

plementation study. More than a **50 percent reduction** in glucose response was possible after just a week of supplementation. Even though the individuals in this study were eating a diet low in refined sugar additional chromium was beneficial. This may point to a lack of trace minerals in our soil.

Figure 2 shows the blood glucose profile of 2 volunteers before and after chromium supplementation. The lower peak glucose concentration contributed to the smaller AUC for subject #3, while a slower rise and quicker fall in elevated blood glucose contributed to the smaller AUC for subject #5, without reducing the peak glucose concentration at all. So, the response to chromium in different individuals will vary even in the way that the AUC is reduced.

Chromium taken by diabetics and others has increased insulin sensitivity, reduced fasting insulin, decreased fasting glucose levels, decreased cholesterol and triglyceride levels, and stimulated weight loss. However, not all diabetics or normal people respond to chromium supplementation. Supplemental chromium is only helpful for people who have low body stores of chromium. This was true in our study as well, since 2 of the 6 volunteers had no change in glycemic response after supplementing with chromium.

Methods

Details of the methods and protocols used in this study can be found in the full article, available from Hallelujah Acres.

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Let's Juice!

What the Glycemic Index really says about Carrot Juice and Blood Glucose



Full Article at www.hacres.com

Applications

Carrot juice—too much sugar? We want to understand the role of carrot juice in the context of other foods. First of all, the serving size of carrot juice generally recommended is about 8 oz, which only contains about 12g of sugar and 18g of carbohydrate total. This is not a large sugar load.

In Table 1 a comparison is given between carrot juice, a few common fruits, and three common carbohydrate foods. The glycemic response expected from a serving of these foods, compared to a 50 g carbohydrate serving of bread, is given in the last column, labeled as the serving size GI.

As you can see, the typical serving size would yield only about half as much of a glycemic response as 2 large slices of bread (46 vs 92). From this analysis it appears that a diabetic individual, or others who have poor blood sugar control, would be able to drink carrot juice and eat fruit in moderation.

Carrot juice is likely to cause fewer problems to individuals struggling to lower their blood sugar than animal fats, refined sugar, bread, and flour products.

Juice with oil. The glycemic response of carrot juice can be reduced by drinking a serving of carrot juice with a spoonful of oil. The oil has an added benefit of increasing the absorption of the fat-soluble carotenoids. This is a great way to get in beneficial oils and carrot juice at the same time.

Diabetics and carrot juice. Hallelujah Acres has recommended that diabetics start with smaller servings of carrot juice. Since less carrot juice is consumed, the glycemic response will be less, and the sugar sensitive individual will toler-

ate the juice better. So, a person needs to monitor their blood sugar and be very careful when adopting The Hallelujah DietSM.

Chromium. Chromium intake is sub-optimal in most individuals. High sugar diets promote the excretion of chromium in the urine. A two-week trial with daily chromium supplementation would be adequate to see if a person receives any benefit. Up to 1000 µg/day of chromium has been used with no negative side-effects. There is some evidence that more than 200 µg/day of chromium is necessary to see a positive effect in diabetics. Fasting blood glucose concentration may be reduced along with fasting insulin. A morning challenge with carrot juice (such as done in this study) would easily reveal any benefit from extra chromium.

Good sources of chromium are nuts, seeds, whole grains, and brewer's yeast. Increasing nut and seed intake will provide more chromium and more of the beneficial plant oils associated with successful raw food diets.

Table 1. Context for carrot juice. Serving size GI is the predicted glycemic response for the stated amount of each food, compared to a 50g carbohydrate serving of bread.

Food Item	Weight (g)	Carb (g)	Sugar (g)	Svg size GI
Carrot juice, 1C	230	18	11	46
Med. Apple	138	21	17	35
Med. Orange	131	15	12	32
Med. Banana	118	28	22	55
Med. Yam	114	28	11	52
Med. Baked Potato	122	31	2	84
Whole wheat bread, 2 big slices	92	47	4	92

Introduction

The Hallelujah Dietsm is a pure vegetarian diet emphasizing raw fruits and vegetables along with the use of freshly extracted vegetable juices and Barley-greenTM. Carrot juice is an integral and potent part of The Hallelujah Dietsm.

Blood sugar control. Loss of control of blood sugar occurs as people age, increase in body fat, and become less conditioned. More insulin is required to do the same amount of work that just a small amount of insulin was able to do previously. The body produces more and more insulin in its attempt to lower blood sugar concentrations to safe levels. Over time this person develops what is called **adult-onset, or type II, diabetes**. In this diabetic state, when a person consumes carbohydrates their blood sugar rises quickly, but returns to normal very slowly. Their body is resistant to the action of insulin and blood sugar levels always run high.

Glycemic index. The glycemic index is a measurement of blood glucose response to food. Because the glycemic index is normalized to a standard food (bread), the variation between individuals' responses to carbohydrate is accounted for, and the results are more easily applied to other individuals. Glycemic index values are known for many foods.

