Nutritional and Health Benefits of Coconut Sap Sugar/Syrup

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COCONUT SAP

- Fresh oyster white liquid obtained from the tender unopened flower with neutral pH
- Each tree can yield up to 1-3 liters of sap per day
Coconut sugar has great potential as a natural and cheaper alternative for synthetic sweeteners derived from natural ingredients...

Data from PCA:

- **COCONUT SUGAR**
  - 2 gallons = 1 kg

- **COCONUT SAP**
  - 7 gallons = 1 gallon

**COCONUT SYRUP**

Present production from 2 hectares of coconut:

- **300 hybrid coconut varieties** = **3.5 metric tons coconut sugar** = **205 gallon of coconut honey**
CHARACTERIZATION OF COCO SAP SUGAR AND SYRUP IN TERMS OF NUTRIENT AND NON-NUTRIENT (Phytonutrients) COMPOSITION
PROXIMATE COMPOSITION OF COCONUT SAP SUGAR AND SYRUP

- Moisture
- Ash
- Fat
- Protein
- Carbohydrates

Coco Sap Sugar
Coco Sap Syrup
IRON, ZINC AND CALCIUM CONTENT OF COCONUT SAP SUGAR AND SYRUP
SODIUM AND POTASSIUM CONTENT OF COCONUT SAP SUGAR AND SYRUP

[Bar chart showing the sodium and potassium content of coco sap sugar and coco sap syrup]
IRON (Fe) AND ZINC (Zn) CONTENT OF SUGARS* (mg/100 g Sample)

*Data from PCA
Dietary Fiber and Inulin Content of Coconut Sap Sugar and Syrup
TOTAL SHORT CHAIN FATTY ACIDS FROM COCO SAP SUGAR AND SYRUP

mg/g

- Coco Sap Sugar
- Coco Sap Syrup
SHORT CHAIN FATTY ACIDS PRODUCED FROM COCO SAP SUGAR AND SYRUP

mg/g

Acetate | Propionate | Butyrate

Coco Sap Sugar | Coco Sap Syrup
CHOLESTEROL SYNTHESIS

Propionate (Chen et al, 1984) similar to the action of Statins
PHYTONUTRIENT CONTENT OF COCO SAP SUGAR AND SYRUP

mg/100g

Polyphenols
Flavonoids
Anthocyanidin

Coco Sap Sugar
Coco Sap Syrup
ANTIOXIDANT ACTIVITY OF COCONUT SAP SUGAR AND SYRUP

DPPH measures % inhibition
FRAP measures reducing power expressed in mg Trolox/100g
SUB-CLINICAL TEST:

GLYCEMIC INDEX
OF COCO SAP SUGAR AND SYRUP
GLYCEMIC INDEX

is a classification of food based on the blood glucose response of a food relative to a standard glucose solution or a starchy food e.g. white bread.

IT IS WIDELY RECOGNIZED AS A RELIABLE, PHYSIOLOGICALLY BASED CLASSIFICATION OF FOODS ACCORDING TO THEIR POST-PRANDIAL GLYCEMIC EFFECT

(Foster-Powell et al, 2002; FAO/WHO Joint Expert Consultation, 1997)
CLASSIFICATION OF GLYEMIC INDEX (GI) OF FOODS

- HIGH: (75-100)
- MEDIUM: (56-74)
- LOW: (55 or <)
The glucose response of white bread (no dietary fiber) and macaroons containing 25% dietary fiber from coconut flour (Trinidad et al, 2003).
FAO/WHO endorsed the use of GI method for classifying carbohydrate-rich foods and recommend that GI values of food can be used in conjunction with food composition tables to guide food choices (Joint FAO/WHO Expert Consultation, 1997).

It also advocate the consumption of high-carbohydrate (CHO) diet ($\geq 55\%$ of energy from CHO), with the bulk of CHO-containing foods being rich in non-starch polysaccharides e.g. dietary fiber, with low GI ($\leq 60$).
LOW GI FOOD HAS BEEN SHOWN TO REDUCE POSTPRANDIAL GLUCOSE AND INSULIN RESPONSES AND IMPROVE THE OVERALL BLOOD GLUCOSE AND LIPID CONCENTRATION IN NORMAL SUBJECTS AND PATIENTS WITH DIABETES MELLITUS.

(Jenkins et al, 1987; Wolever et al, 1992; Brand et al, 1991; Collier et al, 1988; Fontevielle et al, 1988)
METHODS

Study Participants:

10 Apparently Healthy Human Adults

Inclusion Criteria:

- Fasting blood glucose ≤6.2 mmol/L
  but not less than 3.5 mmol/L
- BMI: 20-25 kg/m²
- Age: 30-65 years
- No medication for glucose
- Non smokers
PROTOCOL OF THE STUDY

A 50-gram available CHO of coco sugar and standard glucose solution were given to subjects on separate occasions after an overnight fast.

Blood samples were collected at 0, 15, 30, 45, 60, 90 and 120 min.

Blood was separated from serum and read in a Clinical Chemistry Analyzer.

The Incremental Area Under the Curve of coco sugar and standard glucose solution was calculated to determine the glycemic index of coco sugar.
Feeding of test foods

Blood collection were at 0, 15, 30, 45, 60, 90 and 120 mins

Clinical Chemistry Analyzer
CALCULATION OF GI OF FOOD

GI of food = \( \frac{\text{IAUC}^* \text{ of test food}}{\text{IAUC of control food}} \times 100 \)

*Incremental Area Under the Curve
RESULTS

GLUCOSE RESPONSE OF COCO SUGAR/SYRUP AGAINST A STANDARD GLUCOSE SOLUTION
GI OF COCO SUGAR = 35±4
GI OF COCO SYRUP = 39±4

LOW GLYCEMIC INDEX FOOD
COMPARATIVE GIs OF SUGARS

GI
60
50
40
30
20
10
0

COCO SUGAR
COCO SYRUP
TABLE SUGAR
CONCLUSION AND RECOMMENDATION

- Coco sugar/syrup is a promising sugar for diabetics
- It can be a better substitute for synthetic sugars
- Coco sugar/syrup is a conventional food and may not have adverse effect in comparison to synthetic sugars

A long-term nutrition intervention study should be conducted to validate the results obtained from this study
THANK YOU