ice-cream the level of insulin consumption, during a 24-hour period, was very low. Therefore, this ice cream can also be consumed by type 1 diabetics, but the portion must not exceed 70g.

## Discussion

The Modern Western Diet, of overeating, is typical of our consumer society resulting in the daily intake of too much simple sugar, saturated and trans-fatty acids, high salt/sodium and low fiber [6].

There is an increase in the consumption of industrially made and processed products, fast-food and take-away that contain high amounts of simple sugars, fat and salt/sodium in order to satisfy the public's desire for taste. The ingredients are listed on the label, but may hide a high percentage of added sugars, fats and salt or sodium.

All this leads to a significant increase in nutritional, dietary and medical issues as well as a greater occurrence of diseases related to unsuitable diets such as: obesity, dysmetabolic syndromes, type 2 diabetes, gastro-intestinal and cardiovascular disorders and chronic neurological and oncological diseases [1-3,7,]. In order to correct nutritional imbalances, patients with existing pathologies are placed on a restrictive diet, as a primary and tertiary prevention measure. These restrictive diets are often poorly tolerated and can cause psychological stress, including the loss of taste. This is due to an abrupt shift from dietary excesses to severe food restrictions. Over time, the patient may get tired of these restrictions/prohibitions or refuse to follow a diet, because it is considered monotonous, unappetizing and tasteless. (Your text: “The restriction and prohibition of not being able to eat anything, brings the patient to refuse these monotonous, unappetizing and tasteless diets.”)

For some patients, the “dietary isolation” can reduce the desire for conviviality, which often turns into depression, while others react by transgressing or abandoning the diet all together.

This last attitude creates the well-known “yo-yo” effect (on weight loss or gain) and a worsening of the prognosis of life expectancy as well as a progression of the illness. To overcome these issues, we have developed a very tasty food, the Italian Artisan Gelato, in order to provide a healthy and well balanced food, rich in macronutrient, but not in sugar or fat. It can easily replace a main meal or snack, based on the different portion size: 50g-70g and 100g-120g.

Unlike traditional artisan and industrial type ice creams, we have drastically reduced the amount of sugar and fat content by using vegetable fibers.

This significantly lowers the caloric intake, while maintaining the original taste, considering that fibers are odorless and tasteless [4,5].

The addition of vegetable fibers the structure, makes this ice-cream both a prebiotic and a probiotic food [8] making up for the fiber’s deficiency so typical of today’s Modern Western Diet. This becomes a “functional” product, as evidenced by the obtained European Nutritional Claims, therefore allowing us to “**Modulate Tastes**” according to dietary needs.

We have chosen only one type of sugar, sucrose, derived from organic farming, and have not combined it with other types of sugar such as mono and disaccharide sugars (glucose, fructose and galactose) or syrups (made from corn, maple, glucose, etc.). These can all cause a spike in glycemic and insulin values. If consumed for a long period of time, it can cause the development of dysmetabolic and chronic systemic diseases. Consequently, we have developed some sugar-free flavors by using a mixture of Erythritol and Maltitol, so that type 1 diabetics can eat it as well. We can also call this ice-cream “genuine” and “natural” since it does not contain any artificial coloring, preservatives, emulsifiers or thickeners, often found in industrial made ice-cream. The flavor producing ingredient is a higher percentage than the one found in other ice-creams, therefore, the aroma lasts longer in the mouth, thereby satisfying the gluttony of those who taste it.

Both the sugar-reduced and sugar-free ice cream can be eaten by healthy people, children and the elderly, as well as those who must follow restrictive diets such as people who are obese, type 1 diabetics, cardiopaths, oncological patients, etc.

It can be given to children in order to train them to eat less sugar and to prevent a life long addiction, which, over time, can lead to obesity and cause the development of other, more serious, chronic diseases [6].

In the elderly, it can replace a meal, as it is easy to swallow and digest. It provides fiber, without having to chew, is tasty and helps those who have a poor appetite and those who cannot swallow well. It also helps to tolerate dietary restrictions, it rewards the patient psychologically and facilitates the job of the physician/nutritionist by providing greater control and continuity of the dietary plan. It also reduces the chances of dietary transgression.

It can be eaten by patients who are undergoing oncology treatments, as nourishment and to alleviate the onset of oral and esophageal canker sores and as part of a dietary education program after radiation or chemotherapy.

This leads to the creation of an “Ice Cream for All.”

The laboratory tests that were performed on healthy people, indicated that the people who ate the sugar-reduced ice-cream did not have any significant impact on their glycemic and insulin levels. The sugar-free version did not show any elevation of the glycemic and insulin curve.

When the diabetic patients ate both types of ice-cream, there was no need to administer an ultrarapid insulin intake, only a 24-hour dose, in controlled doses, in the case of the reduced sugar ice-cream.

This delicious, natural, genuine and very tasty Italian Artisan Gelato is ideal because of its diminished sweetness, nourishment and satiation. It is an ideal and healthy food for any type of diet and “brings a smile” to those who have health issues and cannot endure in tasty meals.

**To conclude, our “work in progress” continues to research and create new types of ice-creams that will support other kinds of diets.**

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