Objective

What is the effect of carrot juice on blood glucose levels? What is the Glycemic index of carrot juice? Is it best for sugar-sensitive people to stay away from carrot juice and its health benefits, or can they consume it safely? Are there ways to safely lower the blood sugar response to carrot juice?

Results and Discussion

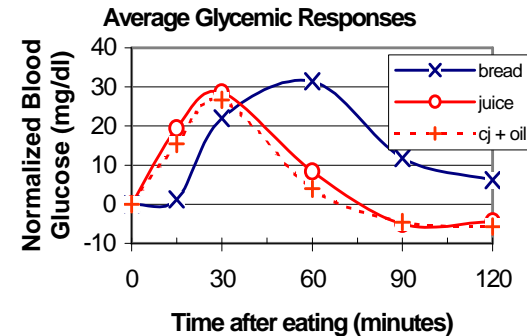


Figure 1. Average Glycemic Responses. Blood sugar values are normalized to fasting level for clarity of presentation. Values for carrot juice and carrot juice + oil are not corrected for lower carbohydrate load (30 g). Bread (x) is a 50g carbohydrate portion. Juice (o) is a 14.5 oz serving of carrot juice. cj + oil (+) is 14.5 oz of carrot juice with 30 g of Udo's Oil.

Amount of Sugar in Juice. In an 8 ounce glass of carrot juice (~230 g), there would be about 76 calories, 11.3 g sugar, lots of vitamins and minerals, and very little fat or protein. By comparison, an 8-ounce serving of soda pop would have between 25 and 31 g of sugar, along with caffeine and phosphoric acid.

Glycemic Response. Figure 1 shows the average glycemic response for the test foods. The beginning blood glucose is set to zero, in order to normalize all of the data to the same starting point. Fasting glucose values varied from 70 to 115 mg/dl in our study group. The mean fasting glucose value was 88 mg/dl. So, the average peak in blood glucose after consuming 14.5 oz of carrot juice is only 116 mg/dl, still in the range of normal blood glucose values.

In fact, there were very few abnormal readings throughout this study. Out of 66 blood glucose trials, there were only 8 tests with peaks higher than 140

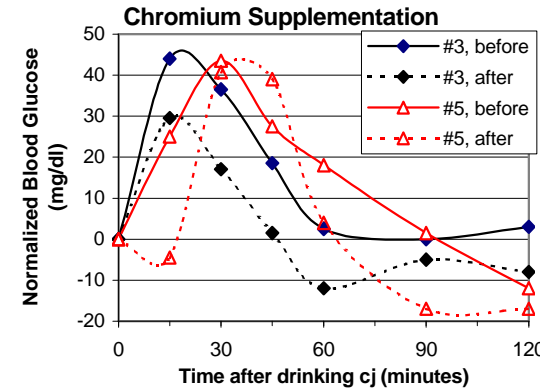


Figure 2. Effect of chromium supplementation on 2 volunteers. The normalized blood glucose response to 14.5 oz of carrot juice is shown, both before and after daily supplementation with 200 µg of chromium as chromium picolinate for 7 days. Data are the average of 2 samples each before and after supplementation.

mg/dl, and 3 of these were when bread was consumed. Also, there were only 4 trials with a nadir lower than 70 mg/dl, with none lower than 65 mg/dl. **So, even with a large serving of carrot juice, 14.5 oz, blood glucose values did not soar or plunge in this study group.**

The response of individuals to carrot juice is characteristically different from the response to a complex carbohydrate. By 15 minutes the blood glucose had risen significantly after drinking carrot juice, while there was no rise in blood glucose 15 minutes after eating bread. Note that when the carrot juice is used with the oil, the shape of the curve does not change. Only the height is different. But this difference in height is significant when the area under the curve is calculated, as done when determining the glycemic index. The difference is 20 points on the GI scale, which can make a difference in long-term use.

The glycemic index for carrot juice determined here is 86, and the glycemic index for carrot juice + Udo's oil is 66, with standard deviations of 33 and 26, respectively. The other published reports for the glycemic index value of carrot juice list it as 85 and 64, which are in agreement with our number. If anything, our estimate appears to be on the high side. This places carrot juice in the medium range of foods in terms of the sugar response generated by the carbohydrates in the food.

Individuals had widely different responses to the same carbohydrate load. Our study group was not large enough to make any correlations between glycemic response, fasting glucose levels, and anthropomorphic measures. However, research has shown that the onset of diabetes is strongly correlated with obesity.

We also found that responses by an individual on different days to the same test food varied as much as two-fold. This result means that there are factors that vary daily in individuals that have a dramatic effect on how the body responds to the same glycemic load. Two known factors are the overall glycemic index of a person's last meal and the amount and quality of sleep the night before a glycemic test. These factors were not recorded in this study.

Chromium. Another known factor in glycemic response is a person's chromium status. We performed a supplementation test using chromium picolinate to see if this was a factor in our study.

Chromium was beneficial for 4 of the 6 subjects who completed the chromium sup-